Assessment of Teachers' Needs to Integrate Learning Analytics in Higher Education: The Morocco Case

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***Abstract*—Learning Analytics (LA) is a better solution for harnessing the enormous data that learners leave behind on learning platforms. To take full advantage of it, it needs to be well integrated by teachers. The aim of this study was therefore to explore the needs and willingness of teachers to integrate learning analytics into their courses. This study used a quantitative method to collect data based on a questionnaire distributed to 140 higher education teachers affiliated with Ibn Tofail University. The results of this study show that most teachers are willing and available to commit to the possibility of adopting learning analytics if training and preparation programs on the subject are implemented. They also have other needs for guidance, assistance, easy-to-use tools, and need access to all student data on the appropriate platforms. The study concludes by discussing and proposing a series of recommendations for successfully integrating learning analytics into higher education.**

***Keywords*—readiness, integration, learning analytics, higher education**

I. Introduction

The widespread use of technology and the internet has increased the data obtained from its use. Many resources have collected huge amounts of data [1]. During the teaching and learning process, various behaviors and movements are recorded by computers. This large amount of data that learners leave during their learning is the most conducive factor for applying learning analytics which is seen as a promising strategy to address ongoing educational challenges [2].

There are several definitions of learning analytics. For the purposes of this article, we will limit ourselves to the most commonly used definitions. The most accepted definition of Learning Analytics (LA) positions this discipline as "the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs" [3]. It refers to "interpreting a wide range of data generated by and collected for students to assess academic progress, predict future performance, and identify potential problems" [4]. It is the collection, analysis, and feedback of data to learners to improve their learning [5].

Three main processes emerge through this concept, namely, data collection, analysis, and action. Each process has its own tools. It can be implemented independently, or it can also be implemented in an integrated manner (all operations are performed with one tool). Furthermore, according to Wise and Zhao *et al.* [6], there are two approaches to perform the operations of collection, analysis and feedback related to learning analytics: embedded analytics and extracted analytics.

Embedded analytics are traces of activity integrated into the learning environment itself that can be used by learners in real-time to guide their participation. Extracted analytics are traces of activity extracted from the learning environment and presented back to learners for interpretation as a separate exercise from participating in the learning activity itself. That is, while the presentation of the analytics may be integrated into the overall learning environment, the activity of interpreting them is separate from that of engaging in the learning activity. For example, analytics presented to learners via most dashboard systems fall into this second category.

In this area, many researchers have studied the use of learning analytics to achieve various goals. Although each of these studies examined a different objective from the others, all of these studies reached good results in which they emphasized the importance of using learning analytics in achieving the objectives they studied. Thus, teachers can use it for the same goals and the same areas of application. For that, they must have the skills that qualify them to apply it. For interpreting learning analytics results, Greller and Drachsler [7] have identified seven skills. They are: digital skills, information literacy, critical thinking, evaluation skills, ethical skills, analytical skills, and self-management.

This means that, if we are waiting for the professor to use LA, we have to support him. So, we have to know his needs. Honestly, the lack of a trustworthy technological infrastructure and disregard for the needs of teachers have created many barriers to the adoption of learning analytics.

To overcome these barriers, this study aimed to examine the needs that facilitate the use of learning analytics, as well as achieve its related objectives, seeking to answer the following questions: Q1) What are the needs of teachers to integrate learning analytics into higher education? Q2) To what extent is it necessary for the professor?

II. Literature Review

As soon as the first infected cases of COVID-19 appeared, the Moroccan authorities took the necessary precautions to slow down its spread. To avoid a new coronavirus pandemic as described by the World Health Organization, many measures have been taken.

In this context, it was decided to suspend classes until further notice in all schools and universities of the public and private sectors from Monday, March 16, 2020. To ensure educational continuity for the 2019/2020 academic year and diversify possible alternatives, the Ministry of Education, Vocational Training, Higher Education, and Scientific Research has launched distance learning.

By using online teaching and learning platforms in

distance learning, vast amounts of tracking data are generated. All of this data has hidden value behind it and, if properly analyzed, it can provide deep insight into the educational setting and reveal which teaching methods and interventions are most likely to improve learner performance and retention [8]. This simply means that the new era of "big" educational data has created a new set of problems, requiring a new set of solutions. One such solution designed to help the education system is learning analytics. The amount of data currently available indicates that we have the opportunity to implement LA strategies taking advantage of the findings and recommendations of studies and experiments.

Many studies have proven its effectiveness in achieving many goals, such as predicting (and improving) student success [9], engaging students [10], increasing student success [11], assessing student learning [12], enhancing student learning, developing future competencies in higher education [13], developing a student engagement model in the learning management system [14], improving student experience [15], understanding and supporting collaborative learning [16], understanding scientific modeling [17].

