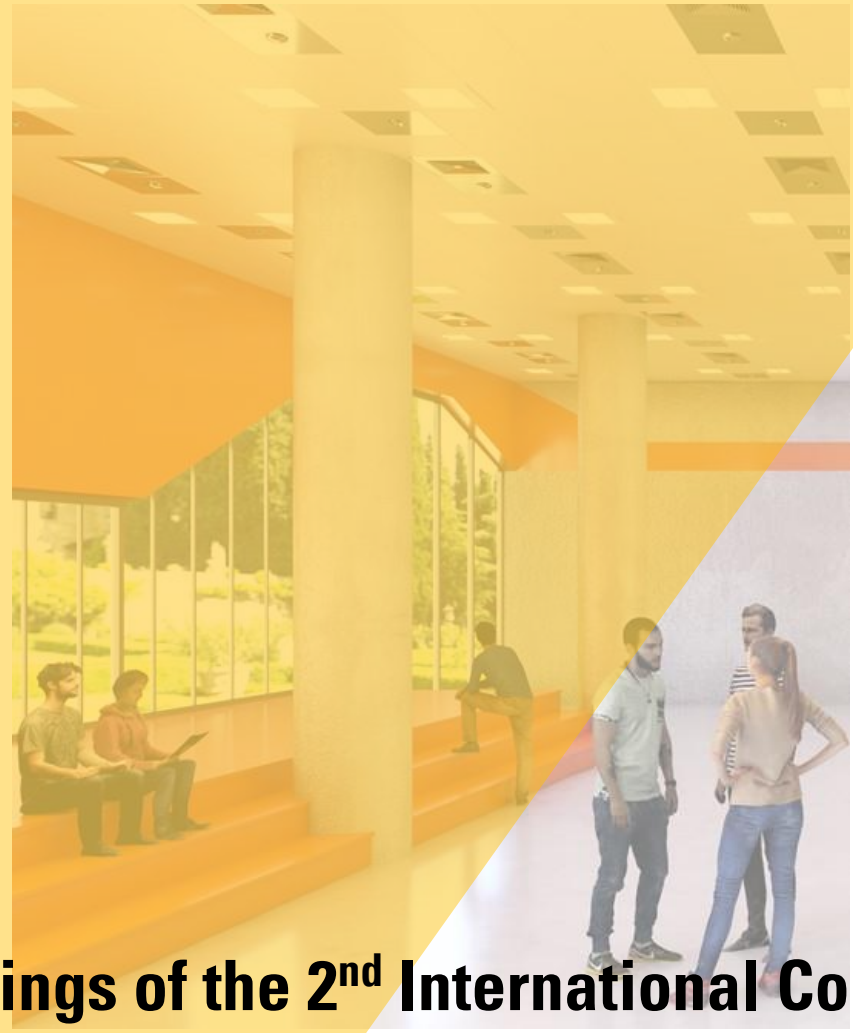

Proceedings of the 2nd International Conference of the Journal Scuola Democratica

REINVENTING EDUCATION

2-5 June 2021

VOLUME II

Learning with New Technologies, Equality and Inclusion

ASSOCIAZIONE "PER SCUOLA DEMOCRATICA"

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Learning with New Technologies, Equality and Inclusion

ASSOCIAZIONE "PER SCUOLA DEMOCRATICA"
Via Francesco Satolli, 30 – 00165 - Rome, Italy

Edited by

The Organizing Committee the 2nd International Conference of the Journal Scuola Democratica

https://www.rivisteweb.it/issn/1129-731X

Published by: ASSOCIAZIONE "PER SCUOLA DEMOCRATICA"

Via Francesco Satolli, 30 – 00165 – Rome, Italy

Published in Open Access

This book is digitally available at:

https://www.scuolademocratica-conference.net/proceedings-2/

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How to cite a proceeding from this Volume. APA citation system:

Author, N., Author, S., (2021). Title, in *Proceedings of the 2nd International Conference of the Journal Scuola Democratica "Reinventing Education",* VOL. 2, *Learning with New Technologies, Equality and Inclusion,* pp-pp

978-88-944888-8-3

Title **Proceedings of the Second International Conference of the Journal "Scuola Democratica" – Reinventing Education VOLUME II Learning with New Technologies, Equality and Inclusion**

This volume contains papers presented in the First International Conference of the Journal "Scuola Democratica" which took place at the University of Cagliari on 5-8 June 2019. The aim of the Conference was to bring together researchers, decision makers and educators from all around the world to investigate the concepts of "education" in a "post-democracy" era, the latter being a set of conditions under which scholars are called to face and counteract new forms of authoritarian democracy.

