Study for the Improvement of the Moroccan Public Higher Education System Based on a Strategic Plan for Learning Technologies

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Abstract— **Within the framework of the comprehensive educational reform of Moroccan universities, the twinning project financed by the European Union has the general objective of accompanying, assisting and promoting the reform of the Moroccan higher education system within the framework of its strategic vision 2015-2030 and its approach to the European Higher Education Area, which has a twofold aim: to enhance the employability of graduates and to improve the governance of the university system. The purpose of this paper is to present the work carried out in the component 3 of this project, focused on the diversification of teaching methods (e-learning strategy). This component has aimed to provide guidelines and recommendations for addressing the main problems of Higher Education in Morocco and improving its quality.**

Keywords—e-learning, Higher Education, Educational technology, Technology Acceptance, TAM, Morocco.

I. INTRODUCTION

In 2015, the Moroccan Government's Higher Education, Training and Research Council approved the Strategic Vision 2015-30 under the title "For a School of Equity, Quality and Promotion", which aims to achieve the following objectives by 2030:

- Equity and equal opportunities.

- Quality for all.

- The promotion of the individual and the society.

This is a comprehensive reform based on a new methodological approach, with a particular focus on the consolidation of the higher education system. Morocco is also seeking to come closer to the standards and guidelines of the European Economic Community through higher education and scientific research, intending to increase the quality of the higher education system and its governance processes. Additionally, a modernisation of the higher education system brings with it an openness to the international market.

In this context, the Kingdom of Morocco and the Regional Ministry of Education of Castilla y León signed a twinning project in November 2017 to adapt the Bologna recommendations in Moroccan universities, addressing issues related to educational technologies, ECTS, diversification of the training offer and recognition of university degrees, among others, in order to generate a process of transfer of European knowledge and experience.

Twinning projects are an instrument of institutional cooperation of the European Commission with the candidate countries and the countries of the region of the European Union's Neighbourhood Policy where, through technical assistance carried out by public institutions of the member countries of the European Union, it promotes the strengthening of the public administrations of the beneficiary countries.

This paper aims to give an overview of the work carried out by the University Institute of Educational Sciences of the University of Salamanca on the diversification of teaching methods (e-learning strategy) in the framework of the twinning project.

The work has been organised in the following sections. The second section describes the main components in which the twinning project is organised. The third section describes the methodology used to carry out the study in Moroccan higher education institutions. The fourth section presents a brief account of the results obtained. Finally, the last section summarises the main conclusions of the study.

II. THE TWINNING PROJECT

The project "Support for the higher education system in Morocco as part of a move towards the European Higher Education Area" (*Appui au Système de l'Enseignement supérieur au Maroc dans le cadre d' un rapprochement avec l'Espace européen de l'Enseignem*), is a European project whose general objective is to accompany, assist and promote the reform of Morocco's higher education system within the framework of its strategic vision 2015-2030 and its approach to the European Higher Education Area (EHEA) in order to improve the employability of graduates and the governance of the university system. The project has lasted two years (January 2018 - December 2019), and its development is organised into six components involving different Spanish institutions coordinated by the Regional Ministry of Education of Castilla y León:

- Component 1: Approximation of the legislative and regulatory framework to EU standards.

- Component 2: Diversification of training provision.

- Component 3: Diversification of teaching methods.

- Component 4: Policy and implementation of ECTS in the framework of LMD degrees (Bachelor, Master and Doctorate).

- Component 5: Recognition of diplomas.

- Component 6: Consolidation of piloting tools.

Each component has a person in charge of coordinating the different missions carried out in Morocco as part of the component so that the objectives of the component are achieved.

In particular, this work falls under component 3 [1], coordinated by the Research Institute for Educational Sciences (IUCE) and the GRIAL Research Group of the University of Salamanca [2, 3]. The component aims to provide the Moroccan higher education system with incentives to diversify teaching methods in all areas of study, to reduce the amount of face-to-face training in order to modernise higher education and improve its quality.

This component has been developed according to the needs formulated by the Moroccan Ministry of Education, related to the modernisation of the higher education system and the need for openness at the international level, thus complying with the recommendations of the Bologna process on which the European Higher Education Area (EHEA) is built [4].

