

Resources, Working Environment and Style of Collaboration among Science Education Teaching Faculty at Lebanese Universities

Christiane Jarjoura¹, Iman Khalil²

^{1,2} Lebanese University, Doctoral School of Literature, Human and Social Sciences, Faculty of Education, Sin-el-fil, Lebanon

Abstract: *This study aims at describing the style of collaboration among science education teaching faculty, the types of resources they use and their working environment. It has been conducted using a descriptive quantitative approach utilizing a questionnaire filled by thirty-eight out of forty-four full timers at the eight Lebanese universities with the highest percentage of students (60%). Even though teachers prefer to work collaboratively, results show little collaboration among them being restricted to exchanging resources once per month with their heads of department. Collaboration has been shown to increase when teachers are younger and when it is done within the same department. In addition, teachers mostly use online resources and perceive their working environment as one that fosters growth; however, they consider this growth dependent on human nature and on educational policies. These results imply that if enough support and incentives are given to teaching faculty from their university administration and from the education policy makers, they may be enthusiastic to work collaboratively to professionally develop leading to exemplary science teaching and quality in the Higher Education sector.*

Keywords: science teaching, resources, collaboration, professional development, higher education

1. Introduction

Due to Information and Communication Technology (ICT) integration in the education sector, resources have become copious so educators have to engage in a colossal task of collecting and filtering resources from different sources which are: traditional, digital and on-line. The next step includes transforming them into documents, and finally implementing the resulting document to students and evaluating it. This is termed 'documentary work' which could increase teachers' knowledge and hence, their professional development (Trouche and Pepin 2014).

During documentary work, educators are involved in an ongoing reflective engagement which is time consuming, but it could be facilitated by collaboration. Although collaboration among like-minded peers has become a sign of quality in education, it is rarely applied in the Higher Education Sector in Lebanon (Towards Lebanese Quality Assurance 2013).

On the other hand, research proves that teachers' professional development is the most crucial to students' achievement level and participation rate (Robinson 2008). Consequently, a lot of research conducted in this last decade has focused on teachers' professional development at the school level, yet less is available on teaching faculty in the Higher Education Sector in Lebanon (Hojeij 2012).

Consequently, this two-year study examines the effect of teaching faculty's collaborative documentary work on their professional development at the Lebanese universities. The teaching faculty members in the science education departments were chosen as sample since science teaching is our concern. In this study, two theoretical approaches were fused: The Documentational Approach (Trouche and Pepin 2014) and the Interconnected Model of Teachers' Professional Development (Clarke and Hollingsworth 2002).

The result of this fusion was our "Synthesized Model" that was used in the analysis of the qualitative results of the two-year study. However, those results and the "Synthesized Model" will be discussed in a subsequent article.

Thus, the current paper presents the most pertinent results of the descriptive quantitative part of that two-year study. In it, the state of the science education departments at the higher education sector in Lebanon is studied especially in what concerns the educational resources used by its teaching faculty, the style of collaboration between them and their working environment whether affording or constraining their professional growth.

2. Literature Review

2.1 The Lebanese Higher Education sector

In spite of laying the foundations for the strategic orientation of education in Lebanon and setting the core standards for quality assurance, the Higher Education still suffers from certain problems in keeping pace with globalization (National Educational Strategy in Lebanon, 2006; Higher Education in Lebanon 2012). 62.5% of the Higher Education institutions in Lebanon face these problems to different extents (Kaissi et al. 2008). Some of the challenges include weak research on a national basis, weak inter-university cooperation within the country and at the international level (Awwad 2009), and training for teaching faculty is occasional, optional and organized based on institutional initiatives (National Educational Strategy in Lebanon, 2006). So despite the big efforts made, there is a general need to further improve the quality and efficiency of this sector by addressing its weaknesses.

