Journal of Humanistic Mathematics

Volume 4 | Issue 2 July 2014

Religion and Language as Cultural Carriers and Barriers in Mathematics Education--Revisited

Murad E. Jurdak
American University of Beirut

Recommended Citation
Murad E. Jurdak, "Religion and Language as Cultural Carriers and Barriers in Mathematics Education--Revisited," *Journal of Humanistic Mathematics*, Volume 4 Issue 2 (July 2014), pages 47-57. DOI: 10.5642/jhummath.201402.05. Available at: https://scholarship.claremont.edu/jhm/vol4/iss2/5

Religion and Language as Cultural Carriers and Barriers in Mathematics Education[1]–Revisited

Murad Jurdak

Department of Education, American University of Beirut, Beirut, LEBANON
jurdak@aub.edu.lb

Synopsis

Here we revisit a paper [7] which examined two theses regarding the roles of religion and language of instruction in mathematics education. The first thesis states that if values of mathematics education are incompatible with the value system of the mother culture, then mathematics will be "appended" to the culture as a "technology" rather than assimilated as a "mode of thinking". The second thesis states that as soon as mathematics is applied in problems and situations, the language of instruction and learning becomes a cultural carrier in terms of behaviors, social relations, habits, and values. In the original paper, the first thesis was examined in the context of Islamic-Arab culture, while the second thesis was developed in the context of Lebanon. Here the original paper is first presented in its complete form, with some minor modifications. Next I offer some reflections on the relevance of these two theses today.

In 1988, I presented a paper entitled "Religion and Language as Cultural Carriers and Barriers in Mathematics Education" to the Fifth Special Day on Mathematics, Education, and Society of the 6$^{\text{th}}$ International Congress on Mathematics Education (ICME), Budapest. At that time, the paper generated a mixture of interest, questions, and controversies, probably because it was addressing issues rarely discussed in mathematics education at the time, namely, the cultural roles of religion and language of instruction in mathematics education.

[1]The original paper with this title first appeared in the proceedings of the Fifth Special Day on Mathematics, Education, and Society of the 6$^{\text{th}}$ International Congress on Mathematics Education (ICME), held in Budapest in July 27-August 3, 1988 [7].

The purpose of the current paper is twofold: first, to republish the original paper with minor modifications and make it available to a wider audience; second, to revisit the paper in order to evaluate the relevance of its main theses from the perspective of mathematics education today. In short, I believe that the issues raised then are still relevant today. Furthermore, I believe that the venue in which the original paper had been published was not easily accessible to everyone, as evidenced by the many requests I received over the years for a copy of the paper.

The current paper is naturally divided into two parts: *The Original Paper* and *Revisiting the Original Paper*.

The Original Paper

1. Introduction

Distant as they are, mathematics education and religion are not as strange bedfellows as they seem. This stems from the fact that each may be regarded as a subculture of the "home" culture. Anthropologists such as White [12] identified four components for any culture: technological (manufacture and use of tools), ideological (beliefs and values), sentimental (attitudes and feelings), and sociological (customs and institutions). It is basically on the ideological plane that religion and mathematics education may meet or conflict. In some societies, depending on the nature of both religion and mathematics education, the planes of incidence may extend to the sentimental and sociological components.

Although mathematics education and religion are not necessarily discrepant, they may conflict under certain circumstances. One would expect little conflict if each keeps to its own territory. However, a potential conflict between the two becomes a possibility if the nature of the religion is so pervasive as to encompass, beside the ideological framework, significant aspects of the individual's private and social life which is a natural field for applying mathematics. Again, the conflict between the two depends, to a large extent, upon the degree to which mathematics education is perceived as an alien culture to the mother culture. The possibility of conflict between religion and mathematics education becomes an actuality if the values of the two are not compatible.

