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The State of Scientific Research and Research Training in Moroccan Universities: Doctoral Students' Perceptions

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Abstract

The present paper intends to focus on research training in Moroccan universities through investigating doctoral students' perceptions of this training and drawing conclusions and suggestions for the improvement of higher education research practices. This study used a mixed research method with an explanatory survey design. First, a survey was conducted with 144 Moroccan doctoral students to answer research questions on the integration of research courses in undergraduate curriculum, the quality of this research training and the difficulties facing students while conducting research. Then, interviews were carried out with 40 subjects to seek further explanations and triangulate data obtained through the questionnaire. The findings of this study indicate that doctoral students receive little practical training in research prior to starting doctoral studies. Thus, they undergo a myriad of challenges while writing their doctoral theses as they lack autonomy when it comes to carrying out their investigations. Most often these challenges are linked to narrowing the scope of their research, using appropriate methodology, and publishing their research findings. Besides, the students reported difficulties linked with the quality of supervision they get and the lack of financial support to conduct their research in optimal conditions. Based on these findings, some practical implications and recommendations have been drawn.

Key words: *academic research, higher education, research in the Arab world, research skills, scientific research, training for research*

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Introduction

In a global, high competitive world, Knowledge has certainly become a key precursor to all kinds of sustainable development and continuous progress. Acquiring this knowledge and contributing to its building and enrichment are only possible through Inquiry and investigation. More importantly, the results attained from this process of inquiry and investigations are crucial for processing that knowledge, translating it into new products and services and transferring it to future generations. In this line, the appearance of Global Rankings in 2003 and its focus on measuring the performance of higher education institutions as an indicator of a country's economic strengths and weaknesses has pushed world nations to compete through investing in higher education. Since then, research capacity has emerged as a vector for global competition (Marginson, 2006). Building on this, governments in developed and developing nations started giving more importance to investment in research and development (R&D) so as to attract capital, businesses and skills. In this light, most reports about higher education in the Arab world state that the region is lagging behind in terms of research productivity and knowledge building. Reports about research practices in the Arab world, in general, and the MENA region in particular emphasize the need for more efforts in reinforcing the scope of academic research in the universities of the region. For instance, the 2014 Arab knowledge report jointly produced by the Mohammed Bin Rachid Al Maktoum foundation and the United Nations Development Program claims that "the first challenge to the process of transfer and localization of knowledge lies in the weakness of education, training and scientific research institutions…"(p.15). Besides, Reuters (2011) in his Global Research Report underlined the importance of involving students, in general, and youth, in particular, in the transfer and localization of knowledge processes as well as the integration of scientific research activities in the programs of development in the Arab world. More importantly, average government expenditure on research in the Arab States is around 1.5 per cent, compared with 2.5 per cent in OECD (Organization for Economic Co-operation and Development) Member countries (Ramirez, 2008: 7; El Kaffass, 2007: 7).

In this vein, one of the major gaps and challenges facing countries in the Arab region relates to human skills and competencies. More importantly, developing students' research skills has become a corner stone of higher education and a springboard to produce high quality research. Therefore, Arab universities are required to continuously appraise their practices in this field and engineer strategies to face up to global challenges.

Equipping students with research skills and training them in the basics of scientific inquiry has been less emphasized compared to aspects like state policies and institutional challenges. While much has been written on governments policies and budgets devoted to R&D, little has been investigated in terms of the quality of research training and pedagogies in the Arab region. This paper sheds more light on the pedagogy issue of higher education research by studying the case of Moroccan doctoral students. The main aim is to investigate the integration of research skills in university curricula and to assess the quality of these programs through doctoral students' perceptions. Furthermore, the study attempted to scrutinize the main difficulties facing doctoral students in their research practices so as to draw practical suggestions to address these issues. Today's doctoral students are tomorrow's researchers and university professors, therefore, studying their perceptions of the quality of their research training and the difficulties they face in carrying out their research can help improve the quality of this training and future

academic research in Morocco. Besides, such a study may help faculty and researchers to develop ways and strategies to cater for students' needs in research training.

In the end, on the basis of the results and discussions, a model of research skills development in higher education will be suggested. Before getting into the details of this study and its results, a review of the literature on the integration of research in higher education is deemed appropriate and essential.

