A generative computer language to customize online learning assessments

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ABSTRACT
The focus on assessment of learning experiences has shifted from knowledge to competences. Unfortunately, assessing certain competences is mainly a subjective task, being problematic for both the evaluators and the evaluated. Additionally, when the learning process is computer-supported and the number of students increases, traditional assessment procedures suffer from scalability problems. In this paper we introduce a system that supports grading learning competences according to students' performance in an online course. We automatically extract different objective indicators about students' work in a Learning Management System (LMS). Evaluators can use an assessment-specific query language to express a number of required indicators. Such indicators are automatically extracted from the activity logs generated by the LMS. A case study with Moodle LMS-based courses is carried out to explain how such indicators can be obtained and how to analyze the assessment results.

Categories and Subject Descriptors
K.3.1 [**COMPUTERS AND EDUCATION**]: Computer Uses in Education– *Computer-assisted instruction (CAI)*

General Terms
Measurement, Performance, Design, Languages.

Keywords
online learning, competence assessment, technological support in online education, domain-specific languages, learning analytics.

1. INTRODUCTION
The interest on higher education learning has shifted from knowledge to competences. Projects like the Tuning Educational Structures in Europe (supported by the Lifelong Learning Program of the EU) show the relevance of using the concept of competences as a basis for learning outcomes. Learning competences are skills that a student is expected to be able to demonstrate after completion of training. Competences can be distinguished in subject-specific and generic ones [11]. Subject specific competences are related to knowledge in the subject areas, while generic competences are the abilities, capacities and knowledge that any student should develop regardless of his/her subject area. Although the importance of building-up and developing subject-specific knowledge and skills as the basis for university degree programs is widely acknowledged, it is a fact that time and attention should also be devoted to the development of generic competences or transferable skills. It is also important to recognise the application of generic skills outside the academic setting, because they are becoming more and more relevant for preparing students well for their future role in society in terms of employability and citizenship [14].

Unfortunately, assessing certain competences is usually a subjective task, being problematic for both evaluators and evaluated. Unless the competences were clearly linked to a specific assignment or aspect, they are difficult to grasp. Developing a detailed process for assessing students' performance in competences is a complex and time consuming task because of the different aspects to take into account. As a result, lecturers usually do not have enough time for detailed assessment of student's tasks. So even supposing that students can pass a number of distinct assignments, it does not guarantee that they have got the competences specified in the syllabus. Therefore, here there is a major gap.

The scope of our work is related to LMS (Learning Management System) specially designed for collaborative tasks, which they are widely used nowadays. Each file, access or assignment done by a student is registered in the system. Usually researchers can analyze Technology Enhanced Learning (TEL) situations by collecting interaction traces produced by these environments [6]. However, taking advantage of this information stored about course activities requires filtering before it can be used for higher level processing [9]. This collected information would be used as indicators of students' work.

Indicators are statements that determine if the competence level is met. They have been designed so that every student will be able to demonstrate their competence regardless of their grade. As we see in this work, we have defined several indicators to measure different competences, like Planning (and time management), Teamwork, Problem solving, Leadership and Interpersonal skills.

The indicators show evidence on students' performance, and so they can support competences assessment.

We have developed a Domain-Specific Language to customize online learning assessments in Moodle. A Domain-Specific Language (DSL) [17] is a formal language that can be automatically processed to execute simple sentences written using an assessment vocabulary. This language has a simple syntax, oriented to learning assessment [3]. We implemented *EvalCourse*, a computer system that runs queries written in this language, providing in its output the information requested. This way, lecturers can easily retrieve indicators from information stored in the Moodle activity logs without any technical knowledge on databases or computer programming.

The rest of this paper is organized as follows: Section 2 describes the indicators and how they are connected to competences. Section 3 introduces EvalCourse, the domain specific language. In Section 4 we describe a case study and an analysis of the results. Section 5 comments the related works. In the last one, we provide a discussion along with conclusions and future research lines.

2. INDICATORS FOR COMPETENCE ASSESSMENT

In order to obtain a meaningful data collection about student learning outcomes we need to focus on student achievement of the specific performance indicators that define the course program outcome [10]. Through experience, a lecturer can know that there are certain characteristics that can be considered as reliable indicators that a certain student has achieved a specific learning outcome. As the initial step in the present study we have detected several specific performance criteria that can be used as evidence of program learning outcomes.

