

Formative E-Assessment and Behavioral Commitment of Students

Case of the Faculty of Science Ben M'sik

<https://doi.org/10.3991/ijet.v14i12.10389>

Ghizlane Chemsî (✉), Mounir Sadiq, Mohamed Radid, Mohammed Talbi
University Hassan II, Casablanca, Morocco
g.chemsi@gmail.com

Abstract—Digital technology contributes to the development of new teaching practices and a new assessment culture [1,2,3]. Various studies [4,5] show that digital technology facilitates the formative assessment process, an assessment mode that favors the learner's commitment and encourages the learner to adopt an efficient learning method [6]. All the more, the media coverage of this type of assessment generates a large number of indicators enabling to analyze the behavioral commitment of students in their learning process.

The objective of this study is to analyze the impact of formative E-assessment on the students' behavioral commitment based on the digital traces of the students' work, this traceability is considered a very important source permitting to find out about the students' behavioral commitment. The assessment was achieved via the interactive Moodle platform, it was tested on a group of students from the Faculty of Sciences Ben M'sik in Casablanca, Morocco. The results of the experiment carried out for a period of two years (2015-2016 and 2017-2018) revealed that the majority of the students are committed to take the assessment test. We observed a real implication of the latter, where the action traces of the students in terms of participation and contribution could be collected and analyzed by the teacher for feedback purposes.

Keywords—Formative E-assessment, Moodle, Behavioral commitment, Digital traces, Digital technologies.

1 Introduction and Problem

In Morocco, sciences students, not specialized in languages are called on to pursue their university studies in French, despite a pre-university education in Arabic language. These students need to learn French in order to continue their university curriculum in an optimal way.

The majority of these students have real language shortcomings in speaking and writing, comprehension as well as production. They are faced with a serious problem of not understanding the specialty course.

The language incompetency of the students has a double effect, on one side, academic failure and on the other finding a job at the end of their studies [7].

Having taken note of the problem's scope, the leaders and the directors of the Higher Education in Morocco undertook a series of measures aiming at education reform and giving priority to language teaching and the teaching languages stated in the National Education and Training Charter in 1999 [8] and relaunched by an emergency program [9]. It's a question of introducing a module titled «Language and Terminology» during the first two semesters of the university education that aims to meet the expectations and needs of the students in terms of learning the French language in its functional aspect so as to make specific use of it during their university education.

At the Hassan II University in Casablanca, the students of the Faculty of Sciences Ben M'sik, once registered, have to take a placement test to determine their French language proficiency. The test consists in answering questions relative to grammar, vocabulary and reading comprehension. The majority have A1 level, whereas the minimum required level is B1-B2 according to the Common European Framework of Reference (CEFR) classification.

We noted, during the teaching of this module, the student's lack of commitment and perseverance and a high rate of absenteeism. This state of things can be attributed to the students' lack of commitment and motivation despite their difficulty in French language.

In the light of this issue, it seems crucial to think of engaging learning strategies to help these students [10]. Many education research projects record the teaching methods used by the teacher [11, 12] on the motivational dynamics of the learners of which commitment is part of [13, 14]. Several studies confirmed that active methods had positive impacts on the students' motivation and thus on their perseverance [15]. Yet the implementation of a pedagogy innovation, doesn't necessarily bring the student towards meaningful learning. Another key factor that comes into play, namely, the student's commitment.

In our research, we addressed the behavioral commitment which is linked to visible expressions and the quantity of effort taken to carry out an activity. In order to answer our problematic, we adopted an innovative learning strategy based on the implementation of formative assessment via Moodle platform interactive tools. The time allocated to the activity is often a crucial indicator of behavioral commitment that can be used in digital environments [16].

All the more, thanks to the digital traces collected in the platforms, it becomes possible through formative assessment, to recognize students with difficulties, to evaluate their commitment and to help them in their learning process [17].