1. Review of Literature:

It has become almost axiomatic that one of the major roles of higher education is to conduct research and communicate the results through publications, conferences and meetings. However, the question of who is supposed to do this research is still controversial. While it has become a global requirement for faculty members to do research for reasons of global rankings, promotion and academic exchange, a number of universities around the world, especially in developing and under-developed countries, still emphasize academic teaching over academic research and other higher education institutions give very little attention to research training and scientific inquiry.

Nevertheless, integrating research training and practice in the early stages of undergraduate education has been reported to have considerable benefits for both students and faculty members. For example, the American Council for Undergraduate Research underscores the importance of undergraduate research activities and their contribution to the intellectual development of students. In the same vein, there is substantial empirical evidence that participation in undergraduate research positively correlates with students' academic achievement and retention (Cole & Espinoza 2008) helps foster students analytic and critical thinking (Bauer & Bennett 2003, Kuh et al. 2007) and facilitates pupils' integration in graduate studies and choice of major (Wasserman, 2000; Hunter et al. 2006). In another study, Hathaway et al. found that students who engage in undergraduate research are more likely to pursue graduate education and conduct future research. More importantly, high quality education has been linked to practices that actively engage undergraduate and graduate students in exploring and discovering new knowledge (Association of American colleges and Universities, 2002, 2007; Council on Undergraduate Research, 2003).

Research has also emphasized the benefits of involving students in research activities for faculty members. In two studies conducted by Zydney et al. (2002) and Abdekun et al. (2010) faculty members mentoring undergraduates in research reported how they benefited from the experience and how it positively impacted their life and their work. Likewise, Newby and Heide (2008) suggested that mentoring and supervising undergraduate students can be beneficial for both the supervised and the supervisee. Pascarella and Terenzini (2005) report that undergraduate research programs contribute to creating meaningful interaction with faculty members, strengthening, therefore, the relationship between professors and their students.

The most important gains students make from engaging in undergraduate research activities relate to the research skills they pick up during these experiences. Kardash (2000) shows that research activities teach students how to formulate hypotheses, carry out analysis and communicate their results. Similarly, Buckly et al. (2008) points out to the nature of the activities

students engage in and how they may or may not contribute to their skill and intellectual development. In this context, students who are involved in practical activities such as reviewing the literature, formulating research questions and hypotheses, thinking of methods, designs and data analysis and communicating the results of their research are more likely to improve their skills and make authentic benefits. All this stresses the need for a shift from traditional training that focuses on lecturing on research and describing classical types of research methods (such as quantitative and qualitative methods) to more practical, hand-on-task pedagogies. In accordance with this, Nerad (2012) believes that the way doctoral students are taught need to be reviewed in order to 'prepare an effective generation of researchers' (Nerad, 2012: 58). Harman (2008) points out to the challenges facing societies in today's globalized world and claims that countries need to challenge the traditional research training culture in order to face up to the demands of the present and the future knowledge society. New modes which stress the need of providing authentic research experiences for students have been incorporated in a number of universities around the world. In this line, Lave and Wenger (1991) and Wenger (1998) drew from social constructivism and developed a model of learning based on "communities of practice" where novel students are involved in authentic research experiences and socialized into the practice, guided and supported by trained practitioners (Hunter, Laursen & Seymour, 2006). Obviously, such practices and training modes aim at developing students' autonomy and giving them an opportunity to work independently on different levels of the research process. In USA, this training method has been labeled 'the apprenticeship model' and it is an opportunity for students to interact with supervisors, mentors and more experienced peers to learn the intricacies of scientific research (Flores & Nerad 2012).

Engaging first year students in critical inquiry experiences through research activities with faculty members and other group students as well as the involvement of undergraduate students in systematic investigation has been considered examples of high impact practices (Kuh, 2008) Successful research programs tend to concentrate on providing students with key concepts of systematic investigation and research. Kuh 2008 reports that high quality education tends to involve students through empirical observation, technological breakthrough and delightful inquiry experiences.

The main aim of these experiences is to provide students with authentic learning and to help them build autonomy. What's more, students involved in practical research activities will be able to connect theory and practice and make gains on different levels of their academic and professional development. Early engagement with the intricacies of scientific research makes students more productive and active as graduates and as professionals. A key objective of the study reported in this paper was to investigate doctoral students' perceptions of the level of their autonomy and independence as researchers. This allowed for an evaluation of the research training Moroccan students receive before they enroll in doctoral programs. The following sections provide more details about the objectives, methodology and results of this study.