Planning and time management [5] is the student's ability to manage their time successfully and productively, and it is explicitly related to academic performance. In the rest of the paper we refer to this competence simply as "Planning".

Students must submit the activities before a deadline defined by the lecturer. But LMS usually accepts them submissions after this deadline expired. We consider each one of these submissions as a milestone. At the end of the course we can measure the amount of milestones that have been submitted in time, and the amount of them that have been submitted out of time.

Teamwork can be defined as a set of interrelated thoughts, actions, and feelings of each team member that are needed to function as a team and that combined to facilitate coordinated, adaptative performance and task objectives resulting in value-added outcomes [12]. Teamwork is a joint action carried out by a group of students, a work done by several students with each doing a part that must be coordinated with that of the other members. In many cases, the tasks they have to do are interdependent. Thus, a student could have to wait that his/her teammate finishes a previous task so he/she can start his/hers. In this case, if that student does not finish the milestone in time, he/she will be prejudicial not only for his/her, but also for the whole group. In a LMS like Moodle we can use the deadline of the activity to set the milestones for the different teammates task submissions.

Interpersonal skills are the life skills we use every day to communicate and interact with other people, individually and in groups. Communication, interpersonal and decision-making skills are essential for engineering work and should be explicitly incorporated in engineering curricula [1]. We use the student participation in forums as an indicator of performance in interpersonal skills.

Leadership is organizing a team to achieve a common goal. Its development has become increasingly important in engineering education as companies demand engineers with leadership, communication, and teamwork skills [15]. As discussed above, forums are used for Interpersonal skills assessment. In addition, they can be exploited for teamwork activities. In those teams usually someone who should exercise a leadership role. We can take the number of initiated debates as an indicator of the leadership competence.

3. EVALCOURSE

Before explaining our case study, we introduce EvalCourse. EvalCourse is a plugin for the Eclipse IDE that processes queries in a domain-specific language that we have developed to get indicators. It follows a model-driven approach [16] for modeling procedures in order to obtaining performance indicators of competences. It has been created using Xtext [8] within Eclipse Modeling Framework. EvalCourse[1] is provided freely as open-source software under the terms of the GNU GPL.

In Figure 1 we can see the EvalCourse architecture diagram. First, it receives user requests for an indicator (a), then EvalCourse obtains the information from the LMS database (b) to meet the requested indicator. This information is collected using Pentaho libraries (c). Finally it returns an intermediate Pentaho transformation (d) and the data in two formats (e). On the one hand, the raw data in an XML file that can be processed with a analytics software, and on the other hand, a graph on a specific file for the Gephi software. Gephi is an open-source software for visualizing and analyzing large networks graphs that must be installed to view the charts. The Pentaho intermediate file is provided because with this file the user will be able to get the information in Pentaho software and generate others reports in different formats. Pentaho (Pentaho Data Integration) consists of a core data integration (ETL) engine, and GUI applications that allow the user to define data integration jobs and transformations. ETL refers to a process in database usage and especially in data warehousing that involves: extracting data, transforming it and loading it into the end target.

[1] https://www.assembla.com/spaces/evalcourse/wiki

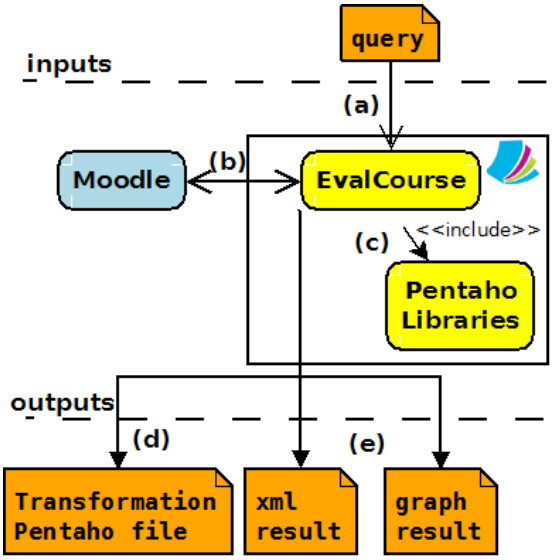

Figure 1. EvalCourse scheme.

