

Ubicua and *Dialecta*: Two Digital Environments That Support Teaching and Educational Innovation

Eduardo Peñalosa-Castro¹, Heriberto Zavaleta-Morales²

¹Communication Sciences Department, Metropolitan Autonomous University, Ciudad de México, México

²Distance Education Area, Metropolitan Autonomous University, Ciudad de México, México

Email: eduardop@correo.cua.uam.mx

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Abstract

Digital tools for learning at the Cuajimalpa Campus of the Metropolitan Autonomous University of Mexico (UAM, for its acronym in Spanish) are described: an educational platform (*Ubicua*) and a learning repository (*Dialecta*). The experience of developing these tools and the initial results of their implementation are described. *Ubicua* is a learning platform developed on the basis of a recent version of *Moodle*, and this development was designed taking into account a conceptual structure consistent with the teaching methods of the Cuajimalpa Campus of the University. Accordingly, a set of dimensions were established as the platform's underlying structure. These dimensions were: operational simplicity, usability, cognitive load, wealth of media, interactivity and sense of presence. On the other hand, *Dialecta* is a web application developed at the University, which stores and makes digital material available to be used in academic processes. Among other functions, it allows users to classify work, discuss their uses, qualify them, and incorporate them into the courses created and taught through the *Ubicua* platform. Both tools are linked so that from the platform users can access and use any content in the *Dialecta* repository. The article reports both the characteristics of these tools, their conceptual and instructional support, as well as the methodology and the results of an evaluation conducted with students and professors of the campus.

Keywords

Learning Platforms, Digital Repositories, Collaborative Environments, Teaching Support, eLearning Dimensions

1. Introduction

The creation of the UAM Cuajimalpa Campus, in 2005, was characterized by a significant interest in innovation,

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which has meant, necessarily, the use of information and communication technology (ICT) in academic activities. This has generated a gradual transition to promote student learning through the use of digital technologies.

The use of a digital platform to support teaching at the campus was originally marked by the use of Virtual Learning Environment (*ENVIA*), a platform developed by another campus of UAM University. Later (late 2006), we used the *Moodle* platform, which is now known as the *Virtual Classroom*. This migration was a natural process in the search for tools better aligned with the strategies of teaching in UAM Cuajimalpa.

In mid-2013, a group of specialists of the campus conducted a review of different educational platforms, both commercial and free software. As a result, the group took the decision to continue using the *Moodle* platform, but with an adaptation that improves the quality of the tool and aligns its operation with the teaching methods of the Cuajimalpa Campus. The result of this adaptation is the new platform now named *Ubicua*, a name that arose from a proposal made by a group of teachers at our campus. Another important work environment, *Dialecta*, is a web application developed at UAM Cuajimalpa which stores and makes digital material available to be used in academic processes. In addition, among other functions, it allows users to classify work, discuss their uses, qualify them, and incorporate them into the courses created and taught through the *Ubicua* platform. Both tools are linked so that from the platform users can access and use any content in the *Dialecta* repository.

This paper focuses on the two work environments described, which are part of the different digital tools and environments-developed or in development for the campus

2. The *Ubicua* Platform

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From initial experiences of the academic community regarding the adoption of technologies and educational innovation, and based on work done by the campus Committee of Educational Innovation, it was considered appropriate to develop a new educational platform and a repository of digital learning materials, among other relevant tools to support teaching. The following initial basic features were defined for *Ubicua*:

1) Incorporate the educational model of the campus and, to that extent, allow access to quality media materials, which allow students to access problems, cases, projects, dilemmas, etc., with the goal of using the tool to resolve these situations through the application of knowledge, obtained through research and collaboration.

2) Have a clear usability for teachers and students, in an environment that is characterized by operational simplicity and simple, intuitive handling procedures.

3) Have the capacity for integration and interoperability with existing tools, at the campus and with third-party tools, so that other functions and contents are integrated, as well as the ability to obtain information about student use.