Other studies have also been conducted, including predicting student performance behavior [18], supporting students' engineering design [19], predicting student performance [20], predicting student performance [21–23], developing an early-warning system for at-risk students [24], predicting students' academic performance [25], understanding students' self-reflections [26], scaling the provision of personalized feedback [27], improving teamwork assessment [28], tracking student progress in LMS [29], evaluating and monitoring the learning progress [30], assessing students' behavior in open-ended programming tasks [31], reviewing curriculum [32], visualizing and recommending [33], providing personalized recommendations for finding peers [34].

Many studies also indicate that in order to successfully integrate learning analytics, the needs of teachers must be known [4, 35–38]. Conversely, few studies have explored the basic needs of teachers. Most of these studies have focused on teacher needs that can be addressed by integrating LA, but have not focused on teacher needs that facilitate the use and adoption of LA.

This shows the teacher's need for learning analytics and does not provide the needs that he will need to use.

According to the Supporting Higher Education to Incorporate Learning Analytics (SHEILA) and Learning Analytics in Latin America (LALA) frameworks, when formulating strategies for adopting learning analytics, one of the important stages is identifying stakeholder needs. Through the research that used the tools of these frameworks, including the research of Hilliger *et al.* [2, 39], these needs include expectations, preliminary conditions, considerations and goals to be achieved.

For students and professors, all the needs expressed were in the form of expectations from the use of learning analytics. Students need quality feedback and timely support, and teachers need timely alerts and meaningful performance assessments. These are the results of studies whose aim was to understand the needs of stakeholders in order to choose the appropriate learning analytics tool to meet these needs.

According to Hilliger *et al.* [39], other expected needs include: academic support for subgroups of students, timely and personalized feedback to improve the teaching and learning process, clear information on students' academic workload, clear information on students' academic progress at the curriculum level, indicators of high failure rates and risk of dropping out, improvement of existing LA tools for consulting, use of educational data collected from faculty and students, integrated systems to obtain information on students' academic and psycho-socio-emotional profiles, and clear information on students' satisfaction with courses and programs.

This is normal in contexts that are advanced in learning analytics because they have created the necessary conditions. For contexts that are novices or have not yet adopted learning analytics, the situation is different. In our opinion, the needs will combine the necessary conditions for the use of learning analytics and the expectations and goals to be achieved by its use.

Thus, in the context of our study, we expect that needs are conditions for the successful use of learning analytics. These needs include guidance [38], leadership that supports learning analytics [40], stakeholders committed to the use of learning analytics, a competent team in the use of analytics, necessary human resources, a clear and strategic vision, technical infrastructure, technical expertise, incorporation of learning analytics into teachers' working time, motivation of teachers using learning analytics, a legal framework that protects student data, tool feasibility, ease of use, and tool utility [41].

Therefore, in this research, we will address the needs of the teacher to use learning analytics effectively.

III. Materials and Methods

Given the nature of this study, which has to collect information directly from teachers of higher education in order to obtain results that help to understand their needs and the extent to which they want to use learning analytics, the researchers used the descriptive-analytical approach. This approach expresses the phenomenon to be studied quantitatively and qualitatively, with the aim of analyzing the phenomenon and revealing the relationships between its different dimensions, in order to reach conclusions that improve and develop reality.

The necessary data was collected from the study population through a questionnaire that was developed and distributed to participants, numbering 140 teachers of higher education belonging to IBN Tofail University. To ensure the reliability of the questionnaire, we conducted an exploratory study with a sample of 6 teachers to determine the extent to which the questionnaire materials were understood before implementation of the main study, in order to avoid abnormal or contradictory responses. We calculated Cronbach's alpha test. The Cronbach's alpha score is 0.88, which is sufficient for research purposes. We excluded this exploratory sample from the main sample, and applied the tool to the entire sample.

To ensure participants' privacy, we informed them that all collected data would be kept confidential. We promised not to disclose any individual's information to others and stressed that the data would be used exclusively for doctoral research purposes. After giving them the necessary time, we retrieved

and approved all questionnaires for the purposes of statistical analysis. We used Statistical Package for Social Sciences (SPSS) and Arab processor in Social Statistics (APSS) software. The first was used in calculating the validity of the questionnaire and calculating proportions, while the second was used in the analysis of Likert scale type questions.

IV. Results

The main objective of this study is to know the needs of teachers concerning the implementation of learning analytics and assess the degree of its utilization. Then the researcher tries to know the needs and their extent in terms of conditions, expectations and specifications of the tool.