In particular, component 3 focuses on incorporating eLearning solutions [5, 6] to the Moroccan university context in order to solve the different challenges of massification faced by Moroccan public universities, as well as to incorporate methodologies and pedagogical proposals that improve the teaching-learning processes mediated by information and communication technologies (ICT), all from a strategic reference framework [7, 8].

III. METHODOLOGY

A. Study design

Component 3 was carried out over six missions in Morocco and a visit to the University of Salamanca and the University of Burgos by a delegation of Moroccan representatives (Fig. 1). The four phases of the study were carried out during different missions:

- Phase 1: analysis of the context and design of the research (Mission 3.1.1)

- Phase 2: a quantitative study:
  - Design of the instruments and definition of the data collection protocol (Mission 3.1.2).
  - Application of the instruments.
  - Quantitative analysis of the data collected in Moroccan universities (Mission 3.1.3)

- Phase 3: a qualitative study:
  - Design and implementation of the interviews based on the results obtained in the quantitative study (Mission 3.1.4).
  - Qualitative analysis of the interviews and relationship with the quantitative results (Mission 3.1.5).

- Phase 4: Recommendations to diversify teaching methods in all fields of study.

The first phase focused on the collection of information for the design of the study. Specifically, it focused on the collection of documentation to understand the reality of Higher Education in Morocco: massification, shortage of teachers, weak technological infrastructures, few indicators of access to online training, incipient appropriation of solutions based on mass instruction platforms, such as MOOC (Massive Open Online Course) [9, 10] and SPOC (*Small Private Online Course*) [11], as well as on other alternatives of eLearning environments. Likewise, opinions were collected from those responsible for higher education at ministerial level, and it was necessary to contrast this information with the agents directly involved in online training within the universities themselves: those responsible for teaching and technology in the universities, coordinators of innovative proposals or specific eLearning centres, non-innovative teachers, etc.

In response to this need, a mixed approach study is proposed, with an explanatory sequence [12] in which the quantitative phase precedes the qualitative phase and helps to plan it.

Finally, after implementing the instrument with the support of the Moroccan Ministry of Education, the third mission of Component 3 (Mission 3.1.3) has focused on carrying out the analysis of the results collected from 1 July 2019 to 4 November 2019.
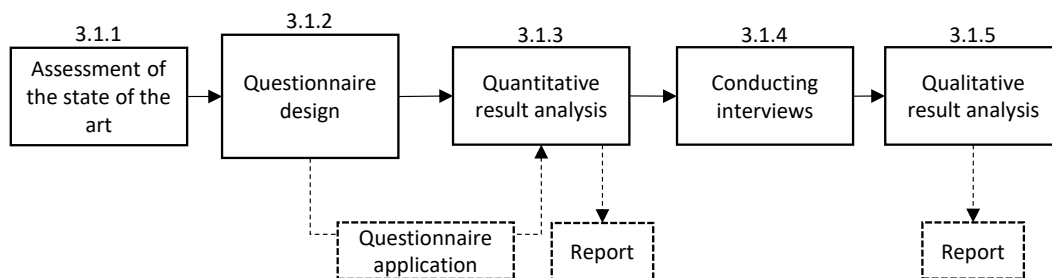

Fig. 1. Design of the study according to the phases and missions.

B. Population and sample

The study population is made up of teachers from Moroccan public universities, regardless of their professional category. Concerning private universities, the Ministry has indicated that they should be excluded from the study population.

According to figures from the 2018-2019 official statistics on university higher education in Morocco (Direction des Stratégies et des Systèmes d'Information, 2018), the population is composed of 14 400 teachers. However, the report for the academic year 2017-2018 [13] provides an overview of the gender distribution, with a total of 13954 teachers, 3740 of whom are women (26.80%) and 10214 men (73.20%). Table I details the sample collected at each of the universities involved in the study.

TABLE I.   SAMPLE OF QUESTIONNAIRES COLLECTED FROM TEACHERS (BETWEEN APRIL AND NOVEMBER 2019). POPULATION AND SAMPLE BY UNIVERSITY

University	N	Sample %	The population of the University	Population %	Participation %
ESI	7	1,1	-	-	-
UAE	63	9,5	1.200	8,6	5,2
UCA	123	18,6	1.554	11,2	7,9
UCD	28	4,2	627	4,5	4,4
UH2C	24	3,6	2.211	15,9	1
UHP	23	3,5	385	2,8	5,9
UIT	32	4,8	572	4,1	5,5
UIZ	61	9,2	1.190	8,6	5,1
UM5	136	20,5	2.299	16,5	5,9
UMI	71	10,7	940	6,7	7,5
UMP	29	4,4	893	6,4	3,2
USMBA	53	8,0	549	3,9	9,6
USMS	12	1,8	1.501	10,8	0,7
Total	662	100	13.921	100	4,7

The sample corresponding to the qualitative phase was composed of a total of 26 subjects: 20 university teachers (with and without experience in the educational use of ICT) and 6 university key agent managers from the different Moroccan universities organised into four groups.