4) Have the ability to extend its functionality to allow its development, according to new needs of the campus, which would mean that new and innovative tools can be added, as well as current and updated versions of known software.

Based on the above and due to the short time available for the launch of a new educational platform, we evaluated the major functional and operational characteristics of some of the most popular software available (both free and commercial): *Moodle*, *Dokeos*, *Sakai*, *Atutor* or *Blackboard*. The main results that guided the decision to work with the open source platform *Moodle* were:

- a) The set of features available at the time of the evaluation.
- b) The range of plug-ins available and compatible with third-party tools.
- c) Knowledge and experience of the academic and student community of the campus.
- d) Flexibility to adapt, both related to technologies with which it is developed, and the extensive documentation available online for this process.

The design and features of the platform were approved by the committee, made up of academics from the campus. And, with this, we started the adaptation of the new platform.

2.1. *Ubicua* Conceptual Model

Based on the identification of needs of the new educational platform for the UAM-C (*Ubicua*) and based on the decision to perform the adaptation of the *Moodle* platform, a conceptual model was developed, which is shown

in **Figure 1**. *Ubicua* maintains the *Moodle* core and the ability to increase its functionality through plug-in support. But it incorporates a personalized user interface, as well as a number of mechanisms and technological resources that facilitate the inclusion of distinct components: video conferencing systems in real time, streaming, and the digital repository of *Dialecta* materials as elements of its own development. It's important to note that it shares with the latter the technological infrastructure that supports it as well as HTML5 technology standards that provide compatibility with most of today's electronic devices. The addition of custom user interface aims to keep the student's attention focused on the content and resources at their fingertips.

Potential distractions are minimized or are made less obvious. For teachers, the link with *Dialecta* lets them have access to the resources used in the elaboration of their courses in a centralized space, reducing the time spent on administration, if they are not compatible, while it permits them to distribute and share with their students, colleagues, and the interested public. These are just two examples of the benefits expected from the implementation of the proposed model.

2.2. Dimensions of a Platform Model

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Based on the literature, which describes the dimensions of learning through technology, we thought that the structure of the new UAM-C educational platform would include some of the following features.

2.2.1. Graphic and Cognitive Usability

The new platform incorporates elements of usability that allows teachers or students to interact easily in this environment. In **Figure 2**, we see that the student has access to the elements of their course, with a minimum of distractions. Cognitive overload that traditionally comes from the different templates in the *Moodle* platform is reduced. And user attention is focused on the important elements of a material or resource available through the new platform (Miller, 1956; Sweller, 1988).

2.2.2. Interactivity of Materials

Interactivity is seen as the possibility to complete cycles of messages with learning materials. For example, **Figure 3** shows one of the themes developed for this platform, a course with high failure rates: Math Workshop. In the figure, the representation graphic of the use of the parabola is shown.

The material has a structure of four stages: introduction, topic development, interactive exercises, and evaluation of the topics covered in the course. The interactivity of the materials, the structure with which they were designed, and its integration with the new platform, allow users to deploy self-learning processes and self-evaluation, freeing the student of the need for personal help in their learning process (Peñalosa & Casteñeda, 2010).

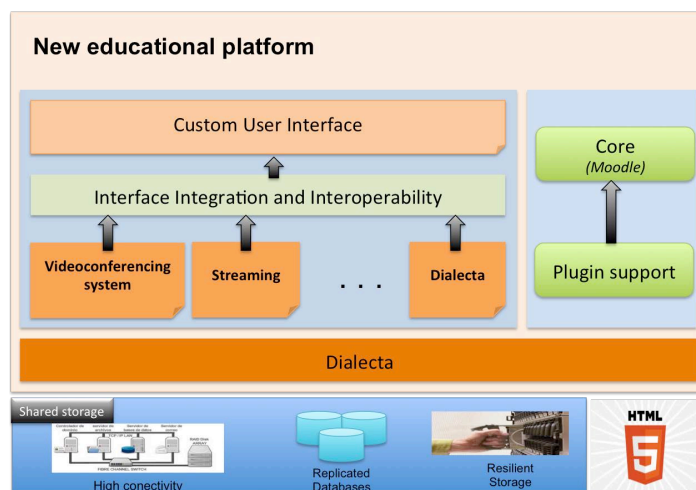


Figure 1. Conceptual model of the educational platform *Ubicua*.