Our main objective through this study is to evaluate the impact of formative E-assessment on the behavioral commitment of a group of university students. It is recorded in the analysis of digital traces of the students' work during the development of formative tests in Moodle, this traceability is a very important source allowing to enquire on the learners' behavioral commitment. In a more precise way, our problematic aims to answer the following question;

In what way does online formative assessment contribute to learners' behavioral commitment? From this, two precise sub questions seem important:

1. What indicators allow to measure the behavioral commitment of learners in online formative tests?
2. How does the traceability of digital work facilitate the follow up of students' behavioral commitment?

2 Theoretical Context

2.1 Formative assessment

Assessment constitutes a lever to enable teachers identify the comprehension level of their students and the achievement degree of the fixed objectives [18]. Scallon's research (1988). clarified the definition of formative assessment as the continuous assessment process: « [...] *to assure the progression of each individual in a learning method, with the intention of modifying the learning situation or the progression rhythm to bring (if there is) improvements or corrections* » [19] (p.155). this type of assessment consists in the use of information from the assessment to reduce the « gap » between a performance level attained by the learner and the desired level of performance [20, 21, 22, 23].

The feedback concept is also at the center of formative assessment [24]. Since the information it gives on the acquisition degree and errors committed will allow to re-take, widen or correct the teaching accordingly [25].

2.2 Behavioral commitment

Formative assessment plays a determining role in learning [26], it favors inherent motivation and encourages the learner to adopt a more efficient learning method [6]. [27] considers that « *assessment practices focused on learning processes, create the motivation to learn, because it favors the perception that the student has value for the activities even if they are not graded* » (P.78).

Learners' commitment and perseverance are linked to their motivation. For [28], commitment is the most susceptible indicator of academic motivation able to directly affect success, it implies « *action triggering* » [29] and « *active participation* » [30]. Furthermore, research done on the subject, defines three dimensions linked to academic commitment: behavioral aspect, cognitive and emotional [31, 10, 32].

According to [33], behavioral commitment can be viewed as a participation continuum, he mainly refers to the positive or negative behaviors the students demonstrate in school or in class. Positive behaviors are among others, respecting instructions, involvement in school work and activities proposed by the teacher as well as participating in extracurricular activities [34, 10, 35].

2.3 Digital technologies and students' commitment

A series of studies carried out by Corno and Mandinach reveal a relationship between the use of digital technologies, motivation, commitment and performance of

students. Students in technology-based classrooms had increased motivation, on task behavior and academic commitment. There was decreased absenteeism, but [36] noted that students who expressed SRL [self-regulated learning] when they worked with technology performed better in academic assignments than other students. «There was a direct link between skillful self-regulation when using technology and academic performance» [37] (p.315) [37].

All the more, the implementation of online learning activities generates a great amount of traces allowing to examine what the students do in real time in relation to what is expected [38]. In our study these indices allow to examine the behavioral commitment of the students in their learning process.

2.4 Digital Traces of students' work

A learning trace is an actor's activity index in an instrumented or non-instrumented learning situation. Lund and Mille (2007) [39] define a trace as a record of actions performed on a computer and relates from a temporary sequence set from observations of human interactions.

These digital collected from platforms, allow via formative assessment to spot students with difficulties, to follow their commitments and to accompany them in their learning process [40, 17, 41]. According to Heraud, Marthy, France and Carron (2005) [42], it is necessary to refer to the analyses of the students' traces as much as possible, to control and regulate the learning activity. Indeed, information provided can constitute cognitive and social indicators [43] allowing to spot the less active students or those with difficulties.

2.5 Assessment of behavioral commitment from digital traces

Online formative assessment allows to store learners' activities in form of logs, which generates traces from the different pages visited and the different actions performed.

This traceability is a good indicator that enables to better understand the learners' behavior and there by having a clear idea of their behavioral commitment. These learners' activity traces, can be transformed to represent a measure of behavioral commitment [44].

3 Practical Context

3.1 Methodology

To answer our problematic, we have created a digital space for formative assessment in Moodle, the scenario is based on the implementation of classroom courses and a series of test in form of self-correcting exercises (MCQ-multiple choice questions) to enter in Moodle after a teaching session. The accesses are limited in time (a

week to do the test) with only one attempt. Automatic feedbacks are also suggested to the students for continuous improvement of learning.