Populisms, racisms, discriminations and nationalisms have burst and spread on the international scene, translated and mobilized by sovereigntist political movements. Nourished by neo-liberalism and inflated by technocratic systems of governance these regressive forms of post-democracy are shaping historical challenges to the realms of education and culture: it is on this ground, and not only on the political and economic spheres, that decisive issues are at stake. These challenges are both tangible and intangible, and call into question the modern ideas of justice, equality and democracy, throughout four key dimensions of the educational function, all of which intersected by antinomies and uncertainties: ethical-political socialization, differences, inclusion, innovation.

The Conference has been an opportunity to present and discuss empirical and theoretical works from a variety of disciplines and fields covering education and thus promoting a trans- and inter-disciplinary discussion on urgent topics; to foster debates among experts and professionals; to diffuse research findings all over international scientific networks and practitioners' mainstreams; to launch further strategies and networking alliances on local, national and international scale; to provide a new space for debate and evidences to educational policies. In this framework, more than 600 participants, including academics, educators, university students, had the opportunity to engage in a productive and fruitful dialogue based on researches, analyses and critics, most of which have been published in this volume in their full version.

ISBN 978-88-944888-8-3

Premise

In recent years, an important debate has developed on the role that digital technologies are playing and can play in the transformation of education and its institutions. Digital platforms, distance learning, blended learning, online training technologies are part of a significant restructuring and reculturing of the educational worlds. Digital technologies have restructured learning practices, educational content and the forms of educational governance which are immersed in public spaces and global markets. On the one hand, the digital governance of education contributes to changing and reconfiguring educational practices and the management of education on a local, national, international and transnational scale. On the other hand, technologies make possible the interconnection of multiple modes and shapes of formal, informal and non-formal education and training, producing forms of re-spatialization of education, locating the classroom within a digital learning ecosystem and favouring the emergence of different models of blended or hybrid learning.

The pandemic scenario has accelerated these processes, making more visible the tensions between multiple worlds of education and the processes of digitalization, while triggering a complex restructuring of educational institutions whose directions are not yet easily predictable. Perhaps, we are entering a new era that will mark the end of education as we have known it so far. In such a scenario, it becomes more urgent to carry on and debate an informed educational research, that explores the realities of the relations between education and digital technologies. This is especially needed because technologies are far from neutral. They are a heterogeneous technical and social world in which possibilities to change education for the better and make education fairer can be encountered as well as risks can be run of reproducing social and educational inequalities. Therefore, key questions are: how and in what direction the processes of digitalization are changing education, its practices and its governance? What are forms of coordination between educational technology markets and the institutional and educational actors in the emerging transnational governance arenas? How do the professional and social actors (teachers, managers, students, families) that are involved in the digitalization of education react to and translate these transformations? How do digital technologies change the aims and the curriculum of contemporary educational institutions? How can the digital competencies learned by

students beyond the educational spaces (school and university) become a resource for learning processes and educational socialization in educational contexts? And above all, what are the possibilities that digital technologies offer us to reinvent education and its governance that are worth to be explored?

Papers collected in the Volume try to give preliminary answers to those issues. Furthermore, contributions from a range of experts, specialists and scholars cannot avoid facing educational inequalities which haven't by any means disappeared. They have rather changed and (re)combined into new forms that challenge the resilience of educational systems in terms of both effectiveness and equity. Several contributions published in the Volume aims to address these issues from a theoretical and empirical point of view, as well as their implications for educational policies. In this sense, proposals linked to educational inequalities in relation to social stratification as a factor affecting cognitive results, educational choices, the attainment of educational qualifications and working careers are of interest for the reader. Comparative research on different scale (comparisons between national, regional or local cases) is particularly relevant and much importance is attached to the analysis of institutional factors (tracking, comprehensive vs selective systems, accountability policies, private education, ability grouping) which can produce educational segregation dynamics affecting educational inequalities, intersecting extra-curricular factors, such as urban segregation, for example.

The intertwining and interconnecting of differences (gender, socio-economic, cultural, ethnic, cognitive, and motivational factors) often generate inequalities both for their effects in themselves and in relation to the policies implemented to address them in their multidimensionality and intersectionality. Therefore, specific tracks on how education systems and educational institutions try to manage differences and end up producing inequalities are welcome.

The links between education and the labour market are another central aspect of research: the debate on the inflation of educational qualifications and over-education, the differential returns to education according to the type of diploma, degree program or type of tertiary program attended and, more generally, the relationship between education and social mobility represent a pivotal set of phenomena to understand production and reproduction of educational inequalities.

