

Information and Communication Technology between formal speech and the reality of practice

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Abstract: *In our study, we have analyzed the official instructions on the use of ICT in mathematics of the middle school and mathematics textbooks officially declared to be respectful of the reference frameworks in this area. The analysis has made it possible to identify a very large gap between the current state of these manuals and the stipulations of the conformity to instructions regarding the pedagogical integration of ICT.*

Keywords: *Mathematics education, ICT, pedagogical orientations, Curricula.*

Date Of Submission: 07-01-2020

Date of Acceptance: 23-01-2020

I. Problematic

Various works have established the crucial nature of the use of ICT in mathematics education. Among these works, the work of Kern (2006) that describes the beginnings of ICT in the United States, between the 1960s and 1990s, with the use of computers, email and the Internet. These beginnings have given way to many educational projects among which the projects gathered around the acronym CMO, acronym for Communication Mediated by the Computer. In Mangenot (2008), we learn how ICT support constructivist pedagogy: technology makes it possible to engage learners in processes of exploration and interaction with an environment that in the long run makes mathematical concepts natural and intelligible (Keong et al, 2005).

But while ICT has led to teaching resources and a rigorous pedagogical working atmosphere for teaching mathematics, the question is how to assess the capacity of these systems and frameworks to integrate educational systems in mathematics? This capacity must systematically take into account the advances of the different branches of cognitive science (Tardif, J., 1998). The research, formatting, processing and exchange of information become the cornerstone of the teacher's and student's training. Developing strategies which focus on the interpretation of the results of calculations rather than spending time on their tedious performance have become a necessity both epistemic and epistemological (Harraq et al, 2018).

It is in this regard that authors such as Guay (2001) propose taxonomies of educational activities enriched by the contributions of ICT: From now on, mathematics education systems must take into account the need to implement exercise and communication tasks within the traditional demonstration activities.

In addition, multimedia has become an indispensable adjunct in mathematics education training: mastery of learning processes and development of the sense of imagination (Jacquinot, 1985). Moreover, the digitization and the Internet have major consequences on the continuous training (Nachit et al, 2014)

Hypothesis

The sensitization undertaken by the mathematics education system to the authors of textbooks on the pedagogical integration of ICT has made them more and more attentive to this integration and this is perfectly followed and acted out by the system.

Methodology

As a methodology, we think it is appropriate to put the statements of the system about ICT in line with the official guidelines and instructions for the reaching of mathematics, and put these orientations and instructions in relation to the contents of textbooks, all through a qualitative and a statistical analysis of the facts.

II. Strategies for the integration of ICT in Morocco

In Morocco, a national program has been implemented to mainstream educational technologies in education since 2006. Indeed, the strategy generalization of ICT in Teaching "GENIE" had the ambition to provide 6 million students and 230 000 teachers with the equipment in 8 604 institutions.

In 2008, the said strategy was updated to give rise to a new roadmap. This update put the GENIE program at the heart of the emergency program of the educational reform and through a better involvement of administrative staff, teachers and students along with a permanent follow-up of the Regional Academies of Education and Training.

A new roadmap (2009-2013) revolves around the main axes; namely reinforcing infrastructures, training and the development of digital educational resources and uses.

At the same time, to succeed in implementing its strategy in the field, it was decided to launch TICE caravans in all the regional Academies of Education and Training in order to accelerate the local implementation of the program and to sensitize the entire educational community to the pedagogical use of ICT.

In this context, the evocation of contrasting situations of difficulties, failures and success in introducing the use of educational technologies in the classroom have allowed us to sketch a synthesis of the optimal conditions for integrating ICT and to involve the key elements.

The purpose of this work is to present a study on the use of ICT in the teaching of mathematics education junior high school level in the Moroccan education. To do this, we have done a statistical analysis of textbooks and pedagogical guidelines concerning the use of these technologies.