In summary, four steps characterize our formative assessment scenario illustrated in the diagram in Figure 1:

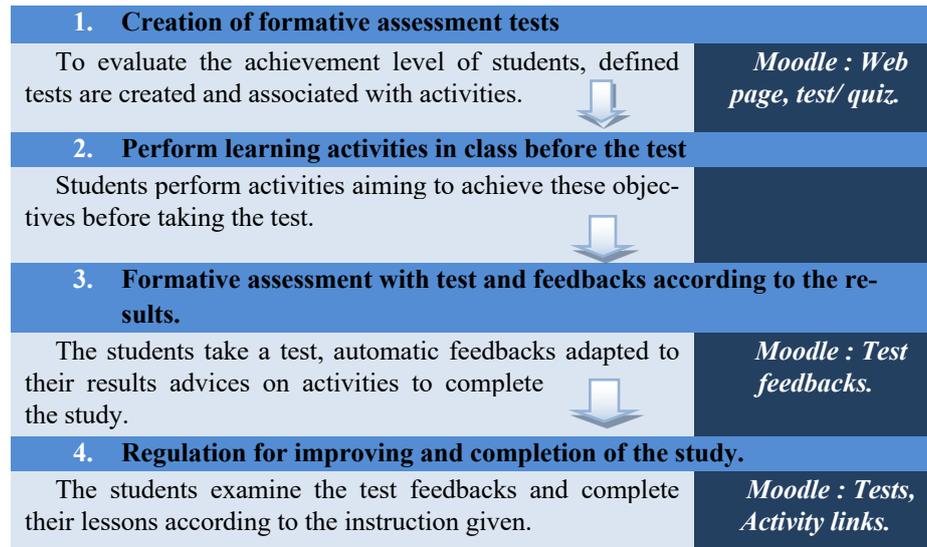


Fig. 1. Diagram: The steps of the formative assessment scenario

3.2 Results and analysis

Sample: The subjects that make our sample are students enrolled in the first academic year:

- A group of students enrolled in sciences, applied mathematics and computer sciences field in second semester, for the academic year 2016-2017:
- A group of students enrolled in the life and earth sciences field in the first semester, for the academic year 2017-2018.

This experiment was carried out for the teaching of the Language and Terminology module at the Faculty of sciences Ben M'sik, Casablanca.

Commitment evaluation: The evaluation of behavioral commitment is based on the trace files provided by Moodle, we proceeded to export the raw data to analyze them using a raw data exchange and transformation software. The choice of indicators is based on the motivation model in the academic context of [28]. We opted for measurable and observable indicators in the digital context such as: participation and punctuality in taking the assessment tests, number of attempts (effort) and test completion follow-up.

Participation, effort and punctuality: It consists of actions the students performed on the assessment area and enable to consider the student as active. In our case we used access periodicity, punctuality and efforts made by the learners.