3.1 Assessment language

Language syntax (version 1.1) is shown in listing 1, with reserved words highlighted. The line 1 specifies the name of the evidence or indicator (*name_of_the_indicator*). It will be used to name the different files produced by EvalCourse. The line 2 is a constant that indicates that we want to get information about students. The line 3 indicates the kind of information to be retrieved: milestones, participation, access or indication. And the line 4 indicates if the information is collected from assignments, forums, campus or workshop activity. In case one or more activity identifiers are provided ([list of ids]), only information on those assignment, forum or campus will be provided. If not specified, the query acts on all activities of the indicated type. Finally, you can also specify a range of dates to filter the activities (between).

Listing 1. Reserved words and format

```
Evidence name_of_the_indicator:
  get students
  show milestones | participation| access | interaction
  in assignment | forum | campus | workshop [list of ids]
  between YYYY-MM-DD and YYYY-MM-DD.
```

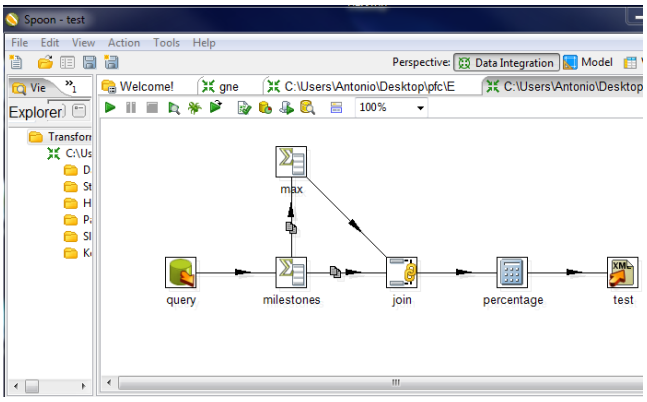

Figure 2. Snapshot of Pentaho describing an ETL process.

At the moment EvalCourse works as a plugin for the Eclipse framework. Eclipse is an Integrated Development Environment (IDE), written mainly in Java, that comprises a base workspace and an extensible plug-in system for customizing the environment. Using Eclipse facilities, user can create an EvalCourse project and write a query in a file with EVC extension. When he/she saves this file, EvalCourse transforms the query in a Pentaho Extract, Transform and Load (ETL) process (figure 2). From the program he/she can execute the transformation and get the results to the query.

Next, one example using synthetic information will be described.

3.2 Example of use

In this example we suppose that students have been submitting several tasks during the course, and now, we want to assess their performance in the competence of Planning. Using EvalCourse, we can ask for that information with the code showed in listing 2. The evaluator declares an evidence called *Milestones_list*, that retrieves the indicator about students' performance in assignments by writing this code.

Listing 2. Code to retrieve students' performance in assignments

```
Evidence Milestones_list:
  get students
  show milestones
  in assignment.
```

This code provides us with the information about students' performance in three files. On the first one we have a list of the quantitative information shown in table 1. For every row we can see the milestones that students have completed (Milestones), the amount of these milestones that have been submitted in time (In-time) and the amount of them that have not been submitted yet (In-progress). This information can be easily loaded into a spreadsheet program for further processing.

Table 1: List of students' performance in assignments.

Id	Username	Total	In-time	Overdue	In-Progress	In-time rate
1	John	5	3	0	2	60
2	Mary	5	1	0	4	20
3	Jane	5	3	2	0	60
4	Michael	5	3	2	0	60
5	Walter	5	3	2	0	60
6	Sam	5	3	1	1	60
7	Sarah	5	3	2	0	60
8	Michelle	5	3	2	0	60
9	Howard	5	3	2	0	60

The first row of the listing starts with two columns identifying the student by his Moodle internal identifier (1) and his name (John). Then, the *Total* column indicates the number of activities that students had to submit during the course (5 in our case). The *In-time* column indicates that John submitted three activities before their deadline; *Overdue* column shows that he submitted no activities after deadline and *In-Progress* indicates that two activities had not been submitted yet. Finally, as we can work with this data in a spreadsheet, we added a new derived column: *In-time Rate*, which indicates the ratio of completed activities in time in relation to the total (sixty percent for John).