The applications of randomized controlled trials to the assessment of policies aimed at reducing inequalities and improving cognitive and career results as well as empirically driven reflections on how educational policies intersect the complex relationship between equity (equality and inclusion), quality and excellence are one of the main focuses researchers have dealt with in the collected papers.

Gender inequalities are a key topic to understand educational differences. Educational contexts are marked by a significant gender gap in staffing and in the formative experiences of children, teenagers and young students. These differences reflect and often reproduce gender stereotypes and asymmetries in societies at large. How are gender issues addressed in classrooms? Where are they encountered in training settings? What models do teachers convey, and what are the emotional responses from students of diverse gender? How do educational institutions practice and reproduce gender stereotypes and asymmetries? Can school and university provide contexts in which to acquire gender awareness and tackle gender issues? What are the responsibilities of educational contexts in the representation of gender in society? What experiences and good practices have been activated to promote greater gender equity? What cultural resistances? Several questions are addressed in the Volume and many are the answers discussed.

Many forms of educational segregation persist, yet today a growing presence of women – which are in some cases becoming a majority – is found even in fields that have historically been a male domain; this is the case, for example, of medicine and biology in higher education. International and national data show that many things have changed in recent decades, and gender equity is rising in all spheres of education and training. At the same time, several initiatives have been launched to promote greater awareness of gender stereotypes and prevent phenomena such as discrimination and gender-based violence. However, much remains to be done – not least to prevent backslashes and the emergence of new inequalities alongside established ones. This is the case, for example, of the asymmetries in accessing fields of knowledge that may become relevant for the future of work (e.g., digital skills), or the development of new practices of discrimination related to the use of new technologies (e.g., hate speech or revenge porn).

Younger generations have been challenging those constraints surviving from the past, but new challenges arise in a constantly evolving global environment, where the urgency of the climate

crisis in the midst of the coronavirus pandemic call for societal radical shifts while populism, unemployment, artificial intelligence, remote education and communication are affecting the ordinary daily life as we knew it.

Some analysts fear the pandemic will spur a new kind of backlash against the very basis of global society, from migration to cooperation and interdependence, while others worry about younger generations' abilities to overcome mass unemployment and economic vulnerability. Economic, political and environmental crisis are now fully part of the youth horizon: how are formal, informal and non-formal education going to support young people in moving forward positively and purposefully in their lives while simultaneously ensuring space for their autonomy, decision-making and voice?

Such general question contains intersected and multiple issues and applies across contexts as diverse as the role and relevance of democracy as educational content, the changing landscape of non-formal learning/education, the forging of future visions on politics, digital technologies and the media, youth educational transitions, youth experiences at work, the relation between consumerism and environmentalism, the widening of opportunities and constraints stemming out from cooperative learning and digital exchange tools.

Social research and youth studies have been producing a wide range of analyses on these relevant issues, with the (re) emergence of broader theories and empirical inquires directed towards the recognition and validation of non-formal education, the promotion of youth participation, and the deeper rethinking of youth policies.

Under the large umbrella of an education to be re-invented, papers in the Volume are dedicated to new generations, transitions and the future of education, with a broad, multidisciplinary, and internationally set of contributions focusing on a variegated platform of topics on youth studies theories, critical analysis of relevant societal debates surrounding youth in and out education; in and out the labour market; on youth transitions throughout and across cultures, statuses, roles, responsibilities and institutions; on the impact of the various initiatives to promote and enhance youth participation; on the role of youth organisations as well as on the strengths and weaknesses of youth policies at both a national and supranational level.

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Beyond the Click. The (Potential) Contribution of Plug-Ins in the Educational Design of Online Courses

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ABSTRACT: *The contribution focuses on some of the main technical and educational potential of the «plug-ins» that can be installed on the Moodle LMS platform. The paper will describe some of the most frequently downloaded and used learning analytics tools on the Moodle platform. One of the plug-ins presented goes 'beyond the click', it is a tool designed to offer more complex processing (going beyond descriptive analysis). Its distinctive open-source nature, combined with machine learning, makes it a particularly interesting tool, opening the way to the possibility of making predictions about a student's success, paving the way for exciting future scenarios.*

KEYWORDS: *Learning Analytics; Plug-In; Moodle; Teaching-Learning.*

1. Learning analytics and online learning

The Learning Analytics sector (from now on 'LA') has become a significant area of research in the field of Technology-Enhanced Learning over the last ten years or so. In particular, «a combination of the availability of big datasets, the emergence of online learning on a large scale, and political concerns about educational standards has prompted the development of this field» (Ferguson, 2014, 145). However, while the educational potential of LA is not yet fully understood, there is compelling evidence that LA will help develop a more student-focused higher education offering, and provide data and tools that institutions will be able to use for continuous improvement in the quality of their educational provision. In the words of Fabbri and Trisolini (2020):

> (the) participation of numerous users in online courses has shifted interactions onto the net. These computer-mediated interactions are recorded in log files inside which the operations performed by the interface systems and by users on hardware devices and software applications are stored in chronological order. Through the analysis of these log files and LMS environments by administrators, teachers and tutors it is possible to monitor accesses, the use of videos, user interactions and abandonments (108-109).