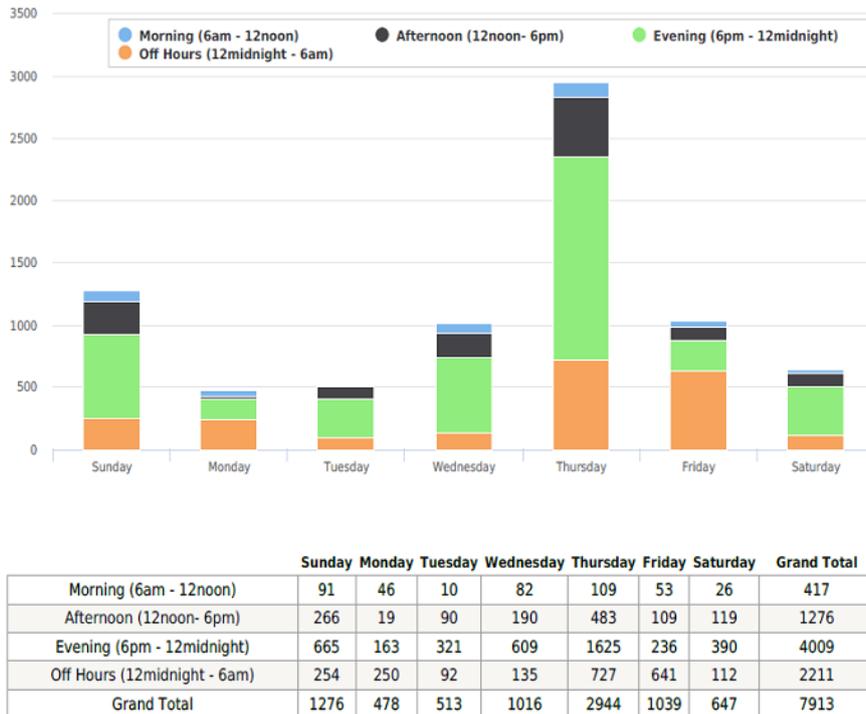


Fig. 2. Learners access analysis

The graph below explains how the students access to the system is implemented during the assessment. In our case the course unit is, week (which corresponds to the duration of taking the test).

We notice that majority of the students are committed to take the assessment test (7913 attempts), each one according to their availability (Morning, noon, evening). The table shows that the maximum access is observed on Thursday (2944 attempts), this day correspond to the test due day, this explains that the students are committed to complete the task on the fixed deadlines.

Progression: Progression is the student’s advancement in completion of the tests. In our case, we talk of completion follow-up.

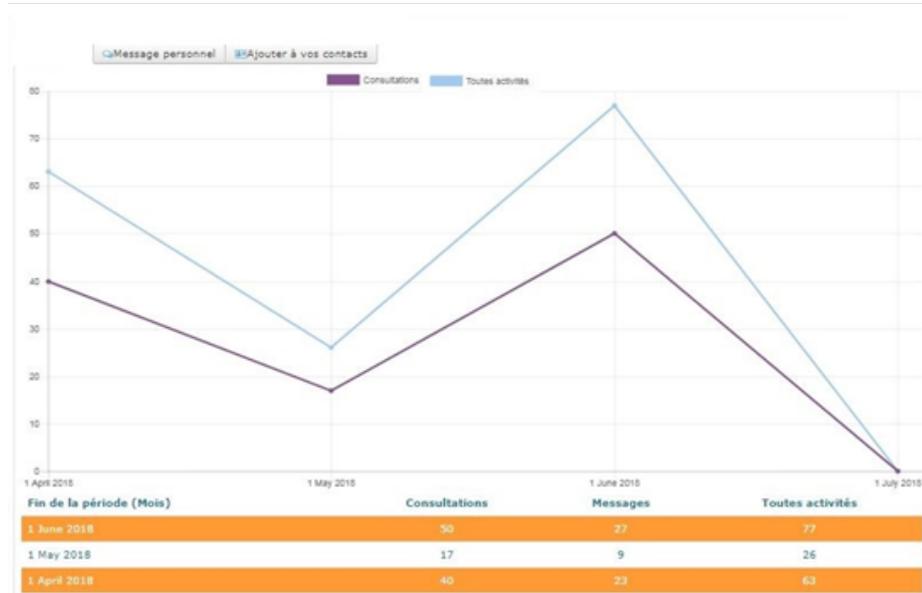


Fig. 3. Completion of activities (consultation and messages) of a student

The results obtained provide statistics allowing to monitor the commitment of a learner, we noticed that the students made efforts all along the test period (from April to June). The completion level of activities varies with time.

These results directly represent commitment and advancement of the student in completing the assessment tests. The analysis of the test traces left in the software will enable us to assess effort, persistence and participation. Thomas, Wadsworth, Jin and Thunders (2016) [45] show that it is not the self-evaluation tests scores that have a significant impact on the learning quality, but the number of attempts that turns out to be a positive predictor. We note therefore, that online formative assessment, has a positive impact on commitment and perseverance of learners.

4 Conclusion

Digital technologies have enabled us to facilitate the process of formative assessment, an assessment method that allows the progression and commitment of learners in their learning process [46]. The data we collected from the assessment traces (behavioral commitment expression) show that students positively committed themselves to take the tests. The traces left allow to follow and equally evaluate the effort and process as well as the result. This innovative practice in the university context contributes to build learners commitment and to counter students' absenteeism in class since class presence allows them to follow the lesson and take notes so as to take the assessment test online.