On the second output file, we are provided a graph (figure 3). The central vertex represents the activity we are considering. In this case, activity is the delivery of assignments by students. Each other vertex represents a student enrolled in the course. Each student is linked to the central vertex activity. The thickness of the link indicates students' performance in the indicator. A visual representation gives an overview of the results that can support the interpretation of the data. In the example, the links to the first and second student are thinner than that of the rest. That means that their performance was lower than that of the other students.

Finally, we are also provided a Pentaho transformation file.

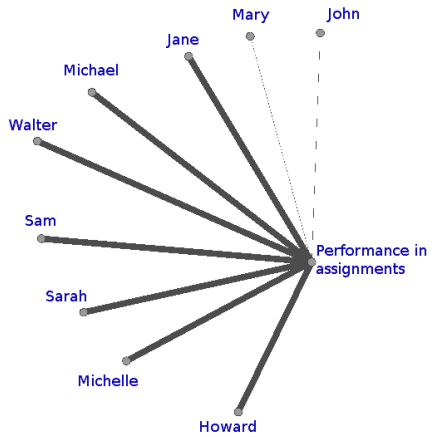

Figure 3. Graph of students' performance in assignments.

4. CASE STUDY

The case study we analyze was developed in University of Cadiz, Spain. In particular, in a compulsory course on Language Processors II of its degree on Computer Science. 36 students enrolled the course in 2012/13 academic year. The course was developed in its first semester of the fifth (and last) year. The course evaluation was done manually and we later applied EvalCourse. This course was taught by one of the EvalCourse project members.

Student had several compulsory tasks over the course and an exam at the end of the semester. They provided a grade about students' knowledge. We used EvalCourse to get indicators that assist in competence assessment. Next, we describe the obtained indicators

4.1 Information retrieved

4.1.1 Extraction of indicators from milestones

During the semester, students had to work in small teams of two or three members. Every team had to carry out several milestones during the course. These milestones were parts of a software development project that they had to code and upload into the appropriate LMS assignment activity. Every milestone had a deadline, although system allowed students to submit these activities after this deadline. For each team, only one member had to upload each activity. For example, if we have a team with members S1, S2 and S3, they can submit the activities distributing them as desired: S1 can submit the five handouts, but S2 and S3 do not submit any; or S1 submits the first handout, S2 submits the second one and S3 the rest, etc. What is important is that all the activities are submitted in each team, no matter who does it. All the teammates will share the team grade.

The competences we wanted to assess were Planning and Teamwork, and for this purpose all the activities that had been submitted in time add up. Those teams who submitted all their milestones in time and submitted exactly the five activities were evaluated in the competences with a positive grade. If a team submitted exactly five activities but not in time, then they were evaluated in Teamwork with a positive grade but not in Planning. If they submitted all milestones in time but more than five activities (because more than one teammate uploaded the same activity), they were evaluated positively in Planning but

negatively in Teamwork. Of course, if milestones were not submitted in time and more or less than five activities were submitted by a team, they were evaluated as negative in both Teamwork and Planning.

4.1.2 Extraction of indicators from forum

As commented before, students worked in small teams. Each team in the course had a forum for internal communication. We used the forum to get indicators to assess a pair of competences: Interpersonal skills and Leadership.

As the indicator of Interpersonal skills of each student we calculate the total forum participation. A student who has three or more participations in forum will be grade positive in Interpersonal skill competence.

As the indicator of Leadership we took into account the amount of debates that each student started. A student who has started two or more debates will have a positive grade in leadership competence.

4.2 Analysis of results

4.2.1 Extraction of indicators from milestones result

Moodle in its configuration allows the creation of working groups. Unfortunately, supervisor of this course did not define them explicitly in the system. So we had to get the list of students from assignments, and manually remark the team of each student.

In Table 2 we can see the final result of teams' performance in competences according to indicators. There are eight teams that obtained the positive mark in both Planning and Teamwork competences, because they submitted all the milestones in time and they made exactly five submissions. There are five other teams that have a negative mark in both competences, because they did not submit all the activities. Only one group has a positive grade in Planning but a negative grade in Teamwork, because they were not well coordinated and in some activities there were multiple submissions.

Informally, the course supervisor confirmed that these indicators were closed to the grades he manually calculated for every student in the course.

