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ANALYSIS OF MATHEMATICS ASSESSMENT PRACTICES IN THE QUALIFYING SECONDARY CYCLE IN MOROCCO DURING THE COVID-19 PANDEMIC

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Abstract: *All over the world, the COVID-19 health crisis has had an impact on the teaching-learning process. Since the closure of schools and the suspension of face-to-face classes, preventive and urgent actions have been put in place to guarantee pedagogical continuity. In Morocco, from September 7, 2020, the Ministry of National Education has declared the adaptation of distance education as a pedagogical form, with the possibility of covering face-to-face teaching, while allowing parents of students to choose the mode of teaching that suits their children. Faced with the experience of distance learning and technical problems related to internet access and the inadequacy of digital tools experienced the school year 2019-2020 most parents have chosen the face-to-face mode. Faced with this situation and in order to preserve the health security of students, the Ministry has implemented a teaching mode that consists of alternating groups of students in each class to attend face-to-face classes. From then on, this change emerged from new evaluation practices. The main objective of this study is to analyze the evaluation practices of school mathematics learning in Morocco during the COVID-19 pandemic, and to identify the different forms taken by formative evaluation in such circumstances. For this purpose, we opted for a qualitative approach based on a content analysis through the analysis of the continuous tests of 10 teachers of mathematics of the qualifying secondary cycle, addressed to their students of the scientific common core level during the first semester of the school year 2020-2021; as well as the realization of an interview with the same teachers, in order to explain the obtained results. The results demonstrate a certain deviation from the formative evaluation process, as well as a decline in the evaluation practices considered in COVID-19.*

Keywords: *COVID-19, continuous checks, distance learning, hybrid teaching.*

I. INTRODUCTION

Following the health crisis of the COVID-19 pandemic, the whole world has experienced transformations in various fields (economic, socio-political, educational, etc.). At the educational level, from March 2020 the closure of schools and universities provided the adoption of distance education, or hybrid education to ensure pedagogical continuity, and guarantee the safety of learners. The transition from face-to-face education to distance education has brought about new evaluation practices.

Faced with this unprecedented context, certain scientific studies **[1, 2, 3, 4]** have established the difficulty of implementing evaluative activities through e-learning during the pandemic. Nevertheless, the evaluation modalities have undergone a diversification at higher institutions between essays, reflective syntheses, tutorials, open-book exams, multiple-choice questions (MCQ), long open response questions (QROL), collaborative podcasting, portfolios, and mental maps **[5, 6, 2, 7].**

Although under these conditions, this legitimizes the loss of the temporal continuity of the evaluation **[8];** which tends towards more or less the accomplishment of the diagnostic and summative functions but not the formative function **[9].** Indeed, the absence of a real interaction has not allowed teachers to set up efficient

evaluation tools to carry out the regulations as well as the remediation at a distance. This leads us to rethink evaluation practices and approaches to promote the teaching-learning process during the pandemic.

In Morocco, since the closing of schools on March 16, 2020, face-to-face assessment was no longer possible except for the two years of the baccalaureate. Local standardized college and primary school examinations were cancelled, provided that the calculation of the average was limited to the assessment of learning acquired just before the closure of schools.

From September 7, 2020, the Ministry of National Education declared the adoption of distance learning as a pedagogical form, with the possibility of covering face-to-face teaching, while allowing the parents of students to choose the mode of education that suits their children. Faced with the experience of distance learning and not to postpone the technical problems related to Internet access and the inadequacy of digital tools experienced in the school year 2019-2020, most parents have chosen the face-to-face mode. Faced with this situation and to preserve the health security of students, the Ministry has implemented a teaching mode that consists of alternating groups of students in each class to attend face-to-face classes.
This article raises a question concerning the problematic situation of mathematics assessment practices in the Moroccan qualifying secondary school during the health crisis: How has the assessment of mathematics learning in the qualifying secondary cycle been able to meet the criteria of compliance, program coverage, and representativeness of cognitive levels in the context of COVID-19? What form did the assessment of learning in mathematics at the qualifying secondary level take in the context of COVID-19?