Figure 2. Interface simplicity and content-centered design.



Figure 3. Incorporation of interactive self-learning materials.

2.2.3. Wealth of Media

Wealth of Media is associated directly with resources and materials, rather than the platform; however, the technical ease and usability of the new platform facilitates the incorporation of a wealth of materials and resources: audio, video, images, interactive features, video conferencing, etc. thus providing significant advantages for users. In Figure 4 we see the interoperability of *Ubicua* with *Dialecta*, where we can see a resource published in

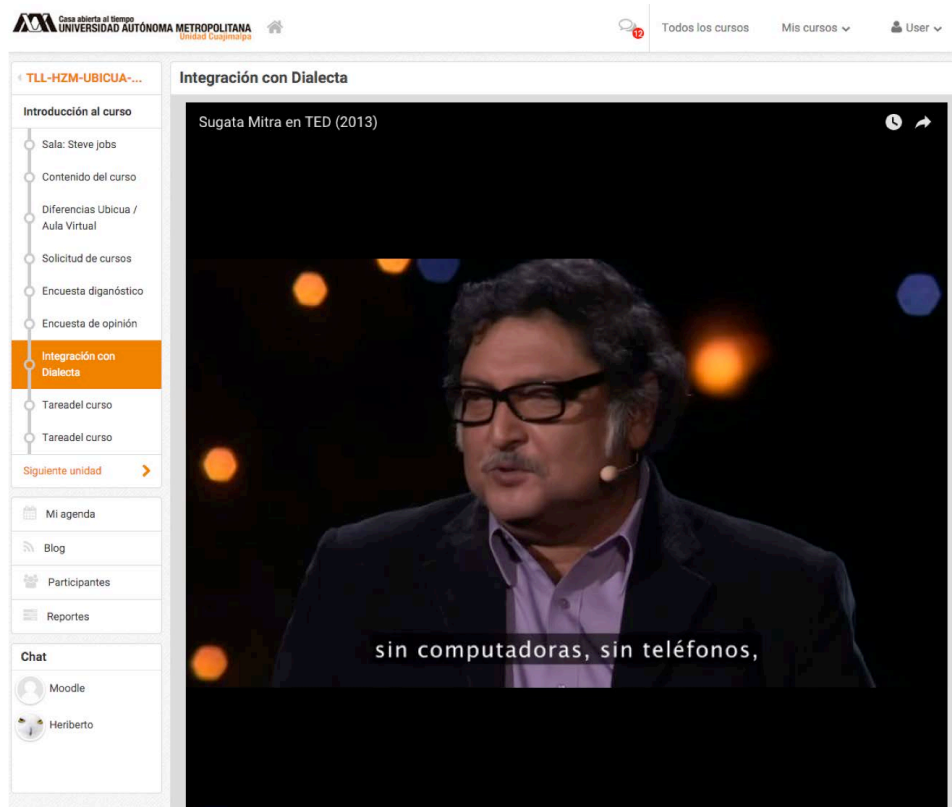


Figure 4. Wealth of media in *Ubicua*.

Dialecta. This has been incorporated into a course in *Ubicua*, and, at the same time, it shows the ability to include multimedia as part of the contents in *Ubicua*. We exploit both cognitive learning channels: pictorial and verbal, with their variant modalities (video, animation, text, voice). This shows that it increases the quality of learning (Mayer, 2001).