2. Methodology:

2.1 Research questions

This study set off to investigate Moroccan doctoral students' perceptions of the quality of research training they receive as undergraduate and graduate students and explore the difficulties

they face as researchers. Two main research questions were formulated for the objective of this research:

1- Do Moroccan students receive research training during the first years of their university studies? And how effective is this research training?

2- What are the problems and difficulties that face doctoral students in their research practices?

2.2 Design

This study used a mixed research method with an explanatory survey design. In research, mixed methods procedure entails the integration of quantitative methods and qualitative procedures at the stages of data gathering and the interpretation of the results (Creswell, 2003). In the present study, priority was typically given to quantitative data, but some of the results obtained by the questionnaire needed further explanation which was sought by conducting interviews with a smaller sample of the participants who filled in the questionnaire.

2.3 Participants

144 Moroccan doctoral students took part in this study. These participants were doing their Ph.D. research in various disciplines such as Economics, Education, Technology, Humanities and Engineering. 55.8 % of the subjects were males while 44.2% were females.

2.4 Procedure

A questionnaire and an interview were used to collect data for this study. Primary data was collected by a five-item likert scale questionnaire designed for doctoral students' perceptions of their research training and supervising. This questionnaire contained questions about undergraduate research training, students' judgment of the quality of research programs and supervision, and students' productivity. To validate the results of the questionnaire and seek explanations for some of the results it provided, 40 participants took part in semi-structured interviews. In order to investigate the effectiveness and quality of the research training that Moroccan students receive prior to their subscription in doctoral programs, the participants were asked to judge their autonomy as researchers and to state the number of researches they have conducted as well as the number of research papers they have published. At the same time, the students were given open-ended questions in the questionnaire and the interviews to express their perceptions about the state and the quality of research in Morocco.

3. Results

The first part of the questionnaire inquired about the students' research experience during their first three years at university. The results obtained indicate that 68.7% of students had courses in research methodology as undergraduates. Besides, 67.5% reported that they practiced research during the first three years of university. On the other hand, only 33.8% claimed that they participated in workshops on how to conduct research prior to their master and doctoral studies. At the same time, more than 40% of the subjects stated that they were not supervised by a practicing researcher and that they didn't participate in groups of research before they started their doctoral theses. In their judgments of their autonomy to conduct research, 75.3% of the participants believed that Moroccan doctoral students have not developed autonomy in conducting research. Furthermore, more than 80% of subjects rated the quality of their research

training as average or below average, while only 7% thought that they were well oriented and guided by their supervisors. In the same line, only 2.8% believed that doctoral researchers are well-equipped by their universities. 20% said that they are not equipped at all and more than 60% rated their equipment at below average.

The participants were also asked to report on the number of researches they had conducted before they started their doctoral research and the number of research papers they had published up to the day of the survey. In this context, more than 70% of the subjects stated that they conducted less than 3 unpublished researches while 72.7% said they did not publish any research paper.

In the open-ended question at the end of the questionnaire, most of the participants drew a grim picture of the state of scientific research in Morocco. A large group of subjects stated that Morocco's performance in scientific research is very poor and imputed this to lack of genuine interest in research from governments and lack of appropriate and sincere policies of R&D. In the interviews, the participants were asked about the type of research training they received as undergraduates. Most of the participants explained that they received lectures on introduction to research where professors described what quantitative and qualitative research is. Moreover, most of them stated that the research they carried out was a project report they had to write on a topic as a requirement for a BA degree at the end of the first cycle of their studies (the first three years of university).