This follow-up can not only help to justly assess, but to equally guide the students in a better way. If class assessments are generally on explicit traces, those on computer network generate a great number of implicit indices that allow to make visible the students thoughts and to exercise active digital commitment and confirm their perseverance and behavioral commitment.

5 Bibliography

- [1] Audet, L. (2011). Practices and challenges of online assessment. *Montréal : REFAD*. Document accessible on this address.
http://www.bdaa.ca/biblio/recherche/pratiques_defis/pratiques_defis.pdf
- [2] Blais, J.G., Gilles, J.L. et Tristan-Lopez, A. (2015). *Welcome to the 21st century: Learning assessment and information and communication technologies*, Brussels: Peter Lang.
- [3] Lebrun, M. (2015). Hybridization in higher education: towards a new assessment culture. *Evaluate. International journal of education and training research*, 1(1), pp. 65-78.
- [4] Miller, T. (2009). Formative computer-based assessment in higher education: The effectiveness of feedback in supporting student learning. *Assessment & Evaluation in Higher Education*, 34(2), 181-192. <https://doi.org/10.1080/02602930801956075>
- [5] Ricketts, C. et Wilks, S. (2002). Improving student performance through computer-based assessment: Insights from recent research. *Assessment & Evaluation in Higher*.
<https://doi.org/10.1080/0260293022000009348>
- [6] McMillan, J. H. and Hearn, J. (2008). Student Self-Assessment: The Key to Stronger Student Motivation and Higher Achievement. *Educational Horizons, Vol. 87* (1), p. 40-49.
- [7] Haidar, M (2012), "French teaching in Moroccan university. The case of Life sciences and earth sciences field, 2012", National Ph.D. thesis in sciences and language (Sociolinguistics and teaching of languages). Taken from
<http://tel.archivesouvertes.fr/docs/00/72/58/03/PDF/2012theseHaidarM.pdf>
- [8] National Education and Training Charter, October 1999. Taken from the site: Récupéré au site: www.enseup.gov.ma/dajesp/loi/index_loi.htm.
- [9] Emergency Program (2009-2012). Taken from
https://www-ieuem.univ-brest.fr/epure/figures/Programme_urgence_Maroc.pdf
- [10] Fredricks, J. A., Blumenfeld, P. C., & Paris, A. (2004). School engagement: Potential of the concept: State of the evidence. *Review of Educational Research*, 74 , 59–119.
<https://doi.org/10.3102/00346543074001059> .
- [11] Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating Project-Based Learning: Sustaining the Doing, Supporting the Learning. *Educational Psychologist*, 26(3-4), 369-398
<https://doi.org/10.1080/00461520.1991.9653139>
- [12] Meece, J. L. (1991). The Classroom Context and Student Motivational Goals. In M. L. Maehr & P. R. Pintrich (Eds.) *Advances In Motivation And Achievement*. (Vol. 7, pp. 261-285) Greenwich. CT: JAI Press.
- [13] Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *The Minnesota symposia on child psychology, Vol. 23. Self processes and development* (pp. 43-77). Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.
- [14] Furrer, C., Skinner, E., Marchand, G., & Kindermann, T. A. (2006, March). *Engagement versus disaffection as central constructs in the dynamics of motivational development*. Paper presented at the Society for Research on Adolescence, San Francisco.