To meet those challenges, joint European-Lebanese projects have encouraged Lebanon to implement policies for the development of its institutions and to reform the public

and the private Higher Education sectors through defining a new quality assurance strategy, an accreditation system, curricular reform and more research studies (Basic Foundations for the Strategic Orientations 2014). Some of the projects' recommendations are that teaching faculty should share good practices with colleagues within the same institution or across different ones (Towards Lebanese Quality Assurance 2013) and that the role of research in the Higher Education should be fostered (Jammal 2012). Moreover, there is an increasing inclination that the only way to face global challenges and to limit the cost of research and professional development is to collaborate (Higher Education in Lebanon 2012).

Consequently, according to the literature review done, the Ministry of Education and Higher Education in Lebanon (MEHE) accords a big value on research, on effective collaboration among individuals, and on teaching faculty's development as means to achieve quality in the education sector. However, research also shows that little of this is actually applied. Accordingly, a gap exists between what the Lebanese Higher Education sector prioritizes in its strategic orientation of education and what it sets as core standards for quality assurance on the one hand and what is applied in practice, on the other hand. According to us, no research in Lebanon addresses measures to decrease this gap.

2.2 Teaching faculty's professional development

Developing human resources is becoming a key challenge and a necessity in Higher Education institutions that emphasize quality, worldwide and in Lebanon (Basic Foundations for the Strategic Orientations 2014) because teaching faculty members are expected to process high subject content knowledge, to understand students' different learning styles and to keep up with their institutions' requirements.

Another view of professional development emerged: the non-formal professional development where teachers could develop through experience on the job, thus shifting the emphasis from 'what' teachers learn to 'how' they learn (A Commentary 2013). This view is influenced by a constructivist orientation and an inquiry-oriented approach. The advocates of the non-formal professional development claim that the extent of professional development practiced informally on the job is six times more effectively prominent than the one practiced formally through schooling, courses and workshops (Knight, Tait, and Yorke 2006). Research shows that teachers as adult learners are considered to construct their teaching knowledge more effectively from colleagues, as a means of horizontal learning, than from an external expert, which is called vertical learning (Park et al. 2007). Thus, horizontal learning could be considered a form of non-formal, on-the-job professional development. Moreover, research shows that teachers who are engaged in a joint collaborative work to implement a new approach are more likely to understand it better and to continue implementing it even if all external support stops (Levine and Marcus 2007). Results of studies show that collaboration could serve a viable system for teaching faculty's professional development providing for the more experienced teaching faculty, reinforcement and greater

clarification of the concepts. However, it serves for the less experienced teaching faculty, instruction (Deni and Malakolunthu 2013). Some benefits related to teacher collaboration are providing support, decreasing workload, promoting reflection, and consequently, teacher's learning.

Professionals from all disciplines usually seek out peers as part of their lifelong professional development; nevertheless, research has pointed out that teachers' profession lacks sharing expertise because of a culture of isolation that might eventually lead to alienation of its faculty members (Park et al. 2007). In addition, studies show that the few teachers that collaborate with each other mostly do so to solve day-to-day problems that arise, and to develop new teaching strategies rather than to professionally develop (Kelchtermans 2006). This is since, as cited by Clement and Vandenberghe (2000), unless this collaboration is coupled with deep reflection, no professional development occurs; moreover unless meaningful, intellectual involvement with a community of colleagues happens, no professional development occurs. According to us, no research in Lebanon addresses the possibility of collaborative reflection among teaching faculty as a form of non-formal, on-the-job professional development to improve quality in the Higher Education sector.

3. Problem Definition

According to the literature review done, very few studies in Lebanon were found to investigate teaching faculty's professional development as a means to improve quality in the Higher Education sector. No study investigated teaching faculty's resources used or examines their style of collaboration or studies their working environment. These three areas, according to Trouche and Pepin (2014), are the ones to consider when studying teachers' professional development. Therefore, given the big number of universities with education departments in Lebanon, and the little available research done in the field, we choose in this article to address the following research question targeting the state of the science education departments at the Lebanese universities: What is the form of collaboration among teaching faculty in the education departments concerned with teaching science? What are the types of educational resources, technological tools and software packages used for their documentary work? In what manner does the environment support growth of its teaching faculty?

4. Methodology

4.1 Research Design

This study follows a quantitative approach to describe the resources used, the style of collaboration and the working environment of the teaching faculty of the education departments of science teaching in the Lebanese universities.