Incompatibility of the values of mathematics education and the mother culture is not a mere hypothetical possibility but rather a historical actuality. The last few decades witnessed the emergence of the so-called developing countries as independent states. Already disadvantaged by their low level of socio-economic development, such countries have aspired to accelerate their development through education, science, and technology. Very frequently, such countries looked up to the former colonial powers, with which they were linked by ties of educational and cultural interactions, as models and sources of science and technology. Rightly or wrongly, mathematics was perceived, first, as the basic tool of science and technology and, second, as a heaven-sent, universal, and culture-free discipline. As a result, a massive movement to adopt and/or adapt Western mathematics curricula was started with the support of international and regional organizations. In doing so, the developing countries were not importing a culture-free technology but rather a generalized "Western" culture described by Bishop [3] as a mathematico-technological (MT) culture. In many cases, the values of the MT culture came in direct conflict with the ideological values, and in particular, the religious values of the mother cultures.

The Arab States are not an exception in this respect. The dominant culture in the Arab States is, to a varying degree, derived from two sources: Islam and Arab nationalism. The concerns of the Arab States were reflected in regional conferences of the Ministers of Education [1] and conferences of Ministers of Education and that Responsible for Economic Planning in the Arab States [11]. These concerns focused on four issues: 1) unification of curricula within the framework of the Arab-Islamic culture, 2) provision for the quantitative expansion of education, 3) improving the quality and productivity of education, and 4) orientation of education toward social and economic development. The 1966 Conference of Ministers of Education and Ministers Responsible for Economic Planning in the Arab States requested that emphasis be placed primarily on mathematics and science, and thus in 1967, the UNESCO Mathematics Project for the Arab States (UMPAS) was launched [6]. The project was modeled in content and development after similar projects in the West. It was led by international (Western) mathematics educators and Arab mathematics educators, who by virtue of their education reflected the MT culture. Similar national projects in some of which the author has been involved were similarly modeled. The impact of all such projects was rather limited. My claim is that one major reason

for the apparent shallow adaptation of such projects is the incompatibility of the Islamic-Arab culture and the MT culture carried by the methods and models of these projects.

2. Religion and mathematics education

Against this background, I present my first thesis which says that if values of mathematics education are incompatible with the value system of the mother culture, then mathematics will be "appended" to the culture as a "technology" rather than assimilated as a "mode of thinking". The thesis is to be discussed with reference to the interaction of the mathematico-technological (MT) culture and the Islamic-Arab (IA) culture.

The incompatibility of the values of IA and MT cultures are apparent on the ideological and sentimental levels. On the ideological level, Bishop [3] identified logic as the important criterion in the MT culture, rather than traditions, experience, or personal status. In the IA culture, although logic is used extensively, it is not the ultimate criterion. The latter is reserved to the authority of the Holy Koran (the words of God). It is not an unusual practice to provide evidence by citing a relevant quotation from Koran. On the sentimental level, the MT culture assumes that values can be questioned and statements can be subjected to empirical test. In any religious culture, and certainly in the IA culture, this assumption is not tenable, because in such cultures there are some values which should not be questioned. In the MT culture, knowledge is not a possession of certain members of the culture, whereas, in the IA culture, religious authorities have to possess certain knowledge not available to others (such authorities are called *Al-ulama* in Arabic; the literal English translation is *scientists*).

One could say that the above applies, in varying degrees, to any religious culture. I do not contest that, but I wish to note that Islam is special in at least two ways. First, Islam is not only a religion but an ideology which provides a complete system for civil laws and social and political institutions. The domain of Islam is not only the private spiritual life of the individual, but also the ideological, sentimental, and sociological values of the individual and the society. Second, the Holy Koran is not simply a revelation but the exact words of God, embodied in an immutable text which is not subject to change and which allows little room for interpretation.