Long and Siemens (2011) highlight, among other things, the fact that the most critical factor that will influence higher education institutions in the future concerns big data and, in particular, how these datasets will be analysed and interpreted. Evidently, the analysis of big data can help educational and training institutions to improve decision-making processes, optimise the allocation of resources, monitor students' difficulties in good time and offer adequate forms of support (Ivi). According to these authors, the most important objective is to advance the quality of teaching and learning through the activation of adjustment and improvement processes which involve content, feedbacks, strategies and teaching activities.

In recent years, Learning Management Systems (LMS) have provided a particularly interesting area for experimenting with LA tools and techniques. Through the use of these online environments, in fact, it is possible to extrapolate some data that can be fundamental not only to track the quantity and quality of the cognitive and social processes of a hypothetical participant, but also to provide predictions about the student's educational success.

Following this idea, the contribution shows the main technical and educational potentials of some «plug-ins» that can be installed on the Moodle platform. These are plug-ins that go 'beyond the click', in other words, they are tools designed to go beyond 'simple' tracking (e.g. how many times the user actually clicked on that video, or how long they made use of that resource, etc.) and that enable more complex and enhanced processing not only on the quantity but also on the quality of the participants' cognitive and social experience.

As a result, one of the most interesting aspects of research in the Technology-Enhanced Learning field is that related to the design of 'learning scripts' that require students to engage not only in individual tasks, but above all in complex, well-structured scenarios of collaborative learning and problem solving, which require individual and group learning activities to solve real problems; that require course participants to take on roles in order to achieve group objectives and results or to share ideas and topics using virtual workspaces, etc. (Dimopoulos et al., 2013). Alongside this process of educational innovation, it is strategically important to develop and adopt LA tools and techniques that can 'photograph' the complexity of a teaching-learning process in a more appropriate and targeted manner.

2. Plug-ins undergoing development: The Moodle scenario

Starting from an analysis of the online learning and learning analytics (LA) landscape, it is clear that the Moodle platform is one of the most widespread and most widely-used LMSs (learning management systems), above all in the academic field (Schiavone, 2017). This platform currently has more than 180,000 sites and about 258,000,000 active users

in the world[1]. One significant advantage of LMSs which leads to increased usage concerns its great flexibility, as regards the times and ways it can be used and the possibility of having improved accessibility (Zhang et al., 2020). Much of Moodle's success is also due to the particular manner with which it was created and distributed, that is, as an open-source resource.

The strength of an open-source product is its possibility of being implemented by anyone with adequate programming knowledge, thus providing opportunities to expand the range of actions that the platform can operate.

The free creation of third-party expansions (called «plug-ins») highlights the participation of programmers in the improvement and implementation of a tool that is – in a Husserlian perspective – intentionally transformed and shaped according to the purposes of use. Moodle and its implementation ecosystem allows users to exploit, on the one hand, the database in use since the release of Moodle and, on the other, the plug-ins made available by the community that expands this basin of possibilities.

Plug-ins are, therefore, third-party software programs that are used to expand the possibilities of the basic program. The moodle. org site contains a rich reservoir of these software programs and an internal search engine to help users to move around more easily. Currently there are 1794 plug-ins[2] uploaded to the page hosted on moodle.org, but the number is continually growing and new plug-ins are, in fact, checked and validated every day.

The plug-ins page allows users the possibility to carry out a search according to purpose: administration, assessment, collaboration, communication, content and interface. In addition to searching by purpose, users can also enter the search variable by type of plug-in required; there is a wide variety of plug-in categories, from 'activity modules', to 'themes' and various types of filters, restrictions, import methods and data export. Within the search engine, there are also other advanced search variables that can be set: the version of Moodle on which the plug-in will be installed; the type of recognition (awards) received from moodle. org (functionality on a certain version, recognition for being privacy friendly, for mobile support, recognition by reviewers); and others.

To organise the various search results, it is possible to define the order in which they are shown, based on certain variables:

- Relevance: the presence of the searched words will have a greater weight and importance in the ordering of the items
- Sites: this index is based on the number of sites where the plug-in has been activated
- Downloads: this index is based on the number of downloads from the site

[1] On Moodle, page of statistics https://stats.moodle.org.