4.2 Participants

According to the Directorate General of Higher Education (DGHE) statistics in 2014, Lebanon had 42 universities: 4 of them do not contain education departments, so they were directly excluded from the study; 27 others comprise just

11% of the total number of students, so they were excluded for feasibility purposes. Eventually, the remaining 11 universities were contacted and 8 agreed to participate.

Consequently, the sample universities that participated included 8 universities experienced in the field of education and comprised 60% of the students in the Lebanese Higher Education sector according to the DGHE statistics in 2014. 38 out of 44 of its full time teaching faculty in the science education departments completed our instrument (the questionnaire) with a response rate of 89%.

4.3 Instrument: Questionnaire

A questionnaire was presented to the teaching faculty members in the education departments of science teaching in the 8 universities in Lebanon. It was filled by 38 teaching faculty members. Study of this questionnaire describes the state of the Lebanese Higher Education sector of Science teaching aiming to answer the research question.

The questionnaire was designed based on the literature review done and based on the article written by Gueudet and Trouche (2009). The questionnaire included an introduction that briefly described its purpose. It included 33 items divided into 5 parts:

- Teaching faculty's personal information: gender, age, years of teaching experience, professional rank, and type of institution (public or private);
- Information about teaching faculty's work environment: availability of internet services, software packages, online resources; types of training offered by the institution, strategy of cooperation present with other universities, and teaching faculty's perception of their working environment;
- Collaboration of teaching faculty for teaching purposes: frequency and reasons of meeting with peers, teaching faculty's working preferences, and benefits and drawbacks of collaboration;
- Types of teaching resources used by teaching faculty and their purposes: technological tools, software packages, and educational resources;
- Willingness of teaching faculty to participate in a collaborative documentary work study (the qualitative part of the study). If they answered positively, they were asked to write their name, phone number, and email address.

The questionnaire included few open-ended, but mostly, close-ended questions. Content validity was determined by 3 expert researchers in the didactics of Biology, in Statistics, and in Education at the Higher Education level. It was then pilot-tested on 9 teaching faculty different from the ones who participated in the study using the think-aloud technique (Johnson and Christensen 2008) and modified accordingly to establish content validity and reliability.

To be able to administer the questionnaires in the different universities, a special meeting was scheduled with the corresponding chairpersons/deans after emailing them. When all the necessary Institution Review Board (IRB) conditions were fulfilled in the private universities, the teaching faculty members filled the questionnaires individually, and then the researcher collected them.

4.4 Procedure

The period of this part of the study was from January 2015 till August 2015. It included:

- Meeting with the chairpersons/deans of the education departments in 11 universities
- Fulfilling the IRB requirements
- Distributing the questionnaires to the full time teaching faculty members of science teaching in 11 universities
- Collecting the questionnaires from 8 universities (38 teaching faculty out of 44 filled the questionnaire)
- Performing the descriptive quantitative analysis

4.5 Data Analysis

Data from the questionnaire was analyzed using the Statistical Package for Social Sciences (SPSS) version 19, in order to answer the research question.

5. Results

Characteristics of the sample

Results show that the majority of teaching faculty members are exclusively in Science teaching (27/38), are 41-50 years (15/38), are females (28/38), with 7-15 years of experience (15/38), having the assistant professors' rank (15/38), and teaching in the private sector (28/38).

Table 1: Teaching faculty profile

	<i>Teacher Profile</i>	<i>Number (/38)</i>
Area of expertise	Science teaching (exclusively)	27
	Other (Science & Math)	11
Age range	<30	1
	30-40	11
	41-50	15
	>50	11
Gender	Female	28
	Male	10
Years of experience	<7	8
	7-15	15
	16-24	7
	>25	8
Professional rank	Lecturer	6
	Instructor	8
	Assistant professor	15
	Associate professor	7
Type of university	Professor	2
	Private	28
	Public	10

Work environment

Results show that teaching faculty claim their university has: wide Internet services (37/38), software packages related to different fields (28/38) and enough online resources (34/38).