2.2.4. Computational Self-Efficacy

The combination of the basic benefits of the new platform-usability, efficiency, compatibility with new technologies, and adaptability to new environments, etc.—and the full or partial implementation of these aspects make it possible for the user to master the procedures of this tool. They, therefore, develop a computational efficacy with all the operational benefits obtained by implementing the tasks in the educational platform and benefit from the consequent assimilation of knowledge (Murphy, Coover, & Owen, 1989; Compeau & Higgins, 1995).

2.2.5. Sense of Presence

Users feel they are where the learning activities are given, with the availability of common areas, such as discussion forums, virtual video conferencing rooms in real time (as shown in Figure 5), and spaces where works are observed by peers where you share with others, given the availability of audiovisual media. This makes users feel part of a group, included in activities, and participating in interactions through the co-construction of work (Lehman & Conceicao, 2010).

3. *Dialecta* Repository

A web repository of learning materials is a collection of digital objects. Heery & Anderson (2005) indicate that there are many meanings of this concept. The repository can be institutional, thematic, and informational for documents, data, or learning objects, among others.

Dialecta (<http://dialecta.cua.uam.mx>) is a repository of digital academic web resources, allowing users to

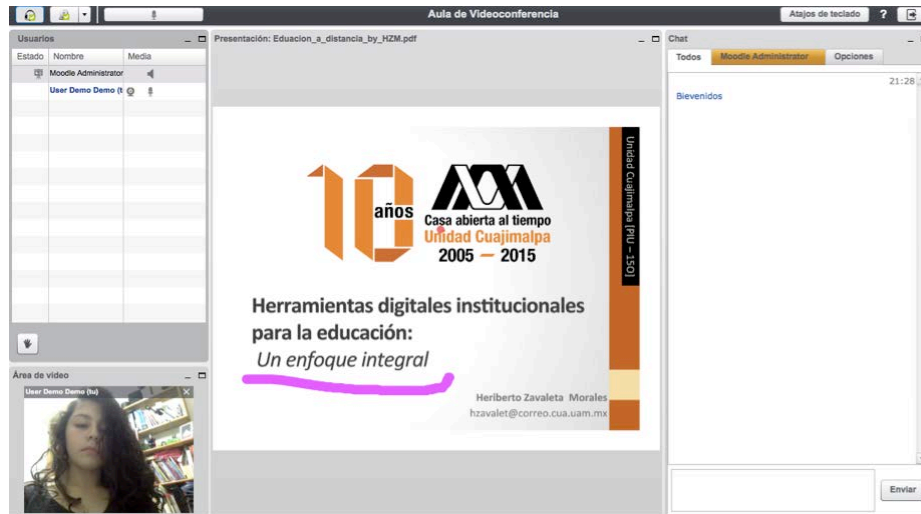


Figure 5. Common spaces of interaction.

disseminate, share, use, and reuse resources to support academic activities at the UAMC. Its design is based on a principle of operational simplicity, which refers to an interface with a minimum of elements, but with important functional and operational capabilities.

In **Figure 6**, we see the simplicity of its interface, with just a few elements-text boxes, menu bar, resource list for quick access, navigation menu-that give sufficient interaction for users to search, play, work, review, store, classify, and publish their resources and those of other users.

Conceptual Model of *Dialecta*

The conceptual model of *Dialecta* consists of a set of stacked and interrelated layers, with transversal defining common elements and features in all layers: technology development, support mechanisms, and information security.

Figure 7 shows the conceptual model of *Dialecta*. Here the bottom layer of the model is observed-which gives this application the ability to adequately cover the needs of physical and logical storage. It is based on a network of technologically high performance hardware and software. It is based on a technologically high performance network with backup and replication of data schemes. With this, we want to ensure greater availability of services, shortening data access time and optimizing the recovery process before any contingency.

In the middle layer-collaboration and interaction-the model defines the core of the operation of *Dialecta*, encapsulating user processes and resource management, optimized searches, user profiling, dissemination and collaboration, as well as other components that make *Dialecta* unique.

In the upper layer, is the user interface, which defines the current technological standards that ensure compatibility with modern devices, through a simple, easy-to-learn interface.