4.2.2 Extraction of indicators from forum results

Only 18 students of the 36 enrolled in the course participated in forum. We do not determinate that they have not worked these competences, we only state that they have not demonstrated that they did. We can analyze the results of using EvalCourse with these indicators in table 3. Very few students made the grade of these competences. There are several students who stood out of the rest. Then, we export the data to a spreadsheet software and get the pie chart in figure 4. In this summary we consider that participation in forum has not been widely used by students, although they knew that they had to. In spite of this, we have informally observed that students with good grade in these indicators really had a good performance during the course carrying out these competences. So, we can say that the indicators we have chosen seem good evidences about students' achieved competences.

Additionally, we can use EvalCourse to view the interaction among students in the forum. We could check whether this interaction can be a fraud to fake the interaction between two students previously arranged. With the code 3 we obtain information about student's forum interaction. We can see results in figure 5. We can also filter this information. For example, if we get just a glimpse of the work of students in the month of November we can use the following code 4. We can see results in figure 6.

Table 2. List of teams' performance in assignments in case study.

Team	Total	In-time	Overdue	In-Progress	Planning	Teamwork
Team01	5	5	0	0	+	+
Team02	5	2	1	2	-	-
Team03	5	4	1	0	+	+
Team04	5	5	0	0	+	+
Team05	5	4	1	0	+	+
Team06	5	1	1	3	-	-
Team07	5	5	0	0	+	+
Team08	5	2	2	1	-	-
Team09	5	4	1	0	+	+
Team10	5	5	0	0	+	+
Team11	5	2	1	2	-	-
Team12	5	6	1	0	+	-
Team13	5	4	0	1	-	-
Team14	5	4	1	0	+	+

Table 3: List of students' performance in forum participation in case study.

Id	Username	Debate-starter	Debate-participation	Total
43	S2	0	1	1
44	S3	3	4	7
45	S4	2	2	4
46	S5	0	1	1
48	S7	4	3	7
50	S9	6	8	14
51	S10	1	1	2
53	S12	0	1	1
55	S14	1	1	2
59	S18	1	2	3
60	S19	2	0	2
61	S20	0	2	2
62	S21	0	1	1
67	S26	0	1	1
70	S29	0	1	1
71	S30	2	1	3
75	S34	1	5	6
78	S37	2	4	6

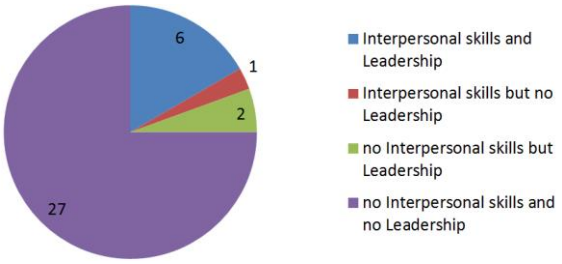

Figure 4. Pie chart of students' performance in forum participation case study.

Listing 3. Code to retrieve the students' interaction in forum

```
Evidence forum_interaction:
  get students
  show interaction
  in forum.
```

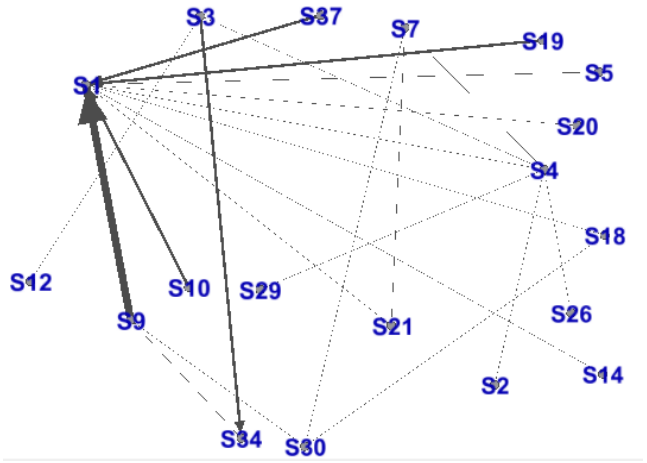

Figure 5. Graph of students' interaction in forum case study.