C. Instruments

The instruments were designed at the beginning of the second and third phase. The quantitative instruments were designed based on the information obtained in the first phase. To design them, a model was made to evaluate the current state of integration of Educational Technologies in the teaching-learning processes in the Public Universities of Morocco, both at the level of accessibility and support and concerning their useful inclusion in university teaching.

In particular, as part of the analysis of the situation, two instruments were developed, a questionnaire of indicators on the penetration and use of educational technologies in Moroccan public universities [14-16], and a questionnaire on the acceptance of educational technologies for teaching in Moroccan public universities [17-19]; both available in English, French and Spanish.

The indicators tool has been developed based on the UNIVERSITIC reports [20-23] developed by CRUE Spanish Universities [24].

The second instrument is a questionnaire based on the extended Technology Acceptance Model (TAM) [25-31]. The evaluation model proposed, besides evaluating the three typical dimensions of TAM models (Perceived Utility; Perceived Ease; Behavioral Intention), includes seven external dimensions related to social influence (Subjective norm; Social image), the professional context (Volunteerism; Relevance; Results of use; External control of the tool) and the personal context (Anxiety).

Concerning the instrument used for the qualitative part, a set of semi-structured interviews was designed to address the issues of interest revealed during the previous quantitative analysis. Thus, these interviews were organised around the following topics: institutional resources for the use of new technologies, level and types of use of ICTs in the teaching of the interviewees, perceived benefits of the use of ICTs, main difficulties in the use of ICTs and areas for improvement, institutional support for the incorporation and use of ICTs in teaching. In each of the interviews, the questions were adjusted to the opinions and interests expressed by the participants, allowing other issues to emerge such as the characteristics of the students or the change in the teaching and educational model needed to accompany the implementation of ICTs in higher education.

D. Data collection and analysis

During Mission 3.1.2, the instruments described above were defined in order to apply them in the 12 Moroccan public universities. The first instrument, "Questionnaire of Indicators on the Penetration and Use of Educational Technologies in Moroccan Public Universities", was answered in a unique way by each public university, taking into account the importance of the answers reflecting the reality of each institution in the most reliable way. The questionnaire has been shared as a form in PDF format so that it has been sent to the key agent of each university to provide the requested data. The process has been developed from April 2019 to November 2019.

The second instrument, "Questionnaire of Acceptance of Educational Technologies for Teaching in Moroccan Public Universities", is aimed at teachers in all public universities in Morocco. This questionnaire has been carried out online, so the data collection process has consisted of sending it to all public universities and making several reminders in order to obtain at least 50-60 responses per university. The process has covered the period from April to November 2019.

The qualitative information was collected through four discussion groups with university teachers and management and administration staff held in December 2019.

IV. RESULTS

About the analysis of the first questionnaire, referring to indicators of penetration and use of new technologies, it is necessary to highlight the need for improvement in infrastructure to solve some shortcomings that hinder the use of new technologies on campus, such as the lack of availability of WiFi connection in 100% of university spaces or the low number of free computers available to students.

However, despite the shortcomings detected in infrastructure and support, all universities have a virtual teaching platform, which indicates an interest on the part of both the institutions and the Ministry in implementing eLearning solutions. On the contrary, these platforms are

underused, as the number of teachers using them is a negligible percentage of the total population.

Secondly, the results of the analysis of the questionnaire on the acceptance of new technologies (Table II) show that, although the willingness of university teachers to use educational technologies is positive, there is a wide range of improvement.

In total, high scores (above 5.5) were obtained on 18 items, medium scores (between 4.5 and 5.5) on 10 items and low scores (below 4.5) on 6 items.

TABLE II.   DESCRIPTIVE ANALYSIS OF THE ITEMS OF THE QUESTIONNAIRE OF ACCEPTANCE OF EDUCATIONAL TECHNOLOGIES FOR TEACHING.