On the other hand, they agree that most of the training offered by their university is: on ICT (29/38) and on teaching methods (24/38).

Moreover, (22/38) claim their university possesses a strategy of cooperation with other institutions; while (11/38) don't know if such cooperation exists. Those (22/38) say the strategy of cooperation with other institutions is mostly for research. Finally, (27/38) "agree" and (8/38) "strongly agree" that their working environment fosters their pursuit of learning.

Collaborative work between the teaching faculty members

Most of the teaching faculty members (21/38) confirm that the frequency of meeting with their head of department (HOD) is "once per month". Moreover, it is also "once per month" among colleagues who teach the same course in the same institution (18/38). Most (20/38) of the teaching faculty members "never collaborate" with colleagues of different departments within the same institution and "never collaborate" among colleagues of different institutions (27/38). These meetings serve mostly "to exchange resources" (29/38). Cross tabulations were done between exchange of resources between colleagues in different institutions by Teaching Faculty's profile (age, gender, years of teaching experience, professional rank, type of university) to check for any relationship between the two variables; however, none of the results were statistically significant according to chi-square and spearman-rho except for age range = -0.334 and $p = 0.04$.

In addition, (19/38) prefer to work with "some collaboration", while (15/38) prefer to work with "much collaboration".

Also, (19/38) of the teaching faculty members perceive that the benefits of collaboration "exceed its drawbacks" and none believe that the benefits "fall behind the drawbacks". Moreover, cross tabulations were done between "perception of the benefit of collaboration" by teaching faculty profile (age, gender, years of teaching experience, professional rank and type of institution) to check for any relationship between the variables; none of the results were statistically significant except for the professional rank $\chi^2 = 17.41$ $p = 0.03$. On the other hand, Spearman's correlation was also significant at this level = 0.46 $p = 0.009$. Finally, most (31/38) believe that collaboration has positive effect on knowledge, motivation and on classroom application.

The types and purposes of technological tools, software packages and educational resources used by teaching faculty

Concerning the technological tools used: results show that the overhead projector is "never used" (15/38), whereas the LCD and Laptop/desktop are "always used" (31/38) and (32/38) respectively. On the other hand, the Interactive white board is "never used" (23/38). "Other" technological tools are "always used" by the different teaching faculty (30/38) in such a way that every teaching faculty uses the technological tool (Logiciel technologies, Lectorpia, tablets, Visio conference or DVD) that best serves his/her educational purposes.

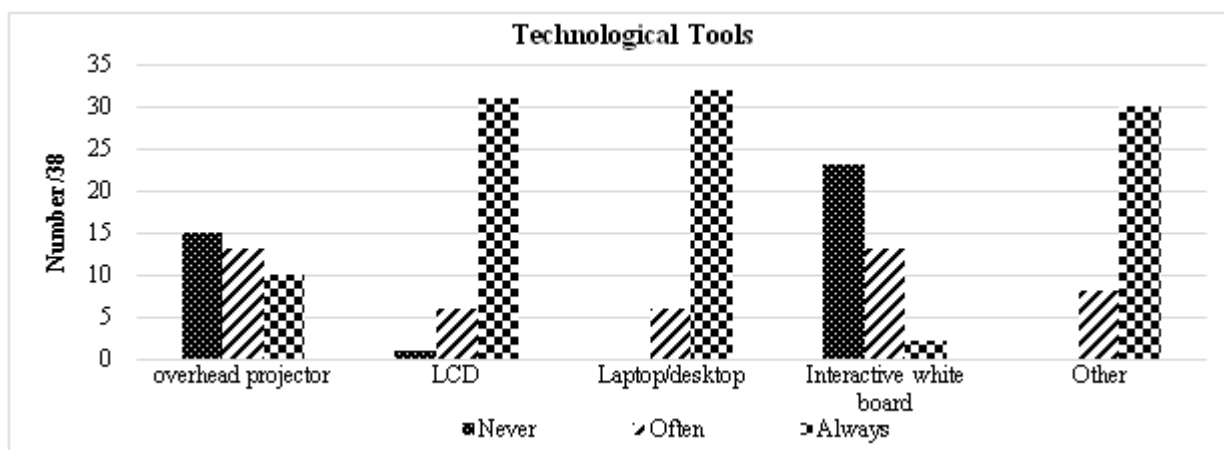


Figure 1: Technological tools used and their quantities

On the other hand, the reasons behind "often" or "never" using technological tools are that they are either not necessary for content or unavailable in the institution.