A. Demographic Characteristic

The sample of the study was composed of 75% men and 25% women from higher education institutions affiliated with the University IBN Tofail. The age distribution of respondents is as Table 1.

Table 1. Distribution of teachers by age and by experience

Demographic		Percentage
Sample age (years old)	≤ 30	13%
	31–40	9%
	41–50	34%
	51–60	34%
	≥ 60	9%
Years of experience (years)	≤ 5	9%
	5–10	13%
	≥ 10	78%

Out of the total 140 teachers in our study sample, Table 1 reveals that 13% of respondents are under 30 years old, while 9% fall in the age bracket of 31 to 40. Moreover, 34% of participants are aged between 41 and 50 years, 34% fall between the ages of 51 and 60, and finally, 9% are over the age of 60. Also, the majority of respondents (78%) have less than 10 years of experience, with 12% reporting experience between 5 and 10 years, and 9% reporting less than 5 years of experience.

B. Adoption of Learning Analytics

In this axis, we asked the following question: Does your organization adopt a specific form of learning analytics? We received the following response (Fig. 1):

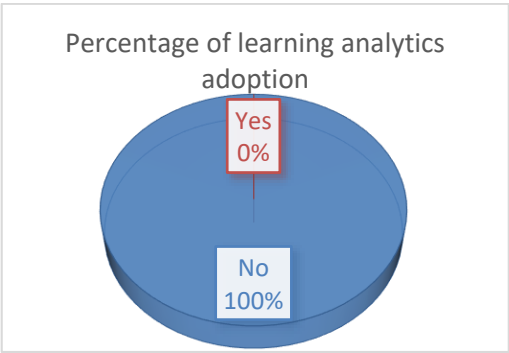

Fig. 1. Distribution of teachers according to their university's adoption of the learning analytic.

It is evident from the chart that none of the organizations are employing learning analytics. This can be attributed to two plausible explanations: IBN Tofail University either did not devise a policy for the implementation of learning analytics or did not consult faculty during the process. In either scenario, it is plausible that educators will have unmet requirements if they seek to integrate learning analytics.

C. The Use of Learning Analytics Tools in Teaching Practice

To determine the extent of teachers' utilization of learning analytics, we asked the question: Do you utilize any learning analytics tools in your teaching practice? The responses were distributed as follows:

The Fig. 2 shows that 90% of respondents do not use learning analytics tools. While 10% use them. Faculty members who use learning analytics explained that they had used Moodle's built-in learning analytics tools.

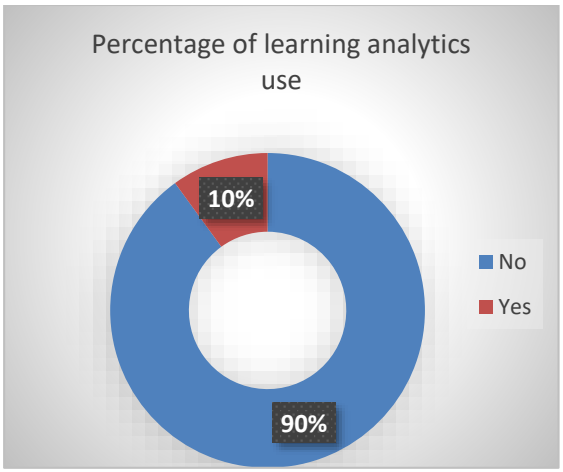

Fig. 2. Distribution of respondents by use of learning analytics.

Everyone who has used learning analytics has used the embedded approach, as showed in Fig. 3. And anyone didn't have any guidelines or procedures to follow regarding the use of learning analytics in their courses.

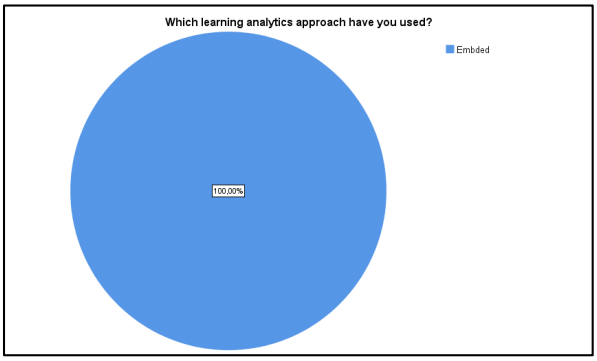

Fig. 3. Approach used.

D. How the Teachers Have Used Learning Analytics?

It is evident from Fig. 4 that all teachers who utilize learning analytics use it to view activity reports, while 75% utilize it to view compliance reports. No one uses it for communicating with students or intervention to enhance learning.