The conflict between the IA and MT cultures does not reveal itself either in the kind of mathematics taught or in the specialized mathematical techniques and procedures used in the classroom. Mathematical content and procedures are not essentially different than what you find in classrooms in other countries. When it comes to mathematics (number, space, operation, etc.), religion apparently plays a minor role, if any. However, the conflict between the IA and MT cultures reveals itself in at least two areas: production of mathematical knowledge and using this knowledge to cope with reality. Mellin-Olsen [9] emphasizes the link between the production of knowledge (mathematical knowledge in this case) and the production of culture. In societies where religion plays such a central role in the society, the enculturation process has to be started and incorporated in formal education very early. In some Arab countries induction into the religious culture starts as early as the first grade with more than 25% of periods allotted to religious studies. By its nature, induction into the religious culture has to be done, particularly at this young age, by imitative and reproductive methods. On other hand, the MT culture relies on productive methods (constructing, discovering, and testing hypotheses). By exposing the learner to two conflicting modes of producing knowledge, the cultural conflict is reinforced by the culturation process itself.

Using mathematical knowledge to cope with reality is a second area where cultural conflict occurs with more far-reaching implications. As explained before, Islam dominates the existence of the individual and the society outside the classroom. In using the mathematics of the MT culture to cope with reality, learners find themselves in cultural conflict situations. Thus, the so-called "mathematical mode of thinking" is easily dominated by the religious mode of thinking. What actually is transferred to real life is the technological aspect of mathematics. This is probably one reason why such societies have "gone back to basics in their curricular work" [3, page 63]. Mathematics thus survives as a collection of tools. "Old techniques" are easily replaced with "new techniques" with the value system rarely affected by these innovations.

3. Language of Instruction and mathematics education

A closely related issue which has cultural implications is the use of a foreign language as the language of instruction in mathematics. Much has been said about psychological and pedagogical implications of using a foreign

language as a medium of instruction [2], but not enough about the cultural and social implications. It seems to me that, at the basis of this, there is an implicit assumption to the effect that the language of mathematics is culture-fair because it is culture-free. As a consequence, the language of instruction, whether native or foreign, does not have cultural implications. This assumption may be challenged in the same way that one challenges the universality of mathematical concepts. Although this assumption may be true for mathematics at the scientific level (even though this is questionable if one considers the different roles ascribed to language in different philosophies of mathematics), it is not necessarily true at the educational level. In mathematics education, the language of instruction and learning is far from being a pure formal language. It is rather more of the ordinary language accentuated with symbols and technical terms. As soon as mathematics is applied in problems and situations, the language of instruction and learning becomes a cultural carrier in terms of behaviors, social relations, habits, and values. There is even some evidence that formal deductive reasoning is language-specific [5].

The social implications of the use of a foreign language as the medium of learning and instruction are obvious. Mathematics is often described as a "critical filter" for university education in general and for scientific occupations in particular. If foreign language is introduced as an additional factor, then instead of one we end up with a double-critical-filter. It is often the case that the socially and economically disadvantaged have fewer opportunities to make it through the double filter than the more advantaged. Consequently mathematics taught in a foreign language tends to discriminate among some social groups, thus, reinforcing social disharmony. The situation becomes more serious if the lines of cultural conflict coincide with those of the social conflict.

Lebanon is a good example of a country where the issues of social and cultural conflicts are much alive. Lebanon has been, and still is, a cross-road of different cultures. In its recent history, Lebanon has become a bridge between the Western culture and the Arab-Islamic culture. In the 19^{th} century, Christian missionaries started to establish schools which reflected Western values and practices through several means, the most important of which was using French or English, not only as foreign language, but as a medium of instruction. The foreign languages took such a strong hold that mathematics continued to be taught in a foreign language even after independence in 1943

and despite laws and regulations to limit such practices. On the other hand, Arabic, the native language, is looked at by the majority not only as a symbol of national identity but also as the carrier of the Arab-Islamic culture. If one accepts the thesis that the language of instruction, even in mathematics, is a cultural carrier, then it is not difficult to anticipate the negative consequences of such a situation. The historical accumulation has resulted in cultural divergence which goes under the name of "cultural diversity" or "colonialism" depending on which side one is.