In the transverse layer of this model, technologies and procedures converge, through *Dialecta*, which is accessible from any device, emphasizing its availability and assuring information it houses.

4. Initial Applications of the *Ubicua* and *Dialecta* Environments

It should be mentioned that the learning environments described are part of a group of elements that include other tools. However, *Dialecta* and *Ubicua* are very important parts of a basic digital environment at the campus, which is connected with other types of software, interactive content, courses, and other digital objects.

The steps that have been taken as part of the promotion of the use of these tools, which has also lead to their adoption by the community of users of the UAM-C, are summarized as follows.

1) *Analysis and development*. In these stages, a group of specialists in the area of distance education were given the task to interact with the Commission for Educational Innovation and Technology Appropriation and make the proposal of both environments. After defining the requirements and scope of the project, we proceeded to the development stage. The aspects and conceptual design described above formed the basis for the development and

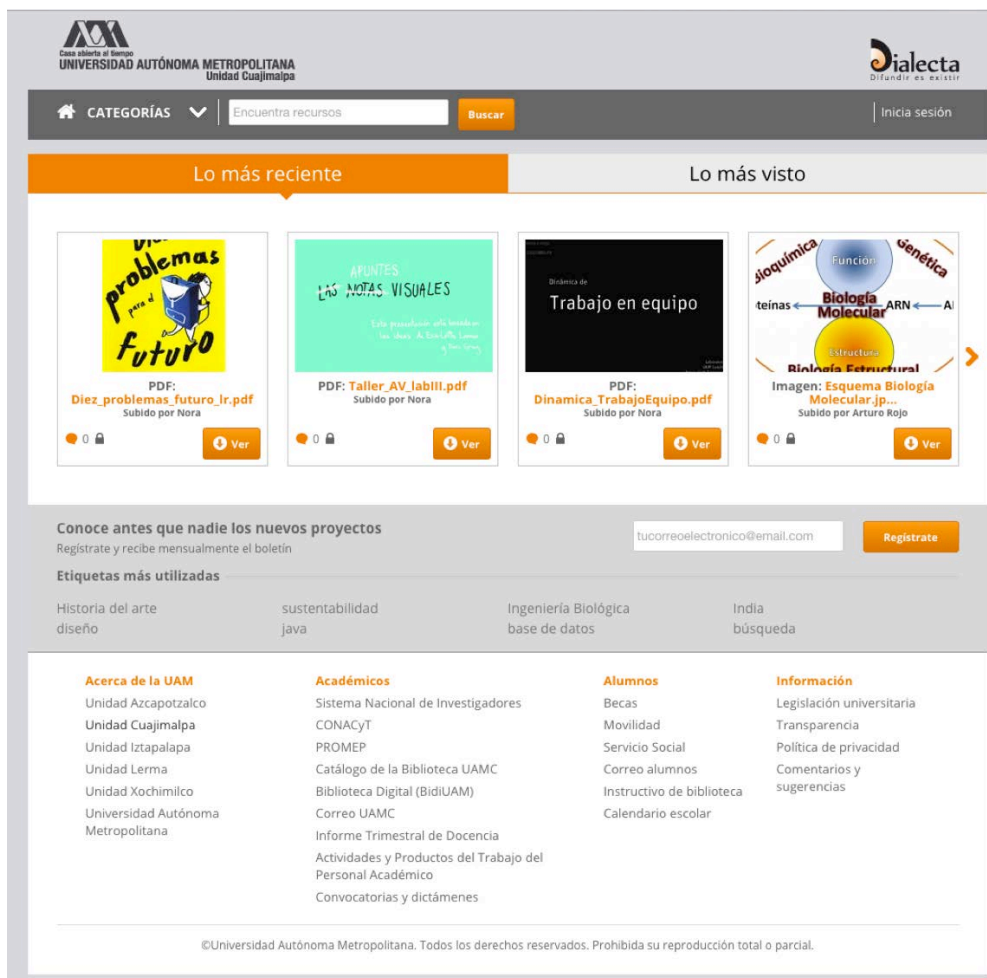


Figure 6. Dialecta’s main screen.