[2] Moodle Plug-ins searching page https://moodle.org/plugins/.

- Fans: this index is based on the number of positive comments received regarding the plug-in
- Recently updated: the presence of plug-in updates will have a greater weight on the order in which the results are displayed
- Recently added: this sorts plug-ins chronologically, from the most to the least recent

This plug-in archive shows some plug-ins by number of downloads, number of community preferences and number of awards from moodle.org. From among these, we based our study on four plug-ins searched by means of the keywords 'learning analytics' and 'time management'. The searches were oriented towards these two variables so as to build a range of possibilities, to understand on the one hand, what things are analysed by learning analytics (LA) and, on the other, how online course users' perception can be improved by using these tools. Within the selection of LA, we focused on tools that did not show the use of external proprietary algorithms for data processing. The choice was made in order to present a sample that adhered to maximum transparency in data processing, so as not to use proprietary algorithms. Generally speaking, LA programs that rely on proprietary algorithms supplied by data analytics companies do not provide the opportunity of fully understanding the models used for processing, precisely because they are external and company-owned. In short, LA programs with proprietary algorithms also contain 'raw' data from the platform that will be placed into a blackbox and then returned with results after being processed by these algorithms whose values or functions are unknown. The plug-ins that were looked at are shown in Table 1:

TAB. 1. *The plug-ins considered with the analysis*

Name	Type	Maintained by	Sites	Downloads	Fans	Awards
'Monitoring of learning plans'	Reports	Issam Taboubi, Marie-Eve Lévesque	1045	556	130	Privacy friendly; Automated testing support, Early bird 3.2
«IntelliBoard – Your data. Right here. Right now.»	General plug-ins (Local)	Anatoliy Kochnev	1638	1000	114	Privacy friendly; Automated testing support, Early bird 3.3, Early bird 3.5, Early bird 3.7
«Level Up! – Gamification»	Block	Frédéric Massart	7182	3000	460	Reviewers' choice;

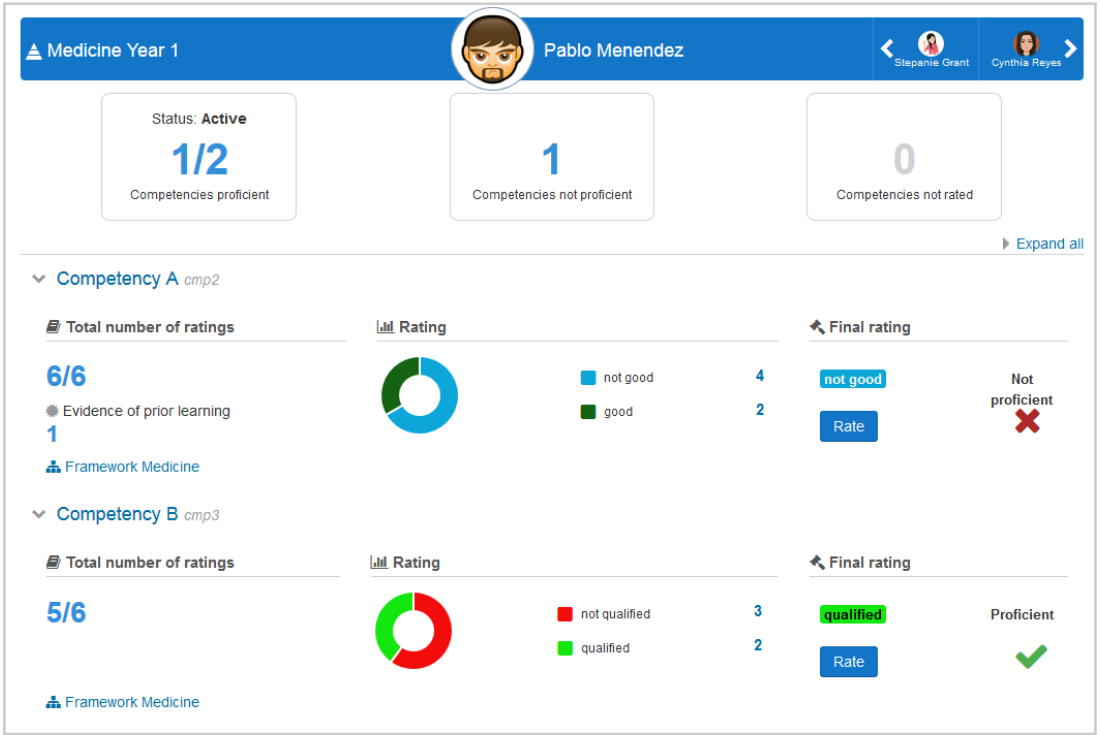
						Automated testing support; Privacy friendly; Early bird 3.0; Early bird 3.2-3.8;
'Completion Progress'	Block	Michael de Raadt	9793	3000	214	Privacy friendly; Automated testing support

2.1. A brief review of the selected Plug-ins

2.1.1. 'Monitoring of learning plans'

The 'Monitoring of learning plans' plug-in collects together various items of information coming from the Moodle platform within a single space and provides the results in graphic form, so that users can quickly view and interpret the various parameters, including the positive and negative percentages of the activities carried out and the skills acquired or otherwise, thanks to the overall count of completed activities.