III. Analysis of the pedagogical orientations:

The pedagogical guidelines and curricula related to teaching mathematics in secondary schools in Morocco, clearly stipulate the need to use information technologies and computer tools in the courses of algebra, analysis and geometry at all stages of the learning process of the three-years schooling in this cycle by using the calculator on pages 25-35-37 and 42, or by using computer software on pages 36-38 -42 and 46 of the Pedagogical Orientations and Curricula for Teaching Mathematics in the Secondary Cycle of the Ministry of National Education, Higher Education and Scientific Research of the Kingdom of Morocco (2007).

IV. Analytical study of textbooks:

Our study concerns the use of ICT in teaching mathematics during these three secondary school years required by the national charter of education and training in the Moroccan education system.

First, we start with the analysis of the textbook "Student Book" of the year of AC1, recognized by the Ministry of National Education in Morocco (MEN, 2009).

The use of ICT for the AC1 manual is given in the table below where we specify the number of activities and exercises using ICT and we denote N: the nature of the ICT used; 1: use of the calculator; 2: use of software; 3: other tools; Nbr: the global number and O: activities or exercises containing ICT.

The lessons		activities			Exercises		
		Nbr	O	N	Nbr	C	N
L1	Operations on integers and decimals	5	1	1	46	2	1
L2	Rational numbers	5	0	-	49	0	-
L3	Relative decimal numbers (Presentation, comparison and order)	5	0	-	42	0	-
L4	Relative decimal numbers (Sum and difference)	5	2	1	43	1	1
L5	Relative decimal numbers (Product and division)	7	2	1	39	1	1
L6	Parallelism and orthogonality	8	0	-	35	0	-
L7	Perimeters and surfaces	6	0	-	30	0	-
L8	Angles	7	0	-	34	0	-
L9	Triangle	5	0	-	32	0	-
L10	Special lines in a triangle	9	0	-	45	0	-
L11	Development and Factoring	8	0	-	44	2	1
L12	The equations	7	7	-	37	0	-
L13	Central symmetry	11	11	-	30	0	-
L14	Straight parallel and secant	5	5	-	22	0	-
L15	Parallelogram	7	7	-	25	0	-
L16	Quadrilaterals	7	7	-	33	0	-
L17	Circle	4	4	-	26	0	-
L18	Cylinder and rectangle prism	7	7	-	34	0	-
L19	Locating a point in the Plan	5	0	-	44	0	-
L20	Proportionality	5	0	-	48	0	-
L21	Statistics	4	0	-	26	0	-