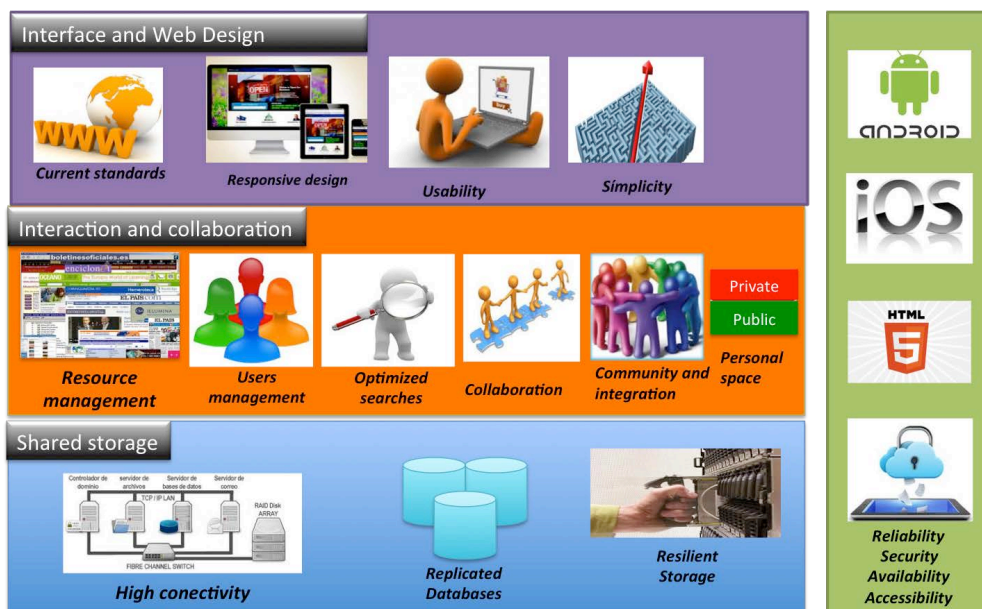


Figure 7. Conceptual model of Dialecta.

adaptation of these tools.

2) *Disclosure*. The use of electronic media such as Facebook, the institutional portal, and emails are some of the mechanisms of greater impact in this regard. In person, exhibition forums are held to publicize the various tools available to date. These presentations were designed to create or increase the interest in using these tools by the community and to encourage their use and appropriation.

3) *Courses and Tutorials*. We gave courses to teachers and students in order to familiarize them with the new interface of *Dialecta* and *Ubicua*, and to explain how to exploit these resources and the benefits that they provide. At the same time, the courses were designed to arouse interest in learning about and using institutional tools and to interact directly with them.

Each of the institutional tools have been adapted and implemented to the UAM-C; architecturally they have mechanisms for integration with existing tools, plus the tools remain open for future implementation.

As an example of this, *Dialecta* integrates seamlessly with *Ubicua* at the educational UAM-C platform, allowing users to access the resources available in the first integration (described below).

4.1. Professor's Perception of *Ubicua* and *Dialecta*

Ubicua, as an integrator of institutional digital tools, has been used as a prototype in various courses. Prior to this, it was used as part of the Diploma in University Teaching offered by the campus, a course that covered the use and familiarization of both *Ubicua* and *Dialecta*.

With the registration of approximately 14 percent of the campus teaching staff, we laid the groundwork for its implementation in normal courses of the various academic programs. As a result, nearly a third of the participating teachers chose to use the new educational platform to support their courses. At the same time, within the program of support for the courses with high failure rates, a new group of teachers joined and four courses were included in the program, which was taught through *Ubicua*, incorporating, mostly, resources from *Dialecta* and other tools.