Concerning the software packages used and their purposes: "Microsoft word" is used to type exams (32/38) and to prepare worksheets (26/38); "Excel" is used to present grades (25/38); "PowerPoint" is used to present lectures (36/38); "SPSS" and "reference tools" are used for research purposes (25/38 each). Each teaching faculty could tick more than one option for this question.

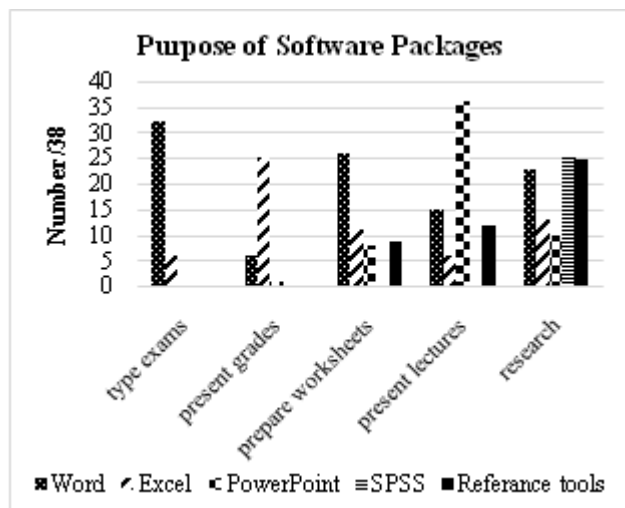


Figure 2: Software packages used and their purposes

Concerning the educational resources used and their purposes: online resources are used to “update scientific knowledge” (38/38); specific journals are used for “research purposes” (34/38). On the other hand, “discussion with colleagues” is the least resource used while “online resource” is the resource used the most. Each teaching faculty could tick more than one option for this question.

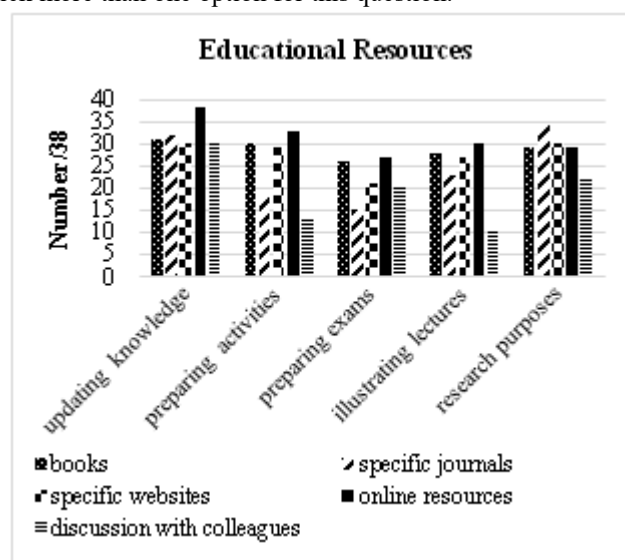


Figure 3: Educational resources used and their purposes

6. Discussion

Most of the teaching faculty members claim that their universities possess a strategy of cooperation with other universities and most said that it is for research purposes. This fact is encouraging and shows the importance teaching faculty members give to collaborative research despite their heavy workload. Nevertheless, the amount of research done at a national level is still insufficient (Jammal 2012). In addition, teaching faculty members admit that their universities offer training courses mostly on information technology which is also in accordance with literature (Dubosc, Kelo 2014). Nevertheless, these formal development opportunities are occasional, optional and based on institution initiatives (Awwad 2009), so considered insufficient. Finally, they generally perceive their working environment as one that fosters their growth and pursuit of

learning; however, they consider this growth also dependent on the human nature and on the educational policy in Lebanon. In other words, even though the working environment inspires growth (availability of a wide range of Internet services, software packages, online resources, and training sessions) it is up to each faculty member to make the best out of the circumstances presented. Moreover, if the educational policies could enforce quality and control it better by providing more support and incentives, the outcome on professional development would be more evident.