II. STUDY METHODOLOGY AND SAMPLE CHARACTERISTICS

"Evaluation necessarily has multiple frames of reference because it takes as a framework the meeting of the individual frames of reference of the actors" indicates **[10].**
Our study was interested in assessing the validity of continuous mathematics tests according to the criterion of conformity. It allows us to assess how well the assessment meets the institutional specifications **[11].** To do this, we conducted a content analysis of the continuous tests (10 subjects of the 1st, 2nd, and 3rd control) of the Scientific Common Core level (TCS) of a public institution of the regional academy Casa-Settat during the 1st semester of the school year 2020/2021.
To investigate this criterion, we explored the mathematics assessment framework for secondary school mathematics **[12]** used by teachers to construct the TCS mathematics assessment and curriculum.
This reference includes three criteria that must be taken into consideration when designing continuous controls: coverage, representativeness, and conformity, which we have sought to achieve in the subjects chosen in our study. Second, an interview was conducted with the teachers in our sample to explain the results obtained from the analysis of the continuous tests.

III. RESULTS AND DISCUSSION

1. Criterion 1: Coverage of expected evaluation capabilities

1.1 Number of continuous tests

The following table illustrates the number of continuous tests performed by the 10 mathematics teachers during the first semester.

Table 1: Number of continuous tests carried out in the 1st semester

Continuos control	Number of teachers who carried out the test (%)
Control 1	100%
Control 2	100%
Control 3	40%

The results of (Table 1) show that almost half of the teachers (40%) carried out only two continuous tests per semester. As for the third test, they used the homework grade or the participation grade. This is not in conformity with the reference system of mathematics tests in the qualifying secondary cycle, which requires the realization of three continuous tests during each semester. On the other hand, the decrease in the number of continuous tests does not allow for a judgment on the evolution of learners' skills. Frequent enough assessment during the term improves the quality of learning and provides information on progress. This improves the validity of the assessment **[13].**

1.2 Coverage of expected course capacities

Evaluation is only possible if the objectives have been well defined and correctly formulated. The evaluator is obliged to specify the objectives of the training since it is a question of assessing the results **[13].** However, to define an educational objective, it is necessary to identify capacities that constitute general training objectives, common to several situations **[14].**

In order to measure the degree of coverage of the expected capacities by the evaluation, we have resorted to the targeted capacities of each course required by the reference frame of the evaluation which is organized

according to the 3 controls: the first control which must include the courses I, II and III, the second control: the courses IV, V and VI, and the 3rd control: courses VII, VIII, IX, X (See the table below):

Table 2: Percentage of control subjects having measured each expected ability of the 1st semester

Course required by the standard (Semester 1)	N ° Expected Capacity	(%) of control subjects / Expected capacity			
		Control 1	Control 2	Control 3	Total
Course I	I.1	90%	30%	10%	130%
	I.2	90%	20%	0%	110%
Course II	II.1	10%	0¨%	20%	30%
	II.2	40%	20%	0%	60%
	II.3	0%	10%	0%	10%
Course III	III.1	10%	20%	0%	30%
Course IV	IV.1	30%	40%	0%	70%
	IV.2	60%	70%	10%	140%
Course V	V.1	0%	30%	20%	50%
	V.2	0%	50%	10%	60%
	V.3	0%	40%	10%	50%
	V.4	0%	10%	20%	30%
	V.5	0%	0%	0%	0%
Course VI	VI.1	0%	10%	10%	20%
	VI.2	0%	10%	10%	20%
Course VII	VII.1	0%	0%	0%	0%
	VIII.1	0%	0%	40%	40%
Course VIII	VIII.2	0%	0%	10%	10%
	VIII.3	0%	0%	0%	0%
	VIII.4	0%	0%	10%	10%
	IX.1	0%	0%	0%	0%
	IX.2	0%	0%	0%	0%
Course IX	X.1	0%	0%	0%	0%
	X.2	0%	0%	0%	0%
Course X	X.3	0%	0%	0%	0%
	X.4	0%	0%	0%	0%
	X.5	0%	0%	0%	0%