Thus, it should be reiterated that the diffusion of the tools has been done through various activities: courses, exhibitions, electronic media, etc. The current status of this process is still considered initial, but the results obtained so far indicate that the start-up has been successful and this has gradually led to new UAM-C members using and appropriating these tools.

Several groups of academics from our campus have been involved in and have participated actively in the process of conceptualization, implementation, dissemination, testing, use, and appropriation of these projects. Some scholars have had the vision and desire to freely share and disseminate these materials and products for institutional teaching.

We analyze the results associated with the development and adaptation of digital tools in the UAMC from different angles.

4.1.1. Ownership of Tools

Groups of teachers of our campus have begun to use the various tools available to support their teaching activities. Similarly, they have adapted their use as collaboration tools for the collective creation of documents for the quarter 15-O (Autumn 2015), incorporating new teachers in the use of the different tools offered.

Integration between existing tools

Dialecta grows steadily in the amount of resources that it houses, therefore, its use through the educational platform increases. The ease with which resources housed in *Dialecta* can be viewed and accessed from the platform has resulted in greater acceptance of both tools.

4.1.2. *Ubicua* Use Evaluation

Almost 50 percent of students in campus pilot programs were surveyed and those who used *Ubicua* in their courses found the interface on the new platform to be adequate. In addition, more than 80 percent of respondents had no trouble adapting to the new interface, or did so with little difficulty.

Figure 8 shows this result, suggesting that the learning curve of the new platform will be short, once it is released in its entirety to the Cuajimalpa community, and that the elements integrated into its interface are adequate.

Among the important adaptations to *Ubicua* is the design of its interface. This is linked to its usability and the distinctive features that minimize the cognitive overload, naturally present in the *Moodle* platform. As noted in **Figure 9**, more than 90 percent of users considered the graphic design of the *Ubicua* platform to be

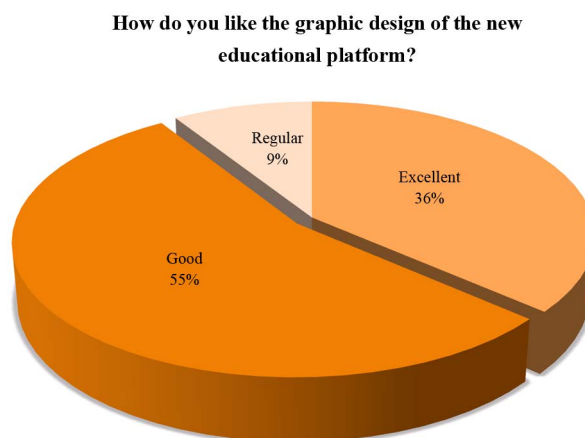


Figure 8. Adjustment process for the *Ubicua* interface.

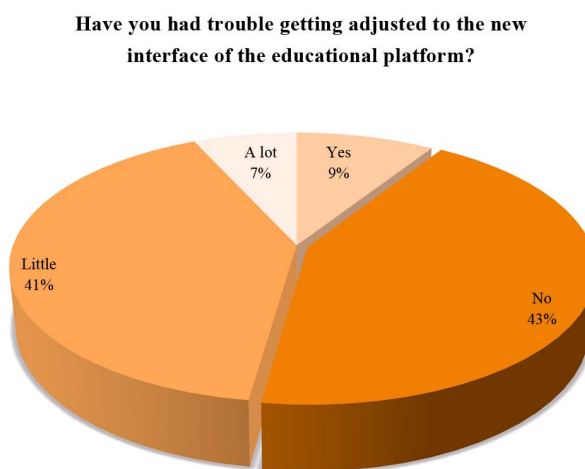


Figure 9. Perception of *Ubicua* graphic design.

good to excellent.

This, coupled with the ease of adaptation to the new interface shown by pilot groups, has led to the rapid acceptance of *Ubicua* by the students of the UAMC.

Note that we are in the process of assessing the impact of these tools in student learning in the participating course. This measurement is currently being prepared and will be communicated in a timely manner.