On the other hand, most teaching faculty members, especially the ones of “assistant professor” rank, approve that the benefits of collaboration exceed its drawbacks. This could be because they are still at the beginning of their career, and are excited to learn more and to reach higher levels of growth with the help of the more experienced faculty members. Moreover, teaching faculty members believe that collaboration has a positive effect on their knowledge, motivation and classroom application. Almost all said they prefer to work collaboratively, which is in accordance with studies in Lebanon (Towards Lebanese quality assurance 2013) and studies out of the country (Park et al. 2007). Nevertheless, their collaboration practices are restricted to exchanging resources once per month with their heads of department. In other words, they are aware of the importance and benefits of collaboration, yet in practice, they do not exercise it. In addition, teaching faculty members rarely work with colleagues in different departments or in other institutions. This is also in accordance with studies on the Lebanese Higher Education Sector (Kaissi et al. 2008, Awwad 2009). Three basic reasons could be the cause of the scarcity of collaboration these are lack of time, autonomic nature of the teaching faculty, and absence of enforcement or incentives for collaboration from the university administration. However, results also show that this collaboration increases for the teaching faculty of younger age and when collaboration is done within the same department. This means that as the age group decreases, the frequency of exchange of resources among colleagues of different universities increases. A reason could be that the new generation is more aware of the importance of collaboration and its effect on the quality of education due to their efforts or that of the DGHE in installing the culture of collaboration and its effect on quality in the Higher Education sector.

Then again, teaching faculty use different technological tools, software packages and educational resources in their classes to serve different purposes. This shows that each teaching faculty member chooses the technological tool that best suits his/her needs according to its availability in their institution or its relevance to the content of their lesson. What is worth mentioning here is that “discussion with colleagues” is the least resource used, which is also in accordance with literature that expresses teaching culture as an isolated one (Park et al. 2007). However, 38/38 claimed that “online resources” is the resource they mostly use to update scientific knowledge, to prepare students’ activities, to prepare exams and to illustrate lecture content. This could be a major threat knowing that a lot of online resources are not guaranteed for their quality or for their leading to

professional development (Shaaban, Khalil, Trouche 2015-Khalil, Shaaban, Trouche 2016). Nevertheless, the teaching faculty should have enough knowledge and experience to discriminate between the good and the not-so-good online resources. In addition, if teaching faculty could share and discuss their resources with their peers, their quality could be assured even if they are mostly from online resources.

7. Conclusion

Typical science teaching would be achieved when teaching faculty members constantly seek to learn, to inquire into their practice, to cooperate with colleagues, and to reflect on their experiences (Wood 2007). Therefore, by collaboratively searching for their resources and by collaboratively reflecting, typical science teaching could be achieved.

An essential topic mentioned in the strategic orientation of education in Lebanon is the need to “professionalize the teaching workforce” in order to assure quality in education. Results of the questionnaire imply that if enough support, enforcement and incentives are given to the teaching faculty from the university administration and/or from the education policy makers in Lebanon, the teaching faculty might be enthusiastic to work collaboratively because they are already conscious of its significance. The culture of collaboration need not be nurtured, teaching faculty are eager, especially the ones of younger age and the ones of “assistant professor” rank, to share their educational resources specifically with the teaching faculty of the same department. This collaboration could be fortified because results show that the Higher Education working environment is one that fosters teaching faculty members’ growth and their pursuit of learning. In addition, the MEHE is in favor of this working style to improve quality at the Higher Education sector.

So, we suggest that if the educational policy makers in Lebanon could provide opportunities for non-formal, on-the-job professional development that include collaboration and reflection, and encourage teaching faculty members to take part in them, some of the challenges of the Higher Education sector could be met. In addition, the result could also be more collaborative research. Consequently, they could now rely a little more on discussion with their colleagues and a little less on online resources for their documentary work.