Listing 4. Code to retrieve the students' interaction in forum in November

```
Evidence forum_interaction:
  get students
  show interaction
  in forum
  between 2012-11-01 and 2012-11-30.
```

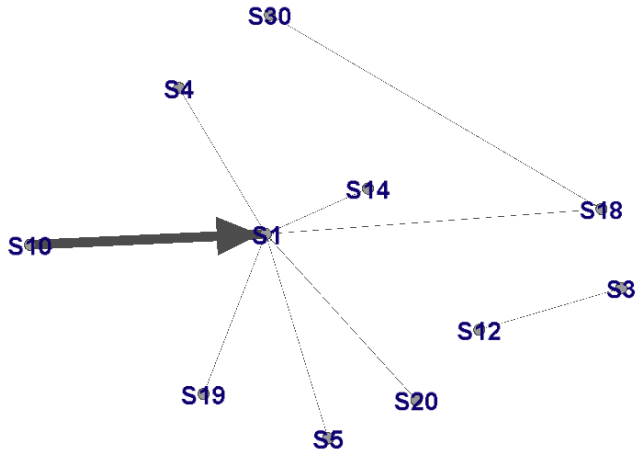

Figure 6. Graph of students' interaction in forum in November.

We conclude that much of the interaction in the forum is due to the response to lecturer's messages (S1). This fact is an indication that in many cases the interaction of students with the forum is more due to the requirement to answer the lecturer that the use of the forum as a communication tool in the group.

5. RELATED WORKS

There are some works related to skills development. For instance, a module that helps in working and assessing the competence of teamwork is presented in [13]. While EvalCourse provides raw results that require extra processing for the teacher, because it simply collects evidence of student interaction with LMS and provides us the results, this module represents a major effort of teachers in the work of monitoring and evaluating students. Moreover, EvalCourse works as an Eclipse plugin, while this module is integrated into Moodle. However, although EvalCourse only works with an instance of Moodle, is devised to be implemented in others LMS.

Other related work is described in [7], it uses a DSL for extracting data models out of databases. This work has focus on the extraction of data from Web 2.0 systems, like MediaWiki wikis or Blojsom blogs. While Evalcourse provides refined reports, this proposal retrieves a model for further processing. EvalCourse has been implemented for being applied to higher education. This involves many areas, not just technology. A non-expert in technology may not know how to deal with data provided by the DSL shown in this work.

DSL is an approach that can be used for areas that are not connected to computer science. A DSL based on agile method adapted to the management process model of distance learning courses within the context of the Open University of Brazil is presented in [4]. Both domain specific languages facilitate work in their respective domains. They are also complementary, since the former can be used for creating online courses and EvalCourse for assessing competences.

The Social Networks Adapting Pedagogical Practice (SNAPP) tool was developed to provide instructors with the capacity to visualize the evolution of participant relationships within discussions forums. SNAPP 2.0 [2] shows the evolution of participant interaction over time and annotates key events that occur along this timeline. EvalCourse generates other types of displays without having to program a new application for visual analysis.

6. CONCLUSIONS AND FUTURE RESEARCH

In education, the focus of assessment of learning experiences has shifted from knowledge to competences. Competences are the practice, skills and attributes we can develop in every aspect of our life. The development of such key competences should be integrated through curricula, along with specific competences.

Assessing certain competences is usually a subjective task. For example, obtaining an objective approach to assess a student proficiency in teamwork competence can be difficult. This becomes even more problematic when the number of students in the course increases. When using a LMS, researchers can analyze interaction traces produced by the environment. LMS stores information about course activities that requires filtering before it can be used for higher level processing. This collected information will be used as indicators of students' work.

We have developed EvalCourse, a generative computer language to customize online learning assessments. Lecturers were allowed to retrieve desired indicators from information in the database without any technical knowledge on system programming using a very simple syntax. We have shown its usage in a synthetic example, demonstrating how it can help to make the problem scalable. Then, we have applied EvalCourse to a compulsory course in University of Cadiz. We assessed students' performance in the competences of Leadership, Planning and Teamwork. We got indicators that assisted us in the assessment of these competences.

Results are promising. Using our system, the lecturer can objectively assess the performance in any of these competences for any student. Additionally, in our case study the interpretation that we did about indicators was closely related to the results that the lecturer noticed during the course. Of course, this is just a case study, needing further study to get a strong conclusion on the validity of the specific usage of the information retrieved by EvalCourse.