In the many panels which often take place to discuss the Arabization of mathematics teaching, the issue soon becomes an epitome of the larger issue of cultural conflict. The pedagogical arguments in favor of Arabization are self-evident and need not be elaborated. That the Arabic language cannot accommodate modern mathematical terms and structures is easily refuted by the fact that Arabic is a sophisticated, powerful language which, at one time, preserved and extended Greek mathematics. What is it then that stands in the way of Arabizing the teaching of mathematics? The claim is that the obstacle is an accumulation of two discrepant culturation processes. The resolution of this seemingly pedagogical issue becomes hopelessly entangled with the conflicting political and social issues.

4. Concluding remarks

In conclusion, I ask the following question: To what extent can the technological aspects of mathematics education be adapted without significantly changing the cultural values? This is a good question for which we don't have a good answer. Some Arab countries which have material resources to buy not only the technology but the means of its production are as determined to adapt technology as to preserve the ecology of their culture. This is a historical encounter whose outcome only the future can tell.

Revisiting the Original Paper

Here I review the original paper [7] in an attempt to reflect on the relevance of the issues it had raised then from the perspective of mathematics education today. More specifically I focus briefly on two specific aspects. First, I provide an update on the research on values in mathematics education in general, and on religious values and language of instruction in

particular. Second, I reflect on and demonstrate the relevance of the two theses postulated in the original paper. To recap, the first thesis states that if values of mathematics education are incompatible with the value system of the mother culture, then mathematics will be "appended" to the culture as a "technology" rather than assimilated as a "mode of thinking". The second thesis states that as soon as mathematics is applied in problems and situations, the language of instruction and learning becomes a cultural carrier in terms of behaviors, social relations, habits, and values.

Research on values in mathematics education has grown tremendously since 1988. In a comprehensive review on the research on values in mathematics education, Bishop [4] has presented a partial story about the development of research on values in mathematics education and concluded that the latter "seemed so significant to us as researchers in mathematics education yet so intransigent as far as making real educational progress was concerned" (page 7).

Research on the role of religion on mathematics has been significantly less than that on values. The main body of research in this area has been done on religion in the context of China. A study [13] analyzed how three major Chinese schools of thought—Confucianism, Daoism and Buddhism—might impact mathematics education in particular. The authors conclude that "Chinese culture does have some impact on mathematics learning, no matter how indirect it is. Though what the Chinese are learning now is not traditional Chinese mathematics, some Chinese orientations come to play during the course of learning, which might have led to the academic success among the Chinese" (page 18). Unlike Islam, it seems that there is no conflict between the religious values of these three traditions and those of Western mathematics. Little discussion or research exists on Islamic values and mathematics education, except a reference to that issue in an article of mine [8].

The thesis that mathematics will be "appended" to the culture as a "technology" rather than assimilated as a "mode of thinking", if values of mathematics education are incompatible with the value system of the mother culture, seems to me to be still tenable. First, no credible example to the contrary has been presented, and second there is an indirect indication, though a little far-fetched, that may be interpreted to support the thesis. Qatar and Saudi Arabia, both by constitution Islamic Arab states, participated in the international comparative study known as Trends in the International Math-

	Overall Mathematics	Knowing	Applying	Reasoning
Qatar	410	$418^{(1)}$	$396^{(2)}$	406
Saudi Arabia	394	$402^{(1)}$	$375^{(2)}$	$388^{(2)}$

Table 1: TIMSS 2011 mathematics national scores for Qatar and Saudi Arabia. Average scale scores are reported for each column. Scores marked with (1) are significantly higher than the Overall Mathematics Average Scale Score. Scores marked with (2) are significantly lower than the Overall Mathematics Average Scale Score. Source: [10, Exhibit 3.4, page 150].

ematics and Science Study (TIMSS). Both countries are among the richest because of their natural resources (gas and oil) and both countries have invested heavily (billions of dollars) in educational improvement with priority given to science and mathematics education. Table 1 above shows selected data on their performance in mathematics in TIMSS 2011. Both countries made a big stride in their national TIMSS score between the two TIMSS of 2007 and 2011. The data in Table 1 shows that their national score in 'knowing' was significantly higher than their overall mathematics score, whereas their score in 'applying' and 'reasoning' significantly lower (equal for reasoning for Qatar) than their overall mathematics score. Could it be that the difference between 'knowing' on one hand, and 'applying' and 'reasoning' on the other is partially accounted for in these two countries by the possibility that values of mathematics education are incompatible with the value system of the mother culture?