	Avg.	Std. Dev.	N
AN_01	2,64	1,82	586
AN_02	2,25	1,75	618
AN_03	2,25	1,81	608
CE_01	5,19	1,73	607
CE_02	4,32	1,98	616
CE_03	5,92	1,67	615
CE_04	4,26	2,18	613
FUP_01	4,12	2,07	622
FUP_02	4,76	1,75	588
FUP_03	5,40	1,61	617
FUP_04	5,14	1,76	631
IC_01	5,80	1,58	592
IC_02	6,04	1,61	590
IC_03	6,12	1,52	324
IS_01	4,13	2,10	566
IS_02	4,84	1,93	594
IS_03	6,05	1,32	628
PT_01	6,15	1,55	658
PT_02	5,81	1,65	638
PT_03	5,90	1,61	643
RD_01	5,81	1,69	633
RD_02	5,80	1,64	614
RD_03	5,47	1,79	622
RD_04	5,22	1,86	614
RS_01	3,45	2,16	536
RS_02	4,36	2,13	515
RS_03	4,94	1,91	609
RS_04	4,86	1,69	606
UP_01	5,84	1,58	624
UP_02	5,79	1,70	629
UP_03	5,82	1,65	625
UP_04	6,08	1,58	636
VO_01	5,99	1,67	635
VO_02	6,20	1,60	597

The analysis of their content allows the detection of two priority areas for improvement:

- **Training of university teachers in the use of new technologies:** since most of the items with the scores refer to the perception of the effort and the own capacity to use the tools.

- **Development of awareness programmes:** taking into account that the scores obtained in the items of the dimensions related to the social image are below 4.5 in most cases.

Finally, the results of the qualitative phase were in line with those obtained in the analyses of the questionnaires, helping to delve into some issues and providing details about some of the problems identified in the first phase. Regarding the available resources, most of the interviewees corroborated that there is a lack of both material and human resources and a problem of accessibility to online resources, which hinders the implementation of ICTs in a generalised way. On the other hand, there was a general demand for more training for teachers, with a twofold focus: technical training in the use of the tools, and pedagogical training in the specific educational uses of these tools, all accompanied by institutional programmes to stimulate the use of learning technologies among teachers, reflected in information and training campaigns as well as an adequate recognition of the time dedicated to eLearning tasks. Finally, the discussion groups also revealed a need to improve communication between teachers and administrative spheres, with the dual objective of being able to receive information about institutional resources and programmes, as well as being able to convey their concerns and needs about the process.

V. CONCLUSIONS

Firstly, some limitations of this study should be highlighted. In the quantitative part, the main limitation encountered was that most of the sample came from few higher education institutions. For its part, one of the main limitations of the qualitative phase was that most of the informants came from the same institution. However, this limitation was compensated for by having a diverse group of participants (teachers with and without experience in handling ICTs, administrative staff, academic heads).

Besides, it is also necessary to take into account, when interpreting the results, the high student-teacher ratio in Moroccan universities, given that there are 63 students for every teacher (62.93).

In general, despite all the needs and areas for improvement identified by the participating teachers, they showed a good disposition towards the use of educational technologies. However, it should be pointed out that the management and technical agents did express some reticence on the part of the teaching staff, which can be explained by the effect of the social desirability bias, which means that teachers may tend to respond to what they consider will be better received by the interviewer. This reticence can be explained by several of the reasons explained above, such as the extra workload involved in starting to use ICT or the lack of institutional stimulus programmes.

However, in both phases of the study, it is clear that inexperienced teachers consider technologies to be useful for their work, although they do not specify specific didactic uses, which again highlights the need for training programmes in the pedagogical use of ICT.

In this sense, the positive results expressed by the participants in the discussion group held with the teachers who are experts in the use of ICT (held at the Institute of eLearning at Mohammed V University) open the door to taking the work carried out at that centre as a model, bearing in mind that its teachers seem to have made a successful adoption of these tools, showing knowledge of both technical handling and educational possibilities.

The final conclusion of the study, especially ratified with decision-makers in the Ministry of Higher Education and government teams from Moroccan public universities, is the need to introduce learning technologies under a strategic framework that allows the important challenges identified to be tackled with adequate guarantees of success and sustainability.

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