On the other hand, if education policy makers could control the quality and the learning aspects in the Higher Education sector by giving credit to collaborative research, and by emphasizing intra- and inter-university collaboration, the Lebanese Higher Education sector could become modernized and globalized.

In conclusion, to reform teaching and learning in the Higher Education, professional development of teaching faculty could have precedence over all other amendments. Moreover, what better fashion than collaboration, “authentic” collaboration, to reform it? As Robert John Meehan puts it, “the most valuable resource that all teachers have is each other. Without collaboration, our growth is limited to our own perspectives.” Collaboration between like-minded peers during the day-to-day activities of documentary work and teaching, would progress teaching

and learning to limits beyond expectations, those limits that can actually let the teaching faculty outgrow themselves.

8. Future Research

A similar study could be carried out for a longer period of time, on a larger sample, including more universities and more teaching faculty from different disciplines. Any such large-scale study could portray the situation in the Higher Education sector in the education departments more precisely by distributing the questionnaire to a bigger sample, thus getting more significant quantitative results.

This study, does not investigate students’ opinion or the chairpersons’/deans’ views on professional development in the Higher Education sector. A beneficial research study could be conducted to examine their attitude towards quality in the Higher Education sector.

References

- [1] M. Awwad, TIES, Guide for the Management of IROs in the MEDA Region, TEMPUS, Brussels, 2009.
- [2] D. Clarke, &H. Hollingsworth, “Elaborating a model of teacher professional growth,” *Teaching and Teacher Education*, 18, pp. 947–967, 2002.
- [3] M. Clément, R. Vandenberghe, “Teachers’ Professional Development: a Solitary or Collegial (Ad) Venture?” *Teaching and Teacher Education*, 16, 81-101, 2000.
- [4] A.R. Deni, S. Malakolunthu, “Teacher Collaborative Inquiry as a Professional Development Intervention: Benefit and Challenges,” *Asia Pacific Educational Review*, 14, pp. 559-568, 2013.
- [5] Directorate General of Higher Education(DGHE)“The Basic Foundations for the Strategic Orientations of Education in Lebanon,” 2014. [Online]. Available: <http://www.higher-edu.gov.lb>. [Accessed: July 10, 2014].
- [6] F. Dubosc, M. Kelo, “Human Resource Management in Public Higher Education in the TEMPUS Partner Countries,” 2012. [Online]. Available: <http://eacea.ec.europa.eu/tempus>. [Accessed: July, 10 2014].
- [7] Education, audiovisual and culture executive agency (EACEA), “Higher Education in Lebanon,”2012. [Online]. Available: <http://www.higher-edu.gov.lb>. [Accessed: July 15, 2014].
- [8] G. Guedet, L. Trouche, “Towards New Documentation Systems for Mathematics Teachers?” *Educational Studies in Mathematics*, 71, pp. 199-218, 2009.
- [9] Z. Hojeij, “A Project Focused on Faculty Development in Lebanese Private Higher Education,” Master Thesis, Saint Louis University, 2012.
- [10] A. Jammal, “Impact of Tempus on the Lebanese Higher Education and Future Needs,” In *Proceedings of the Lebanon Tempus Information Day*, Lebanon, January 19, 2012.
- [11] B. Johnson, L. Christensen, *Educational Research: Quantitative, Qualitative and Mixed Approaches*, SAGE, California, 2008.
- [12] B. Kaissi, A. Jammal, M. Loutfi, S. Abou Chahine, “Quality Assurance for Higher Education in Lebanon: Guide I: Introduction to Quality Management in Higher

Education,” 2008. [Online]. Available: <http://www.higheredu.gov.lb/studies/guide%20QAHEL%202008.pdf>. [Accessed: July 14, 2014].