FIG 1. *Screenshot of the 'Monitoring of learning plans' plug-in*



Source: Moodle plug-in page https://moodle.org/plugins/report_lpmonitoring

The description of the plug-in shows its clear intention to facilitate the work of managing a learning plan, providing a graphical and statistical overview (of the individual and the group).

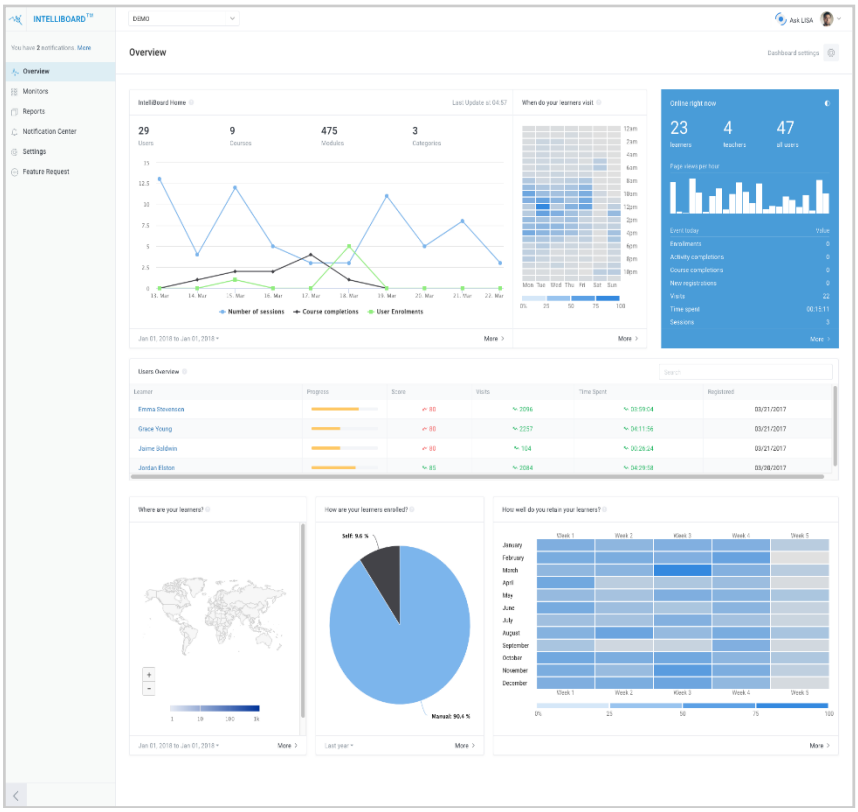
This plug-in requires some preparation work of the online course involving the division of the students into cohorts, so as to be able to process some reasonable and comparable statistics. The plug-in also works on data from the learning models within the course and then also requires the 'competencies' in the individual activities to be established.

The course will therefore need to be prepared fully in all its parts, thus giving the plug-in all the information so that the data can be organised graphically, with particular attention to the information relating to competencies and the assessments of its activities (Fig. 1).

2.1.2 «IntelliBoard – Your data. Right here. Right now»

IntelliBoard works on the statistical data from Moodle, aggregating and presenting it in the form of tables and graphs (also printable) to get an overview of the progress of the course students, with reports that can be customised according to requirements. One of the strengths highlighted in the plug-in description is that it allows all the charts and progress data to be shown together on a single page, enabling the user to understand the commitment of the students at a single glance.

FIG. 2. *Screenshot of the «IntelliBoard – Your data. Right here. Right now» plug-in*



Source: Moodle plug-in page https://moodle.org/plugins/local_intelliboard

As illustrated on the page of the plug-in[4], by processing the data on accesses and the tracking of individual activities, provided by the Moodle platform, this analysis tool can work on various levels:

- Tracking visits and activities of individual students (with the ability to send messages automatically if a student is not very active)
    - Student involvement
    - Use of course content
    - Access to the course
    - Progress summary
- Identification of at-risk students (by tracking and involving students, and by cross-referencing the data of the completed activities and their results)
    - Student success and progress
    - Summary of the student's status
    - Late students
    - Overdue homework tasks
    - Student/average in the course
    - Details on the status of the activities
- Assessments (the quiz trend tools can help by showing which questionnaires are understood the least, thus providing the opportunity to implement educational material on those aspects)
    - Quiz activities on the student
    - Quiz marks
    - Quiz overview
    - Quiz distribution
- Tracing the commitment of teachers (teachers are also fully tracked like students, so as to have the opportunity of understanding)
    - Teaching activity
    - Teaching performance
    - Most active courses
    - Most active teachers

2.1.3 «Level Up! – Gamification»

This very popular plug-in brings gamification mechanics onto Moodle to enhance the experience of learning and student involvement.