- [15] Gijbels, D., Dochy, F., Van den Bossche, P., & Segers, M. (2005). Effects of problem-based learning: A meta-analysis from the angle of assessment. *Review of Educational Research*, 75(1), 27-61. <https://doi.org/10.3102/00346543075001027>
- [16] Taylor, C., Veeramachaneni, K. et O'Reilly, U.-M (2014). Likely to stop? Predicting stop-out in massive open online courses. *arXiv preprint arXiv:1408.3382*
- [17] Siebra, S., Salgado, A., and Tedesco, P. (2004). « Analysing Participant's Interaction in Collaborative Learning Environments », in *Conférence latino-américaine en informatique*, septembre, Pérou, 2004, p. 985-992.
- [18] Wiliam, D. (2014). *Formative assessment and contingency in the regulation of learning processes. Toward theory of classroom assessment as the regulation learning*. Symposium conducted at the annual meeting of the American Educational Research Association (AERA), Philadelphia.
- [19] Scallon, G. (1988). *Formative assessment of learning*, T1. Quebec : Laval university press.
- [20] Sadler, R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, 18, 119- 144.
- [21] Shepard, L. A. (2009). Commentary: Evaluating the validity of formative and interim assessment. *Educational Measurement: Issues and Practice*, 23(3), 32-37. <https://doi.org/10.1111/j.1745-3992.2009.00152.x>
- [22] Wiliam, D., & Thompson, M. (2007). Integrating assessment with instruction: what will it take to make it work? In C. A. Dwyer (Ed.), *The future of assessment: shaping teaching and learning* (pp. 53-82). Mahwah, NJ: Lawrence Erlbaum Associates. <https://doi.org/10.4324/9781315086545-3>
- [23] Wiliam, D. (2010). An integrative summary of the research literature and implications for a new theory of formative assessment. In H. A. Andrade & G. J. Cizek (Eds.), *Handbook for formative assessment* (pp. 18-40). New York: Routledge.
- [24] Clark, I. (2012). Formative assessment: Assessment is for self-regulated learning. *Educational Psychology Review*, 24(2), 205-249. <https://doi.org/10.1007/s10648-011-9191-6>
- [25] Endrizzi Laure & Rey Olivier (2008). « Assessment at the center of learning ». *Dossier d'actualité Veille et Analyses*, n 39, November
- [26] Tan, K. H. K. (2012). How teachers understand and use power in alternative assessment. *Education Research International*, 2012(2012): Article ID 382465. <https://doi.org/10.1155/2012/382465>.
- [27] Viau, R. (2002). Assessment, a source of motivation or demotivation? *Quebec French*, (127), 77-79.
- [28] Viau, R. (1994). *Motivation in school context* (3rd Ed.). Brussels : De Boeck University.
- [29] Connell, J.P. (1990). Context, self, and action: A motivational analysis of self-system processes across the life-span. In D. Cicchetti & M. Beeghly (Eds.), *The self in transition: From infancy to childhood* (pp. 61-97). Chicago: University of Chicago Press. [https://doi.org/10.1002/\(sici\)1234-980x\(199711\)15:4<289::aid-cha2224>3.0.co;2-7](https://doi.org/10.1002/(sici)1234-980x(199711)15:4<289::aid-cha2224>3.0.co;2-7)
- [30] Parent, S. (2014). From motivation to commitment: a multidimensional process for the success of your students. *College pedagogy*, (27)3, 13-16.
- [31] Chapman, E. (2003). Alternative approaches to assessing student engagement rates. *Practical assessment, research and evaluation*, 13(8).
- [32] Skinner E. A., & Belmont M. J. (1993). « Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year ». *Journal of Educational Psychology*, n85(5), p.71-581. <https://doi.org/10.1037//0022-0663.85.4.571>
- [33] Blumenfeld, P., Modell, J., Bartko, W. T., Secada, W., Fredricks, J., Friedel, J., et al. (2005). School engagement of inner city students during middle childhood. In C. R.