From Table 2, we have raised the following information:

- The three abilities (I.1, I.2, and IV.2) were measured by 130% of the test subjects. In fact, this result is because they were measured in the three continuous tests, whereas they are prescribed in a single continuous test **[12].** Most of the subjects of the first test (90%) measured the ability I.1 required in the 1first test, although it was present in the last two tests: 30% of the subjects of the second test, and 10% of the subjects of the 3third test.
- On the other hand, almost half (40%) of the abilities required by the reference system were not measured in all the evaluation subjects of the first semester (V.5, VII.1, VIII.3,
- IX.1, IX.2, X.1, X.2, X.3, X.4 and X.5).
- In the same course, we notice that teachers focus on the measurement of some abilities among others; half of the teachers covered taking the example of the second continuous assessment, the ability (V.2), while the ability (V.4) related to the same course V was ignored by all the teachers. This difference between the abilities of the same course proves that the teacher favors certain notions among others, which increases the subjectivity of the evaluation.

The coverage of some capabilities to the detriment of others, as well as the redundancy of capabilities already covered in the preceding topics; testify to the existence of a deviation in the coverage of the capabilities targeted by the evaluation.

For the evaluation to be valid, the sample of items evaluated must be representative of the whole. Furthermore, to make a valid judgment on competencies, multiple situations must be used and repeated; frequent and diversified information must be available **[15].**

2. Criterion 2: Representativeness

According to [12] representativeness means adjusting the degree of importance allocated to each content, as well as the specific percentages for each question level

2.1 Representativeness of mathematical content

Regarding the respect of the importance of the mathematical content, according to the note 142-08: the first continuous control requires the representation of three courses: course I (60%), course II (25%) and finally course III (15%). The second continuous assessment requires the representation of three courses: course IV (30%), course V (40%) and finally course VI (30%). The third continuous assessment requires the representation of four courses: course VII (25%), course VIII (30%), course IX (30%) and course X (15%).

The results obtained showed us that

- Course I represent 60% in the first control of our sample. A percentage that respects the one required by the ministerial note [12] determined from 60. Contrary to course II, whose representation is 12% remains lower than the percentage specified by the note (25%). Course III is almost non-existent in the evaluation, although it represents 15% of the representativeness of the first control according to the 142-08 note.
- Course IV represents 55% in terms of average in the second continuous assessment, a percentage that exceeds that prescribed in the note142-08 defined in 30%. However, course V represents an average of 15%, although it should cover 40% of the mathematical content of the test. While course VI is almost non-

existent while it should cover 30% of the second continuous control. The discrepancy between the percentage of each course completed and the percentage indicated in the said grade is evidence of the non-compliance with the coverage criterion in the second continuous assessment.

- Only course VIII that was done in the third control, while the other courses that were covered are courses listed in the first or second continuous control depending on the assessment grade in mathematics.

Thus, we notice the non-representativeness of the mathematical content

2.2 Representativeness of the cognitive levels targeted by the assessment

The competency-based approach emphasizes the development of learning through authentic and complex situations. It aims to adapt learning to the learner's cognitive levels based on taxonomic models. The taxonomy of cognitive levels defined according to Guilbert is based on three levels: the first relating to memorization, the second relating to the analysis and interpretation of knowledge, and the third relating to problem solving [16].

The evaluation reference system of mathematics in the qualifying secondary cycle [12] was inspired by Guilbert's taxonomic model, on which the evaluation of learning in the Common Core level requires 60% of the questions in the first skill level, 30% in the second level and 10% for the most complex level. Such a distribution is contradictory in a curriculum that has been oriented towards a competency-based approach since 2002.