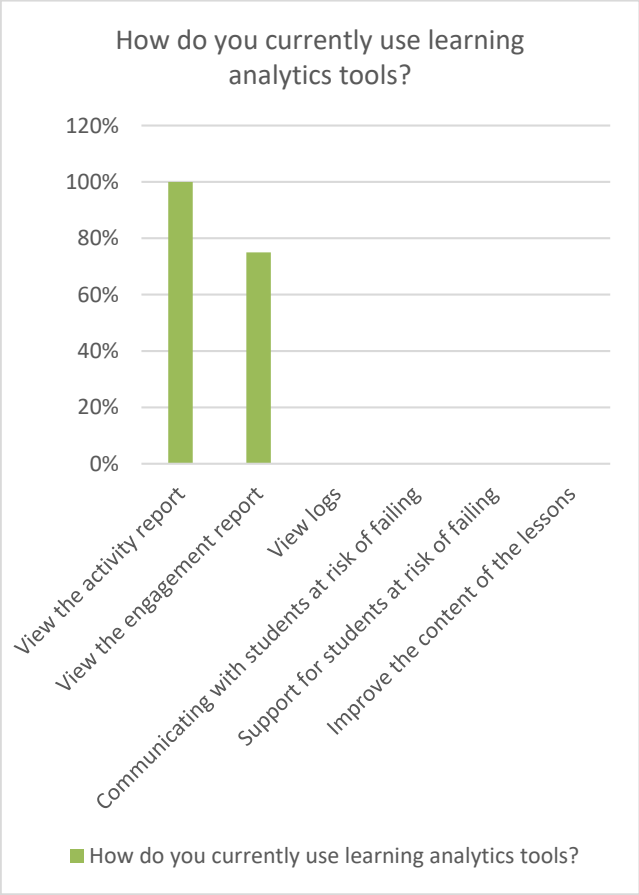

Fig. 4. The use of learning analytics.

E. The State of Readiness to Integrate Learning Analytics

The Fig. 5 shows that only 31% are willing to integrate learning analytics effectively while the majority needs help. Some individuals may be able to integrate learning analytics into their practices through training, while others will need guidance on how to effectively utilize the data generated by these tools. Additionally, some may benefit from using a model that demonstrates how to apply the insights generated by learning analytics.

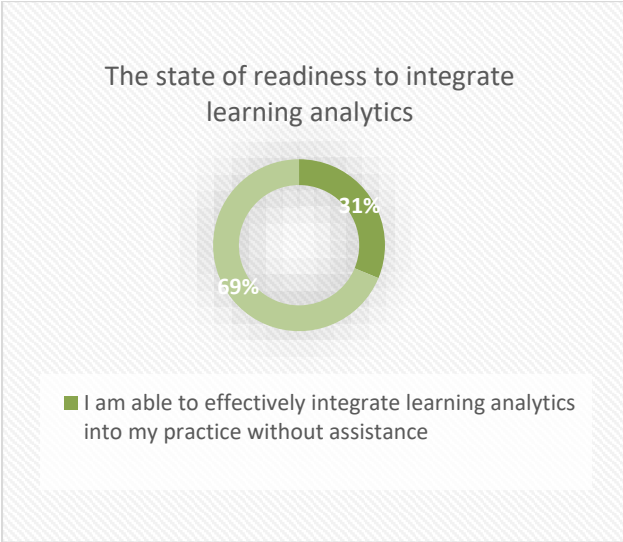

Fig. 5. The state of readiness to integrate learning analytics.

Table 2. Needs in terms of necessary conditions

Terms	Needs	I don't need	I kinda need	desperately need	Average	Standard deviation	Frequency (%)	Trend
necessary conditions	Guidance	0	26	114	2.81	0.39	93.67	I desperately need
	Stakeholders who intend to commit to using learning analytics	0	48	92	2.62	0.48	88.67	I desperately need
	A team competent in using analytics	0	70	70	2.62	0.48	87.33	I desperately need
	A clear and strategic vision	35	44	61	2.19	0.81	73	I kinda need
	Technical infrastructure	0	0	140	3	0	100	I desperately need
	Technical expertise/training	0	0	140	3	0	100	I desperately need
	Incorporating learning analytics into the teacher's work time	35	44	61	2.19	0.81	73	I kinda need
	Motivating teachers using learning analytics	0	61	79	2.56	0.5	85.33	I desperately need
	A legal arsenal that protects student data	9	35	96	2.62	0.6	87.33	I desperately need
expectations	Timely and personalized feedback to improve the teaching and learning process	0	0	140	3	0	100	I desperately need
	Clear information about students' academic workload	66	66	8	2.59	0.61	53	I don't need
	Clear information about students' academic progress at the curriculum level	0	35	105	2.75	0.43	91.67	I desperately need
	Indicators of high failure rates and risk of dropping out	0	57	83	2.59	0.49	86.33	I desperately need
	Integrated systems to obtain information on the academic and psycho-socio-emotional profiles of student	39	66	35	1.97	0.73	65.67	I kinda need
	Clear information on student satisfaction with courses and programs	0	52	88	2.62	0.48	87.33	I desperately need
tools specifications	tool utility	0	0	140	3	0	100	I desperately need
	A tool feasibility	09	39	92	2.59	0.61	86.33	I desperately need
	A tool easy of use	0	26	114	2.81	0.39	93.67	I desperately need
	A tool that measures learning	0	0	140	3	0	100	I desperately need
	A tool that enables data download	0	57	83	2.59	0.49	86.33	I desperately need