- [34] Furlong, M. J., & Christenson, S. L. (2008). Engaging students at school and with learning: A relevant construct for all students. *Psychology in the Schools*, 45(5), 365-368. <https://doi.org/10.1002/pits.20302>
- [35] Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology*, 82, 221-234. <https://doi.org/10.1037//0021-9010.82.2.221>
- [36] Corno, L., & Mandinach, E. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychology*, 18(2), 88-108. <https://doi.org/10.1080/00461528309529266>
- [37] Corno, L., Mandinach, E. 2004. What we have learned about student engagement in the past twenty years. In: D. M. Van Etten, S. eds. *Big theories revisited: Vol 4. Research on sociocultural influences on motivation and learning*. Information Age Publishing-Greenwich, CT 299328
- [38] Blais, J.G. et Gilles, J.L. (dir.) (2011). *Learning assessments and information and communication technologies. The future is here*. Quebec, Quebec : Laval University press.
- [39] Lund, K., Mille, A. (2007). « Traces, interaction traces, learning traces : definitions, computer models, structuring, processing and usage », in *Laboratoire d'informatique en image et systèmes d'information (LIRIS)*, Lyon. Taken from : <http://liris.cnrs.fr/Documents/Liris-3967.pdf>
- [40] Mazz, M., Dimitrova, V. (2003). CourseVis: Externalising Student Information to Facilitate Instructors in Distance Learning. In U. Hoppe, F. Verdejo, J., Kay (eds.) *Proceedings of the International conference in Artificial Intelligence in Education*. Sydney July 20-24, 2003. (AIED 2003). IOS press. pp. 279-286
- [41] Mostow, J. (2004). Some useful design tactics for mining ITS data, In: *Workshop on Analyzing Student-Tutor Interaction Logs to Improve Educational Outcomes*, International Conference on Intelligent Tutoring Systems (ITS'04), Maceio (Brésil), p. 20-28.
- [42] Heraud, J., Marty, J., France, L. & Carron, T. (2005). A help in traces interpretation: *application for improvement of pedagogy scenarios*. Communication presented at EIAH'05.
- [43] Dimitracopoulou, A., Bruillard, E. (2006). Enrich forum interfaces by automatic visualization analysis of interactions and content. *STICEF journal*, vol. 13. Taken from the site: http://sticef.univ-lemans.fr/num/vol2006/dimitracopoulou10/sticef_2006_dimitracopoulou_10p.pdf
- [44] Poellhuber, B., Roy, N. and Bouchoucha, I. (2014). Relationship between motivation cognitive commitment and perseverance in French MOOC (EDULIB), *conference communication at AIPU*, Mons.
- [45] Thomas, J., Wadsworth, D., Jin, Y. et Thunders, M. (2016). Engagement with online self-test as a predictor of student success. *Higher Education Research et Developpment*, 25, 1-11.
- [46] Scallon, G. (2000), *formative assessment*, Montreal, the editions of pedagogical renewal.

6 Authors

Ghizlane Chems: is a PhD in Educational Technology. She is a Professor at Faculty of Sciences Ben M'Sik, University Hassan II of Casablanca, Morocco, B.P 7955 Sidi Othmane. She operates in several fields of educational sciences: educational technologies and assessment, engineering of assessment. She is a Member of the Observatory of Research in Didactics and University Pedagogy (ORDIPU), Member of Association for the Development of Evaluation Methodologies in Education

(ADMEE) – section Morocco and the Multidisciplinary Laboratory in Sciences and Information Communication and Education Technology (LAPSTICE).

Mounir Sadiq is a PhD in Educational Computing. He operates in several fields of educational sciences: the fields of teaching and research on educational technologies, engineering of the distance training, techniques of training. He is a Member of the Observatory of Research in Didactics and University Pedagogy (ORDIPU) and Member of Association for the Development of Evaluation Methodologies in Education (ADMEE) – section Morocco.

Mohamed Radid is a PhD in Physical Chemistry. He is currently the Vice Dean of the Faculty of Sciences Ben M'Sik at Hassan II University, B.P 7955 Sidi Othmane, Casablanca, Morocco since 2014. He is a Member of the Observatory of Research in Didactics and University Pedagogy (ORDIPU) and Member Board of Directors of Association for the Development of Evaluation Methodologies in Education (ADMEE) – Europe. He is an Expert in the fields of teaching and research on educational and technologies assessment, engineering of assessment, Chemistry Didactics, University Pedagogy.

Mohammed Talbi is a PhD in Sciences and Processes of Analysis from the University Pierre et Marie Curie of Paris. He is currently the Dean of the Faculty of Sciences Ben M'Sik at Hassan II University, B.P 7955 Sidi Othmane, Casablanca, Morocco since 2014, and the Director of the Observatory of Research in Didactics and University Pedagogy (ORDIPU). He is an Expert in the fields of teaching and research on educational technologies, engineering of the distance training, techniques of training, information systems. He is the author of several national and international awards and has accumulated more than 30 years of scientific productions.

Article submitted 2019-02-02. Resubmitted 2019-04-03. Final acceptance 2019-04-04. Final version published as submitted by the authors.