Table 1: Use of ICT in the manual "Book of the student" of AC1

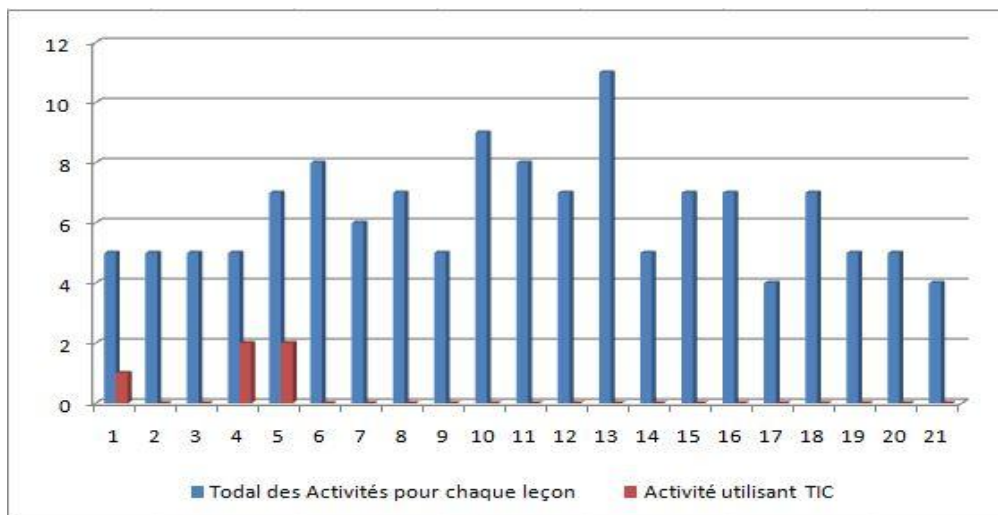


Figure 1: Number of activities with and without ICTs in the AC1 manual

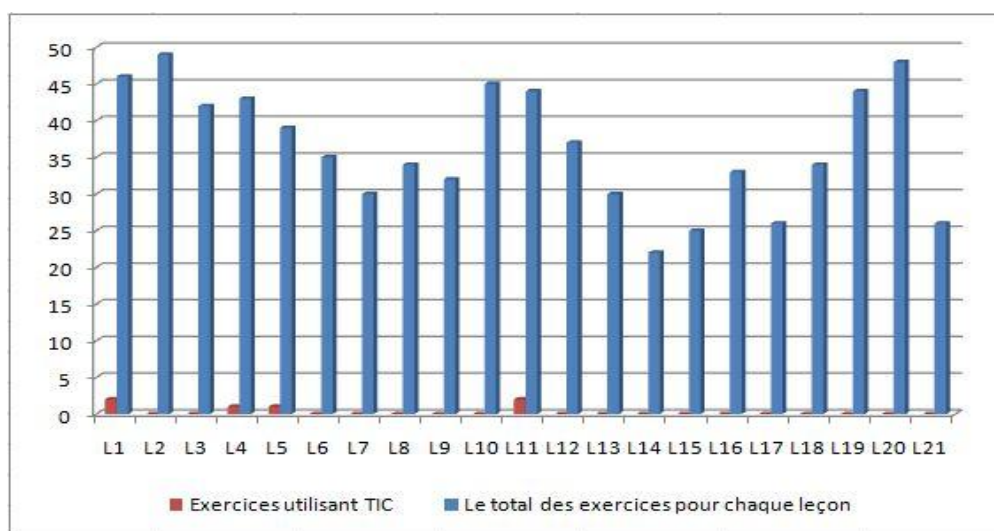


Figure 2: Number of exercises using ICT in the manual "of AC1

Moreover, Table 2 and Figures 3 and 4 represent the textbook analysis of the 2nd Collective Year (AC2) "Almassar" recognized by the Ministry of National Education (MEN, 2010).

The lessons		Activities			Exercises		
		Nbr	O	N	Nbr	C	N
L1	Presentation of rational numbers	12	2	1	43	0	1
L2	Sum and subtraction of rational numbers	16	2	1	34	2	1
L3	Product and division of rational numbers	19	1	1	35	0	1
L4	The usual operations on rational numbers	12	0	-	47	0	-
L5	Powers of a rational number	19	5	1	46	2	1
L6	Arithmetic calculation	15	0	1	41	1	1
L7	The equations	17	0	-	46	0	-
L8	Order of rational numbers	15	0	-	41	0	-
L9	Introduction to real numbers	10	1	1	30	2	1
L10	Axial symmetry	10	0	-	54	0	-
L11	Parallel lines alongside a triangle	11	0	-	52	0	-
L12	Important rights in a triangle	11	0	-	49	0	-
L13	The right triangle and the circle	11	1	1	41	0	1
L14	The Pythagorean theorem	6	0	1	48	2	1
L15	Sine and cosine of an acute angle	8	1	1	35	1	1

L16	Isometric triangles	9	0	-	40	0	-
L17	Vectors and Translation	14	0	-	58	0	-
L18	Solids in space	10	0	-	29	0	-
L19	Digital functions	10	0	-	28	0	-
L20	Statistics	10	0	-	24	0	-

Table 2: Number of activities and exercises with and without ICTs in the AC2 "Almassar" manual