This indicates that some of them have positive intentions and perceptions to integrate learning analytics.

We sought from this axis to measure the needs of the teachers in terms of the necessary conditions, expectations and specifications of the tool. So, we presented them with needs and asked them to what extent they needed them. The result was as follows:

- For the needs in terms of necessary conditions

In Table 2, teachers desperately need: mentoring (93.67%), stakeholders intending to commit to using learning analytics (87.33%), a team of analytics skills (87.33%), technical infrastructure (100%), technical expertise (100%), teacher motivation using learning analytics (85.33%), and an arsenal legal protection student data (87.33%).

- For the needs in terms of expectations

As shown in Table 2 all participants in the study expressed a strong need for timely and personalized feedback to enhance the teaching and learning process. Additionally, 91.67% desperately need to know about progress at the curricular level, 86.33% require indicators of high failure rates and risk of dropping out, and 87.33% need clear information about students' satisfaction with courses and programs.

- For the needs in terms of tool specifications

It is clear from the table that the majority of respondents strongly need: an easy tool (93.67%), tool utility (100%), a tool feasibility (86.33%), a tool that measures learning (100%), and a tool that enables data download (86.33%).

V. Discussion of the Main Results

The purpose of this study was to understand and evaluate teachers' needs and readiness to integrate learning analysis.

The results of the study showed that most teachers are willing to adopt learning analytics if they receive training, advice, or a framework in this area. These are components that are part of their needs to integrate learning analytics. The reason for this can be attributed to the lack of a policy to integrate learning analytics.

This result is consistent with previous studies suggesting that effective adoption of learning analytics in higher education requires development of a learning analytics strategy [42] and adoption of a framework, such as the LALA framework, to facilitate this adoption [43].

The results also showed several needs of very high intensity. In terms of tool specifications, we find: utility of the tool, feasibility of a tool, easy-to-use tool, a tool that measures learning, and a tool that allows downloading data.

In terms of expectations, we find: timely and personalized feedback to improve the teaching and learning process, clear information on students' academic progress at the curricular level, indicators of high failure rates and risk of dropping out, clear information on student satisfaction with courses and programs. These findings are in part consistent with the study by Hilliger [29] and Pistilli and Heileman [43] where teachers need timely alerts and meaningful performance assessments.

In terms of conditions, we find: mentorship, stakeholders who intend to commit to using learning analytics, technical infrastructure, technical expertise/training, motivating teachers with learning analytics, and a legal arsenal that protects student data. Our study is consistent with previous research. They have been shown that technical infrastructure, technical expertise/training, and a legal arsenal that protects student data are significant barriers to the adoption of learning analytics [44–46].

This indicates that the advice and guidance in those studies will be appropriate to meet the needs of our professors. Also meeting these needs lies in the findings of research on how teachers use learning analytics in successful experiences.

As for the other needs expressed in our study, it seems that they will be solved by strengthening the capacities of the actors. We must therefore adopt a framework for strengthening the capacities of actors such as the LALA framework.

VI. Conclusion

In this research, we conducted a survey with 140 teachers to examine their needs and readiness to integrate learning analytics.

At the end of this research, we saw that most faculty are ready and prepared to adopt learning analytics if there is training and preparation. They have essential needs represented in the training, guidance, adoption model, useful tool, easy to use tool, and access to all student data.

To facilitate the guidance of teachers, it is necessary to deepen the research by surveying successful experiences and how professors used learning analytics in them.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Abdelkhalek Zine contributed to the development of the research approach and tools, the analysis of the data, the interpretation of the results and the writing of the article. Abdelali Kaaouachi validated the approach and tools, guided the research and revised the document for corrections. Both authors approved the final version of the paper.

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