The objective of the second research question was to explore the difficulties that face doctoral students in their thesis research at Moroccan universities. To address this question, the subjects were first asked about the assistance and facilities provided to them by their universities. The results are displayed in table 1:

Table1: *Types of assistance provided by universities to doctoral students*

Type of assistance	Percentages of students who benefit from assistance
Supervision	57.9%
Workshops & seminars	51.3%
Bibliography resources	46.1%
Scholarships	32.9%
Publication of articles	25%
Publication fees offered	13.2%
None	13.2%
Other	2.6%

The second part of the questionnaire that tends to explore the difficulties faced by doctoral students in their research experiences asked them to rated 6 difficulties. The findings on this question are reported in table 2 below:

Table 2: *Difficulties faced by doctoral students in doing their research:*

Difficulties	Percentages
Lack of funding	71.4%
Lack of collaboration from participants and laboratory teams	59.7%
Ineffective supervision	50.6%
Lack of skills of research methodology	42.9%
Lack of references	40.3%
Other difficulties	7%
No difficulties at all	0%

4. Discussion:

The results reported above show that although Moroccan students take courses in research as undergraduates, they are not actively and effectively involved in doing research. The content of the courses is restricted to a mere introduction to the two broad types of inquiry: qualitative and quantitative methods. Most of times, these courses fail to bridge theory and practice as they don't engage undergraduate students in practical research tasks like studying the components of research through analyzing published research papers. Besides, the teaching methods apparently fail to disseminate high quality research training that focuses on teaching transferable skills via involving undergraduate students in active learning processes.

In the same vein, the American Council of Undergraduate Research "CUR", defines undergraduate research as 'an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline". (CUR, 2015, p1). This definition underlines the importance of engaging students with hands-on task activities and empowering them with practical skills so as to enable them to produce research at early stages of their academic career. Similarly, Kuh (2008) highlights the skills and competencies that undergraduate research programs need to focus on. He believed that students involved in undergraduate research are expected to develop inquiry and critical thinking through facing challenging questions and engaging with the processes of data collection and analysis, literature reviewing, results interpretation and communication. It is only through this kind of programs that students can hone high quality research prowess and develop autonomy for research in the future. The fact that more than 70% of participants claimed that they don't consider themselves autonomous is an indicator that the research programs that they have been involved in before subscribing in their doctoral programs, if any, are ineffective and lacking in quality. Therefore, reform is needed to integrate better quality undergraduate research in Moroccan universities. A review of the pedagogies and models that nurture these programs is necessary. This should be marked by an institutionalized shift from traditional lecturing into a learning-by-doing approach that actively engages in practical research projects and investigations aligned to their future academic and professional needs.

Another indicator to the poor quality or ineffectiveness of the training students get prior to their enrollment in research programs is the number of publications the participants said they have made. The findings indicate that a great number of subjects didn't publish any research paper. The reasons given by students in the open-ended question and during interviews are linked to lack of funds as the journals require a publication fee, lack of research methodology skills and lack of linguistic skills (inability to write in English as most journals publish English

papers). The late two reasons are strong indicators that Moroccan universities are compelled to make greater efforts in training students in research prior to their doctoral studies and teaching them English in all disciplines so as to acquire the linguistic skills necessary for the acquisition and transfer of knowledge.

The second objective of this study was to investigate the difficulties faced by doctoral students in their research endeavors. The results showed that the major difficulties Moroccan doctoral students face relate to lack of finances, publication issues, resources and access to data collection. The fact that only a few students have scholarships may discourage those who don't have these scholarships to persist and produce research papers as they have to fund themselves, which is not possible for all doctoral students. Generalizing scholarships to all doctoral researchers, especially those who do not have a job is key to promoting graduate research. In addition, given these students access to bibliographical references is an urgent need in today's society. Sometimes the references and resources are there but they are either not communicated or the students haven't been provided by the skills to mine knowledge and information in appropriate ways. Therefore, the role of supervisors and mentors is not only to edit papers or sections of the doctoral students but also to teach them how and where to look for information. Universities are also required to do their best to provide researchers with rich databases and give them access to subjects and bibliographical resources needed to complete their research. High quality research cannot be achieved with Equipments necessary for research labs to give graduate researchers in Science and technology experience with the latest tools of inquiry.