- [13] G. Kelchtermans, “Teacher Collaboration and Collegiality as Workplace Conditions: A review,” *Thementeil, Zeitschrift fur Padagogik*, 52 (2), pp. 220-237, 2006.
- [14] I. Khalil, E. Shaaban, L. Trouche, “Travail documentaire des enseignants de biologie au Liban et son interaction avec leur conceptions sur le déterminismegénétique, » *Recherches en didactique des sciences et des technologies (RDST)*, 13, pp. 251-278, 2016.
- [15] P. Knight, J. Tait, M. Yorke, “The Professional Learning of Teachers in Higher Education,” *Studies in Higher Education*, 31(3), pp. 319-339, 2006.
- [16] T. Levine, A. Marcus, “Closing the Gap Through Teacher Collaboration: Facilitating Multiple Trajectories of Teacher Learning,” *Jornal of Advanced Academics*, 19 (1), pp. 116-138, 2007.
- [17] National Educational Strategy in Lebanon, Vision Document, final Version, LAES (Lebanese Association for Educational Studies), 2006. [Online]. Available: <http://erasmuspluslebanon.org/sites/default/files/documents/National%20Educational%20Strategy%20Lebanon.pdf>. [Accessed: July 20, 2014].
- [18] S. Park, S. Oliver, T. S. Johnson, P. Graham, N. Oppong, “Colleagues’ Roles in the Professional Development of Teachers: Results from a Research Study of National Board Certification,” *Teaching and Teacher Education*, 23, pp. 368-389, 2007.
- [19] C. Penlington, “Dialogue as a Catalyst for Teacher Change: A Conceptual Analysis,” *Teaching and Teacher Education*, 24, pp. 1304–1316, 2008.
- [20] B. Robinson, “Using Distance Education and ICT to Improve Access, Equity and the Quality in Rural Teachers’ Professional Development in Western China,” *The International Review of Research in Open and Disturbed Learning*, 9 (1), pp. 1-17, 2008.
- [21] E. Shaaban, I. Khalil, L. Trouche, “Interactions between Digital Resources and Biology Teachers’ Conceptions about Genetic Determinism: A Case Study of two Lebanese Teachers,” *International Journal of Science and Research (IJSR)*, 4(10), 2015.
- [22] Teaching and Learning Research Program (TLRP), “A Commentary,” *Institute of Education, University of London*, 2013. [Online] Available: <https://www.ioe.ac.uk/research/4697.html>. [Accessed: July 15, 2014].
- [23] Towards the Lebanese Quality Assurance Agency, Task force on the design of an evaluation agency for Quality Assurance in Higher Education, the experience of the Tempus-TLQAA project, 2013. [Online]. Available: <http://www.tlqaa.org>. [Accessed: July 28, 2014].
- [24] L. Trouche, B. Pepin. “From instrumental to documental approach: towards a holistic perspective of teachers’ resource systems in higher education,” *Research in Mathematics Education*, 16 (2), pp. 156-160, 2014.
- [25] D. Wood, “Professional Learning Communities: Teachers, Knowledge, and Knowing,” *Theory into Practice*, 46 (4), pp. 281-290, 2007.

Author Profile



Christiane Jarjoura received a B.S. in Biology in 1994 and a Master in Public Health in 1996 from the American University of Beirut; a T.D in Science teaching from the Notre Dame University and a Master in Education in 2013 from the Lebanese University. She is actually a PhD student in the didactics of biology, at the Lebanese University. Since 2000 she has been teaching and coordinating biology in the Middle school at Saint Joseph School, Cornet Chehwan. Since 2000, she has been participating and presenting workshops held at the American University of Beirut and at the Lebanese American University. Currently she is a member in a Franco-Lebanese Cedre project.



Iman Khalil received a PhD in “Didactique des Disciplines” from the University of Paris 7-Denis Diderot. From 1996 till present, she has been a professor of Science Education and a supervisor of Master Degree theses. From 2009 till present, she has been supervising Doctoral theses in the Didactics of Biology at the Lebanese University, Faculty of Education, and has been implicated in many European and French-Lebanese research projects. She is a referee for some scientific journals and conferences and the director of the Research Center at the Doctoral School of Literature, Humanities and Social Sciences at the Lebanese University. Currently, she is the Coordinator of the Science and Math teaching research team and the Head of the scientific committee for the Educational Research Journal issued by the Faculty of Education at the Lebanese University.