The issue of the cultural role of the language of instruction of mathematics education has been an increasingly hot issue in mathematics education research and debate. One has to look at the place given to this issue in mathematics education conferences such as the PME and ICME conferences to see the tremendous growth in the discussions of language issues in mathematics education. An example of the centrality of this issue in the Arab countries comes from Qatar. In its attempt to reform its system of education, Qatar adopted some ten years ago new curriculum standards in all subjects including mathematics. In addition they shifted the language of teaching mathematics and science from Arabic to English. This policy change was rationalized in terms of improving the productivity of mathematics teaching and hence making it more competitive at the international level. Recently, this policy was reversed again. The rationale was that the resultant improvement in mathematics performance had not met expectations, and it that it

would be more prudent to avoid the possible negative cultural effects of using a foreign language instead of Arabic, the mother language of the country. This illustrates that the issue of language of instruction of mathematics education is still very relevant at the policy level, as well.

In conclusion, the question I raised in the conclusion of the original paper still resonates: "To what extent can the technological aspects of mathematics education be adapted without significantly changing the cultural values?"

References

[1] Arab League, *Final reports of conferences of Arab Ministers of Education* (in Arabic). Cairo, 1953; Kuwait, 1968; Cairo, 1965; Sana, 1972.

[2] John Berry, "Learning mathematics in a second language: Some cross-cultural issues," *For the Learning of Mathematics*, Volume **5** Issue 2 (1985), pages 18–23.

[3] Alan Bishop, "Mathematics education in its cultural context," *Educational Studies in Mathematics*, Volume **19** Issue 2 (1988), pages 179-191.

[4] Alan Bishop, "From culture to well-being: a partial story of values in mathematics education," *ZDM-The International Journal on Mathematics Education*, Volume **44** Issue 1 (2012), pages 3-8.

[5] Murad Jurdak, "Structural and linguistics variables in selected inference patterns for bilinguals in grades six to ten," *Educational Studies in Mathematics*, Volume **8** Issue 2 (1977), pages 225-238.

[6] Murad Jurdak and E Jacobsen, "The evolution of mathematics curricula in the Arab State," in Robert Morris, editor, *Studies in mathematics education, Volume 2*, Paris, UNESCO, 1981, pages 133-147.

[7] Murad Jurdak, "Religion and language as culture carriers and barriers in mathematics education," In C. Kietel (Ed.), *Mathematics, education and society*, Science and Technology Education, Document Series No. 35, Paris: UNESCO, pages 12-14.

[8] Murad Jurdak, "The role of values in mathematics education," *Humanistic Mathematics Network Journal*, Issue 21 (December 1999), pages 39-45.

[9] Stieg Mellin-Olsen, "Culture as a key theme for mathematics education," in M Johnsen Hoines and Stieg Mellin-Olsen, eds., Mathematics and Culture. Radal, Norway, Caspar Forlag, 1985, pages 99-121.

[10] Ina V.S. Mullis, Michael O. Martin, Pierre Foy, and Alka Arora, "TIMSS 2011 International Results in Mathematics," Amsterdam, the Netherlands, International Association for the Evaluation of Educational Achievement (IEA), 2012. Available online at http://timss.bc.edu/timss2011/international-results-mathematics.html, accessed July 3, 2014.

[11] UNESCO, *Final reports of the conferences of Ministers of Education and those Responsible for Economic Planning in the Arab States* (in Arabic), Tripoli, 1966; Marrakesh, 1970; Abu-Dhabi, 1977.

[12] Leslie White, *The Evolution of Culture*, New York, McGraw-Hill, 1959.

[13] Ngai-Ying Wong, Wai Ying Wong, and Esther Wing Yu Wong, "What do the Chinese value in (mathematics) education?" *ZDM-The International Journal on Mathematics Education*, Volume **44** Issue 1 (2012), pages 9-19.