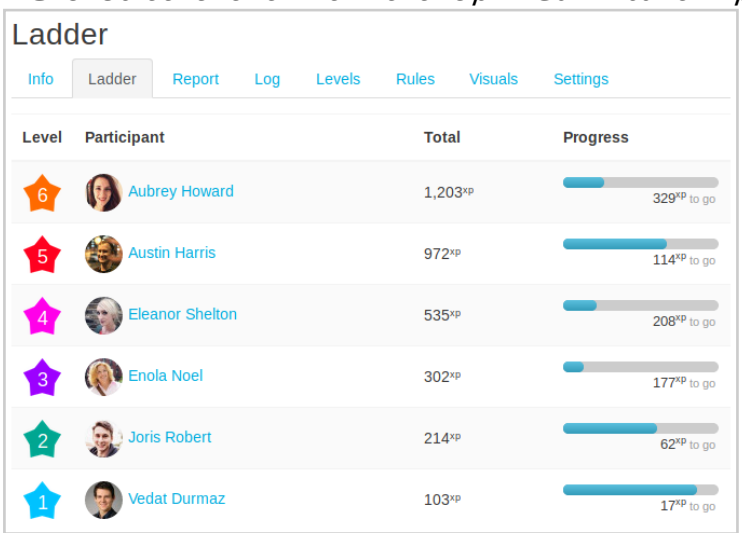
The same LA data discussed above is used, by reorganising and transforming the data into scores according to daily accesses, for example, but above all in relation to the activities; in so doing, some game and 'point accumulation' mechanics are introduced, precisely like bringing gamification inside the course (Innocenzi, n.d.).

Scores are awarded to students in a programmed manner, relating to the actions taken by the student (the scores and the number of levels can be customised and programmed by the administrator) and always show the current score of the student and how many points are missing to go on to the next level. The transition to the next level can be used to release new content and gives the opportunity to gain new experience points.

Scores can also be viewed through an overall ranking; thanks to special permits within the platform, teachers can also obtain the overview of each student and the activities in which they have excelled or those where they had had some shortcomings.

Fig. 3 shows a demonstration screen of a ranking (Ladder)

FIG. 3. *Screenshot of the «Level Up! – Gamification» plug-in*



Source: Moodle plug-in page https://moodle.org/plugins/block_xp

2.1.4 'Completion Progress'

'Completion progress' is described[3] as a time management tool for students; it visually shows the completed activities and those missing by means of a 'progress bar' (Fig. 4).

This simple plug-in is based solely on data gathered from the task completion settings and provides students with the possibility of keeping track of their work progress.

FIG. 4. *Screenshot of the Completion Progress plug-in*

Source: Moodle plug-in page https://moodle.org/plugins/block_completion_progress

This progress bar may also be analysed by teachers with regard to the learning path, so as to allow them to shape and edit the course based on their reading of the collected data.

[3] Moodle plug-in page https://moodle.org/plugins/block_completion_progress

3. The Inspire plug-in

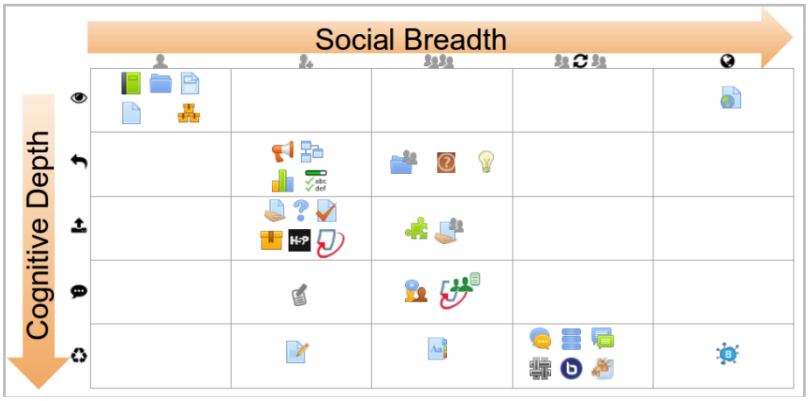
Inspire is a project conceived by Moodle.org in order to implement LA, but above all, as indicated in the description of the software, «a project that aims to go beyond simple descriptive analytics to provide predictions of learner success, and ultimately diagnosis and prescriptions (advisements) to learners and teachers»[4].