Figure 3: Activities with and without ICT in the AC2 manual

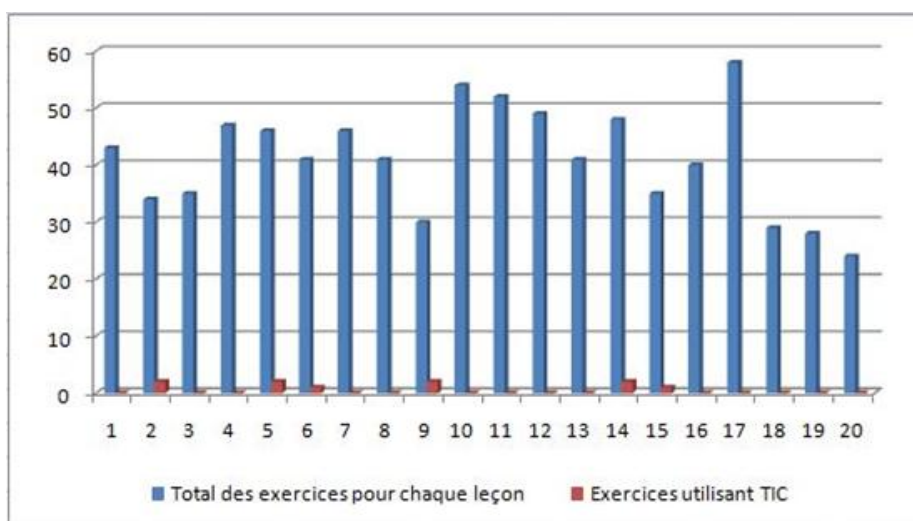
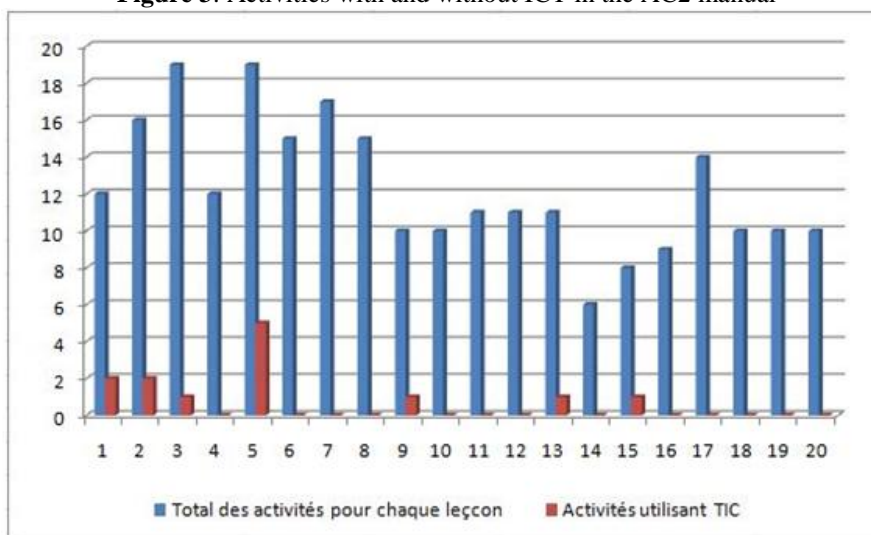


Figure 4: Exercises with and without ICT in the AC2 manual

Finally, an analysis of the "almofid fi arriyadiyahat" school textbook of the third collegiate year (AC3), recognized by the Ministry of National Education (MEN, 2016), was carried out.

Leçons		Activités			Exercices		
		Nbr	O	N	Nbr	C	N
L1	Numerical Computing: Outstanding Identities-Development and Factoring	4	0	-	93	0	-
L2	Numerical calculation: The powers	4	0	-	42	1	1
L3	Numerical Calculation: Square Roots	4	0	-	82	1	1
L4	Numerical calculation: Order and operations	5	0	-	78	1	1
L5	Equations and inequalities	4	0	-	74	0	-
L6	Linear functions	4	0	-	29	0	-
L7	Affine functions	3	0	-	31	0	-