The measurement of the degree of each level in each continuous test of the 1st semester allowed us to obtain the following results (see table below):

Table 3: representativeness of cognitive levels according to each control

Continuous control	**Cognitive level (%)**		
	1st Level	2nd Level	3rd Level
Contriol 1	56%	44%	0%
Control 2	63%	37%	0%
Control 3	54%	45%	0%

The total absence of the third cognitive level in the evaluation of learning, which represents the most complex level and requires synthesis, analysis, and mobilization of knowledge in unfamiliar situations, will condition and orient the learner's way of learning. The more the barrier is set at the first level of memorization and direct application, the less effort the learner Continuous control Cognitive level (%) will make, and the more he will automatically adapt to the level of evaluation. Moreover, evaluation guides learning **[16].**

If assessment is intended to enhance the effectiveness of teaching and learning, then it should be designed according to constructivist learning theory **[17, 18, 19, 20].**

In addition, the average duration of the continuous controls of the 1st semester was as follows: "Control 1: 1h25min", "control 2: 1h45min" and "Control 3: 1h"; thus, the average duration of all the continuous controls does not reach the duration prescribed in the reference frame of evaluation of mathematics [12] specified in 2heures. On the other hand, the reduction in the duration of the evaluation does not allow for the measurement of higher levels of ability and provides more evidence of the progression of the learner's skills.

3. Criterion 3: The conformity of the assessment

According to the Mathematics Assessment Framework **[12];** Compliance makes it possible to respect and be limited to the contents, skills and abilities prescribed in the school-level curriculum. Moreover, 60% of the subjects of the first control measured the IV2 capacity and 30% of them measured the IV1 capacity that should normally be measured only at the second control, which visualizes an invalidity of this compliance criterion.

4. Analysis of the interview with teachers

To explain all these results, we conducted a 10-minute interview with these teachers. Thus, most teachers explained the non-respect of the criteria of coverage and representativeness of the continuous tests by the lack of time generated by the mode of teaching by alternating groups (the learning time decreased from 5 hours per week to 2 hours essentially for the TCS level). especially as the students did not have the necessary prerequisites to attack the new notions and courses of the program because of the closing of the schools last year. This situation led the teachers to plan remedial sessions before starting certain lessons. Thus, they focused on the courses that have more extension in the mathematical program of the following years.

IV. CONCLUSION

The context of the pandemic has had an impact in one way or another on evaluation practices in mathematics in the qualifying secondary cycle, especially at the TCS level.

Faced with a long schedule of courses to be completed before the end of the semester, and in exceptional circumstances where the teacher will have to conduct remedial sessions before initiating a new course, to

allow students to complete their learning from last year. It has proven difficult for these teachers to solve this equation: improving learning in a limited amount of time. While there is a need to adapt a learning-oriented teaching promotes their participation in the construction of knowledge [21] that ensures autonomy and minimal time for learning in class, and emphasizes peer tutoring [22]. Although this flipped pedagogy combines pre-existing pedagogical approaches such as active pedagogy, instructional differentiation, self-directed learning, problem-solving approach, or cooperative learning [23].

The coverage of the program was too low in all the continuous tests. Thus, one reveals the existence of an anomaly in the evaluative approach [24], particularly the first step related to the planning of the evaluation. The same goes for the representativeness of the evaluation of the higher cognitive level in these continuous tests, which was completely ignored; however, the aim of teaching according to a competence-based approach is to put the learner at the heart of the educational action, by encouraging the development of his or her ability to synthesize and solve problems.

Nevertheless, the current health situation does not give a vision of the path to follow. We therefore recommend a strong participatory involvement of all the actors of the educational system, an increase in the rate of pedagogical supervision and orientation of teachers to meet the challenge of teaching and evaluation of learning during the pandemic.

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