The description page clearly explains the integration with the most recent versions of Moodle (from 3.4 onwards) as a tool for LA.

Like all LA instruments, this one uses data from the platform, namely: accesses, times, the time spent on individual pages, activities, assessments, latency in task deliveries and all the tracking details given by the internal activities to the platform. Unlike other plug-ins, however, it uses this data to create a predictive model, relying on machine learning and then being able to exploit modelling that is consistently implemented, if set within the courses, and that will increase its predictive quality.

In the core version of Moodle, which is complete and improved with respect to the plug-in which has a few limitations, the LA component enables more data to be read than other LA tools which read accesses, assessments and the completion or otherwise of activities. This software uses modelling also on a scale with the level of involvement which is calculated based on the diversity of the activities performed. Fig. 5 highlights the two dimensions in which the activities are determined: the 'social breadth' dimension and the 'cognitive depth' dimension. On the 'social scale', we find individual work, work in small groups, work with exchanges between groups and a global task; the 'cognitive scale' starts with cognitive work of reduced cognitive impact (such as the reading of a text or viewing material), and moves to one with greater impact: such as, for example, the response to a stimulus, the loading of a written task, participation in a debate and collaborative creation of learning materials.

FIG. 5. *Screenshot*



Source: Moodle plug-in page https://moodle.org/plugins/tool_inspire

[4] Moodle plug-in page https://moodle.org/plugins/tool_inspire

The limitations of using this LA tool lie in the fact that it cannot be used on free continuing education courses, which have no start and end dates.

Conclusions

Authors such as Kadoić and Oreški (2018) emphasize that LMSs have become, over the last twenty years (also in the educational field), a specific area of scientific research. In parallel with these studies, there has been an increase in the development of tools, such as LA, designed to improve the quality of teaching proposals, in addition to monitoring the educational experience in online courses.

Through LA, teachers can receive feedback on the progress of a course and can then be in a position to calibrate more effectively a plurality of factors, such as the study load and the final and intermediate tests. The data processed by these systems can shed light on the effectiveness (or not) of the tools and the teaching strategies used.

The most recent research and experimental activities (Zhang et al., 2020; Romero, Ventura 2020) focus on the identification of the procedures for interpreting the data acquired through data mining algorithms, assisted by a guided reading of the data extracted by the same platforms. Elizabeth Dalton, research analyst with Moodle and promoter of the *Inspire* project, is part of this interpretive overview and data reading.

When reporting to the community of Moodle[5] on the operation and benefits of *Inspire*, the author highlights the 'open' nature of the tool. Unlike other LA tools[6] which use proprietary algorithms, *Inspire* exploits the logic of machine learning. This tool is designed to be an open system (the algorithms are 'visible') and is potentially improvable from the point of view of technical programming. Through the use of machine learning, the LA tools become analytical tools based on models that are self-implementing. For example, you can forecast in advance potential abandonment rates on a course. The predictive model is then driven beyond the single item of data (e.g. the number of times a document has been opened), the completion of activities or other things. This data is integrated through a 'learning model' that allows for making increasingly more precise predictions.

[5] Moodle Conference about reveals *Project Inspire: the open solution for learning analytics software*, presented by Elizabeth Dalton: https://www.youtube.com/watch?v=-JSYwn42R6Y.

[6] In the landscape of LA tools, the general requirement is to read some material and interpret the data that is often more relevant to a technical field rather than the educational field. The plug-ins listed in the first part, in fact, show a more 'aggregative' than 'interpretive' nature. In other words, the work of interpretation is entirely delegated to the teachers. This factor may reduce the possibility of the data being understood by many teachers, especially by those not trained in the analysis and interpretation of data in such environments. In this regard, it is worth noting the recent studies by Romero and Ventura (2020).

Finally, returning to the reflections of Chen et al. (2020), scientific research is increasingly focusing its attention on the application of algorithms and artificial intelligence in education. A growing interest on the topics of machine learning and artificial intelligence seems to be emerging, thanks also to Moodle's *Inspire* project, also with regard to how those elements may contribute towards enhancing the interpretive and predictive functions of LA. The advent of tools like *Inspire*, which bring flexible models based on machine learning, extends the field of play for the analysis of learning data by making the data more accessible and thus providing the opportunity to exploit it in order to increase, in process terms, the quality of online courses.

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