An important number of students complained about the quality of their supervision and their lack of skills in research methods and methodology. On one hand, this indicates that some of these researchers have not developed autonomy and highly depend on their supervisors to complete their theses; but on the other hand, this is also a sign that supervision programs know some pitfalls that need to be investigated and addressed. As Thein and Beach (2010: p. 117) stated, "Preparing doctoral students to publish in top-tier journals involves more than simply providing them with advice on rhetorical strategies or genre conventions for writing research". During the interviews, a number of students stated that they are left alone to strive with their theses and that their supervisors provide them with little help and guidance that can facilitate their task. As a university professor, I often hear colleagues complaining about doctoral students' lack of research skills or how teaching and lecturing workload leaves them with little or no time for supervision. While research is needed to shed more light on the intricacies of research supervision and the relationship between supervisors and supervisees in Moroccan universities, it is crystal clear that the policies of higher education in this matter need to be revamped. There is also some knowledge management failure at this level as assistant professors are not legally allowed to supervise doctoral students and team work that involves new doctoral students and experienced ones in interdisciplinary areas is inexistent. Implementing mentoring programs that involve experienced doctoral researchers and newly graduate doctors guiding new doctoral students through the path of research may ease the load on supervisors and provide novel students with success stories that they can draw from to persist and complete their research.

Doctoral students' reports that they lack autonomy are a strong indicator for reform of research training programs at Moroccan universities. This reform should focus on providing undergraduate students with the basics of scientific inquiry and involve them in active research

experiences that will teach them the skills of navigating safely and independently through research once they reach higher levels. This paper suggests a model for an undergraduate research program based on latest research in undergraduate research (Wiik, Dunn, Kirsch, Holman, Meeroff & Peluso 2014; Tang & Jackson, 2015):

First year initiation: students at this level are introduced to components of research and research designs and methods. Focus at this level should be on describing and modeling research questions, hypotheses, types of inquiry (exploratory/ experimental) etc.
Second year reinforcement: to reinforce what students learnt in the first year, students at this level are asked to analyze the components in published research papers close to their field of study. They are required to summarize those papers and present them in class. At a second phase, the students are asked to formulate basic research questions based on their observations of phenomena related to their discipline. They work in teams to outline methods to investigate their research questions.

Third year apprenticeship: an in-depth analysis of scientific research papers is carried out with students critiquing the components and results of published research papers. Students are also introduced to technical requirements of publication and ethical practices in research. Then, students are asked to work on research projects that investigate more profound research questions. Students carry out their investigations in teams. Graduate students give these undergraduate pupils scaffolding and guidance. Students finish their projects and present them in conferences at the local and national level. Universities help these learners publish their work in local and national journals.

This model focuses on providing students with training that bridges the gap between theory and practice. This way, students will gain more confidence, 'deepen their understanding of the research project, and improve their communication skills' (Lopatto 2010: p. 28).

Conclusion

Promoting research in Morocco, and elsewhere in the Arab region, requires first and for most a firm belief in the huge importance of preparing university students at early stages for this endeavor. While the importance of scientific research for human development and economic growth has become evident, most Arab countries are still incapable of producing high quality research at a scale that can allow them to compete internationally. Morocco has achieved some progress in the last few years as research became a requirement for doctoral students to graduate and for faculty to get promoted. However, this progress is still insufficient due to the financial and pedagogic gaps that need to be bridged in order to produce high quality research. This paper focused on the pedagogic side of preparing academic science researchers in Morocco. This issue has been given little concern in research and in reports about the state of research in the Arab world and the MENA region. The results indicate that the courses on research that postgraduate students attend are purely theoretical and limited to rudimentary knowledge of basic concepts in quantitative and qualitative research. These courses fail to provide students with practical research skills necessary for scientific inquiry. Therefore, when these students enroll in doctoral programs they lack autonomy and they face a myriad of difficulties at different levels of scientific investigation, such as formulating hypotheses and research questions, finding

appropriate literature or resources, collecting and analyzing data and writing and communicating (or publishing) their research. These deficiencies add up to the lack of financial support most students suffer from and the very low budget devoted to research in Morocco. Hence, some doctoral researchers end up quitting their studies altogether, whereas a large part of those who persist may write low quality Ph.D. theses and produce mediocre research papers.

Thus, reform is needed to revamp the quality of training given to students who will be future researchers and to provide them with skills, tools and funds necessary for the production of high quality research papers. This is only possible through an institutionalized high impact practice that involves university students at early stages of their studies in real life research experiences and a policy that makes of scientific inquiry a priority for the country. Such a vision needs to be based on a firm belief in the strong link between research and development and a genuine intention to encourage all stakeholders to engage in high quality research production and help future generations learn the required skills and know-how of scientific inquiry.

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