L8	A system of two first-degree equations with two unknowns	4	0	-	38	0	-
L9	Statistics	2	0	-	25	2	3
L10	Thales theorem	3	0	-	53	0	-
L11	The Pythagorean theorem	3	0	-	85	0	-
L12	Trigonometric calculation	4	1	1	43	0	-
L13	Central angles and circumscribed angles	4	0	-	68	0	-
L14	Similar triangles	5	0	-	74	0	-
L15	Translation and vectors	4	0	-	28	0	-
L16	The landmark in the map	4	0	-	26	0	-
L17	Equation of a straight line	3	0	-	47	0	-
L18	Geometry in space	6	0	-	34	0	-

Table 3: Activities and exercises with and without ICTs in the AC3 manual

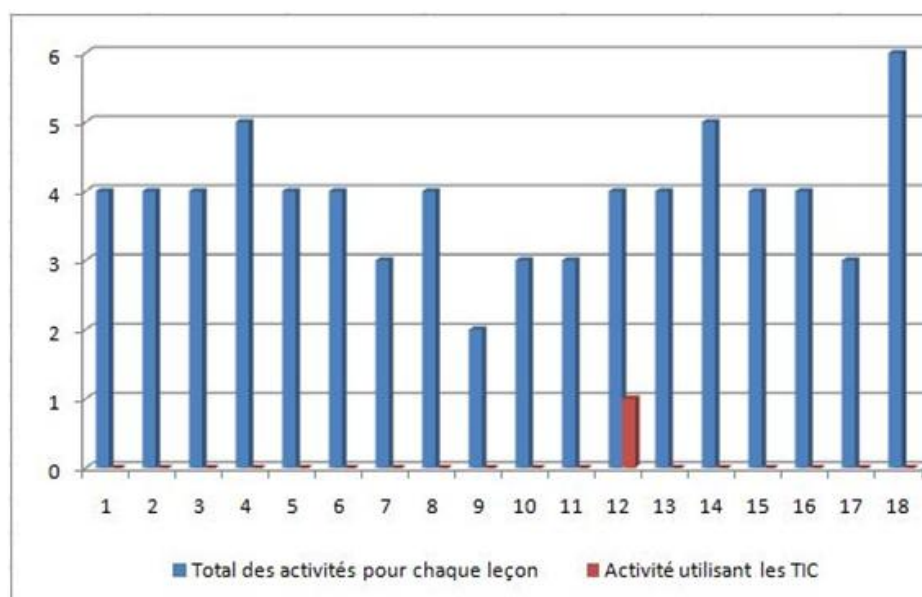


Figure 5: Number of activities with and without ICT in the AC3 manual

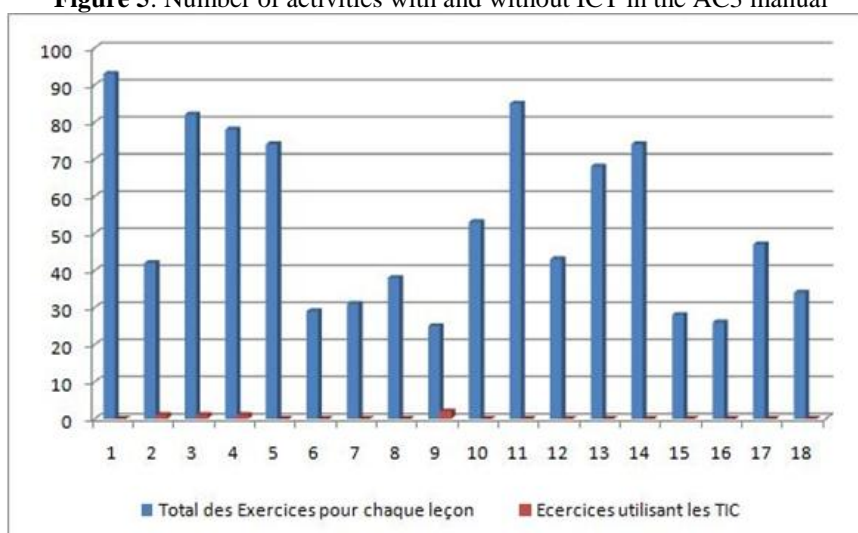


Figure 6: Exercises with and without ICT in the AC3 manual

V. Conclusion:

In this study, we have analyzed three textbooks from the three secondary school AC1; AC 2 and AC3 regarding the use of ICTs. It is clear that neither the activities nor the programmed exercises meet the vision established for the integration of information and communication technologies by the Ministry. Contrary to the formal instructions and school curricula which are produced in the textbooks designed do not follow the

recommendation of the use of these tools and thus, certainly do not meet the goals outlined by the national strategy for the integration of ICT in the educational system.