We have two future lines of work ahead. First, we will identify others indicators stored in LMS that can be used to assess competences, and include them in our syntax. Secondly, our language can express sentences that are general for almost any LMS. But at the moment, the generative computer language just allows lecturers to work with Moodle. So we will expand our generative computer language to be used in others LMS

7. ACKNOWLEDGMENTS

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8. REFERENCES

[1] C. Alvarez, M. Nussbaum, M. Recabarren, F. Gomez, and D. Radovic. Teaching communication, interpersonal and decision-making skills in engineering courses supported by technology. *International Journal of Engineering Education*, 25(4):655-664, 2009.

[2] Aneesha Bakharia and Shane Dawson. Snapp: a bird's-eye view of temporal participant interaction. In *Proceedings of the 1st International Conference on Learning Analytics and Knowledge*, LAK '11, pages 168-173, New York, NY, USA, 2011. ACM.

[3] A. Balderas, I. Ruiz-Rube, J. M. Dodero, M. Palomo-Duarte, and A. Berns. A generative computer language to customize online learning assessments, volume 8095 LNCS of Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), pages 591-592. Springer Berlin Heidelberg, 2013.

[4] A. A. M. Batista, Z. Abdelouahab, D. Lopes, and P. S. Neto. *A process model for supporting the management of distance learning courses through an agile approach*, volume 152 LNEE *of Lecture Notes in Electrical Engineering*. Springer Berlin Heidelberg, 2013.

[5] Bruce K Britton and Abraham Tesser. Effects of time-management practices on college grades. *Journal of Educational Psychology*, 83(3):405-410, 1991.

[6] H. Chebil, J. Girardot, and C. Courtin. An ontology-based approach for sharing and analyzing learning trace corpora. In *Proceedings - IEEE 6th International Conference on Semantic Computing, ICSC 2012*, pages 101-108, 2012.

[7] O. Díaz, G. Puente, J. L. Cánovas Izquierdo, and J. García Molina. Harvesting models from web 2.0 databases. *Software and Systems Modeling*, 12(1):15-34, 2013.

[8] M. Eysholdt and H. Behrens. Xtext - implement your language faster than the quick and dirty way tutorial summary. In *Proceedings of the ACM International Conference Companion on Object Oriented Programming Systems Languages and Applications Companion, SPLASH '10*, pages 307-309, 2010.

[9] B. Florian, C. Glahn, H. Drachsler, M. Specht, and R. Fabregat Gesa. *Activity-based learner-models for learner monitoring and recommendations in moodle, volume* 6964 LNCS *of Lecture Notes in Computer Science (including subseries Lecture Notes in Articial Intelligence and Lecture Notes in Bioinformatics)*. Springer Berlin Heidelberg, 2011.

[10] Rogers G. Do grades make the grade for program. *ABET Quarterly News Source, Fall/Winter*, pages 8-9, 2003.

[11] Julia Gonzalez and Wagenaar Robert. *Tuning Educational Structures in Europe - Final Report - Pilot Project - Phase 1*. University of Deusto, 2003.

[12] Judy Kay, Nicolas Maisonneuve, Kalina Yacef, and Peter Reimann. The big five and visualisations of team work activity. In Mitsuru Ikeda, KevinD. Ashley, and Tak-Wai Chan, editors, *Intelligent Tutoring Systems*, volume 4053 *of Lecture Notes in Computer Science*, pages 197-206. Springer Berlin Heidelberg, 2006.

[13] R. E. Mohedano, A. G. Segador, and J. A. Varo. Moodle module for the management and assessment of teamwork: First results. In *Proceedings of the IADIS International Conference e-Learning 2011, Part of the IADIS Multi Conference on Computer Science and Information Systems 2011, MCCSIS 2011*, volume 2, pages 408-410, 2011.

[14] Deborah Murdoch-Eaton and Sue Whittle. Generic skills in medical education: developing the tools for successful lifelong learning. *Medical Education*, 46(1):120-128, 2012.

[15] S. Özgen, O. Sánchez-Galofré, J. R. Alabart, M. Medir, and F. Giralt. Assessment of engineering students' leadership competencies. *Leadership and Management in Engineering*, 13(2):65-75, 2013.

[16] D. C. Schmidt. Model-driven engineering. *Computer*, 39(2):25-31, 2006.

[17] Arie van Deursen, Paul Klint, and Joost Visser. Domain-specific languages: an annotated bibliography. *SIGPLAN Not.*, 35(6):26-36, June 2000.