The adoption of ICT in education would significantly promote educational differentiation which allows the identification of students in difficulty. Thus, the teacher who becomes more available would devote his attention to students in difficulty who would benefit more from his contribution. Faster or more efficient students would benefit from more autonomy to deepen their knowledge or to focus on more complex activities. For average students, a good level of motivation should be maintained by encouraging their activities (Bahra et al, 2017). The study of the impact of ICT integration in mathematics on the motivation of learners will be the focus of our future research.

Acknowledgements:

We thank our colleague Bouchra Lif for their help in the realization of this work.

References:

- [1]. Bahra, M., Bayali, B & Gonegai, A (2017). TICE et franchissement obstacles à la conceptualisation: Cas de machines conceptuelles versus des machines thermiques associées à la gravité. Actes du Colloque Tice, p 77-103. Ouarzazate. Maroc.
- [2]. Guay, P-J. (2001). Les TIC et l'enseignement : un tour d'horizon. Bulletin Clic, 41, 2-5. Document télé-accessible à l'adresse suivante : <<http://www.clic.ntic.org/clic41/enseignement.html>>.
- [3]. Harraq, J., Hattaf, K., Bamhamed, M. & Achtaich, N. (2018). TIC Dans L'enseignement Des Mathématiques Au Lycée Marocain. European Scientific Journal, 14-22, 86-100
- [4]. Jacquinet, G. (1985), l'école devant les écrans, coll. Sciences de l'éducation ?, ESF éditeur.
- [5]. Keong, C. C., Horani, S., & Daniel, J. (2005). A study on the use of ICT in mathematics teaching. Malaysian Online Journal of Instructional Technology, 2(3), 43-51.
- [6]. Kern, R. (2006) Perspectives on technology in learning and teaching languages. TESOLQuarterly, 40, 183–210.
- [7]. Manganot, F. (2008). La question du scénario de communication dans les interactions pédagogiques en ligne. In M. Sidir, G.-L. Baron, E. Bruillard (Ed.) Journées communication et apprentissage instrumenté en réseaux (Jocair 2008), pp. 13-26. Paris, Hermès, Lavoisier.
- [8]. MEN (2009). Livre de l'élève, première année du cycle collégial. (Edition Maison de culture, 99810.20.473).
- [9]. MEN (2010). Almassar, deuxième année du cycle collégial. (Edition NADIA EDITION, 9954.0.4361.6).
- [10]. MEN (2016). Almofid fi arriyadiyat, troisième année du cycle collégial. (Edition Maison de culture, 9981.20.615.8).
- [11]. Nachit, B., Bahra, M., Namir, A., Lablidi, A., Radouane, K., Snadrou, K. & Talbi, M. (2014) . The Use of the Internet in Moroccan high schools Mathematics teaching: state and perspectives. Procedia - Social and Behavioral Sciences 116 5175 – 5179
- [12]. Royaume du Maroc. (1999). Charte nationale de l'éducation et de la formation. Commission Spécial Education- Formation.
- [13]. Royaume du Maroc. (2007). Orientations pédagogiques et curricula pour l'enseignement des mathématiques dans le cycle secondaire collégial. Ministère de l'éducation nationale, de l'enseignement supérieur et de la recherche scientifique.
- [14]. Tardif, J. (1998). Intégrer les nouvelles technologies de l'information Quel cadre pédagogique ?, ESF éditeur.

Bettioui Benyounes, etal. "Information and Communication Technology between formal speech and the reality of practice." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 10(1), 2020, pp. 30-35.