Aiming to complete the assessment of functionality and design of both learning tools, a questionnaire was applied to professors of the university, who participated in a workshop designed to train users in *Ubicua* and *Dialecta*.

The data collected let us know that professor's perspective from two viewpoints: 1) *Ubicua* as a content editor, and 2) the use of *Ubicua* and *Dialecta* as teaching tools. This assessment is described in the following section.

4.2. Statistical Analysis of Professors' Data

22 professors of the University, who took a workshop about the University's digital tools for teaching and learning, participated in the study. The workshop had a duration of 3 hours, and its objective was to update the participants' knowledge on these tools, given that they were formerly using the *Moodle* platform named *Virtual Classroom*. The course was conducted in an equipped classroom in the University, with internet Access, so they could use *Ubicua*, *Dialecta* and other digital resources to conduct exercises.

The subjects covered in the course included: 1) an introduction to the tools; 2) using *Dialecta*; 3) using the main functions of *Ubicua*; 4) including *Dialecta*'s contents in *Ubicua*, and 5) new features of *Ubicua* as com-

pared to the *Virtual Classroom* platform.

Participants were cited at a computer classroom in the University campus, and the instructor conducted a workshop aiming to train the participants in the digital tools. At the end of the workshop, participants answered a questionnaire with several items, all of them having response options in a Likert scale including the options: a) total disagree, b) disagree, c) indifferent, d) agree and e) total agree.

Table 1 shows a summary of the statistical analysis applied to data resulting from professors' questionnaire. The statistical analysis was a one group means comparison of each item scores against the mean scoring; in the Likert scale, ranging from 1 to 5, the mean was 3. The statistical test employed was Student "t" for one group. Results of the analysis are presented in the next section.

The 22 participants in the study responded as shown in **Table 1**. It shows, from left to right: a) the ideas presented in the questionnaire; b) the value of the "t" test, and c) the "t" probability.

All results showed the acceptance of the characteristics of *Ubicua* and *Dialecta*, and the participants considered that both tools are useful and consequently they will adopt them in their courses.

5. Conclusion

The Cuajimalpa campus continually makes a great effort in the quest for innovation, quality, and efficiency in all the activities of the university. An important part of its educational model includes the building, adapting, and integration of digital tools to support its academic activities.

Interoperability of digital tools permits us to combine the qualities of each digital tool to provide teachers and students with the advantages that facilitate their academic work.

The main objectives of the use and appropriation of ICT in the Cuajimalpa campus support teachers who generate, share, and reuse content. Thus, those are the teachers who, through their experience, knowledge, and ability, generate the elements that enrich the pool of free and available resources in the campus. This supports teaching and the dissemination of institutional academic work.

Ubicua and *Dialecta* are examples of environments, combined with other resources, which are developed internally or retrieved from the arsenal available on open networks, all of which will make teaching innovation possible, in keeping with the educational model of the UAM Cuajimalpa.

The results initially obtained in the application and implementation of *Dialecta* and *Ubicua* force the UAM Cuajimalpa to keep evolving and adapting institutional digital tools. In addition, the UAM Cuajimalpa continues

Table 1. Statistical analysis results.

Item Contents	T	p
<i>About Dialecta repository</i>		
<i>Dialecta</i> is a useful repository to store digital resources and incorporate them into the teaching practices	7.438	0.000
The availability of <i>Dialecta</i> and <i>Ubicua</i> would favour the improvement of teaching quality, better than the formerly used platform (Virtual Classroom)	13.133	0.000
<i>About Ubicua learning platform</i>		
<i>Ubicua</i> is consistent with the educational model of the University	7.085	0.000
The functionality of <i>Ubicua</i> has the following characteristics:		
a) Cognitive overload reduction	5.997	0.000
b) Operational simplicity	17.390	0.000
c) Adequate interactivity	13.096	0.000
d) Allows users' self learning	11.007	0.000
e) Wealth of media	7.780	0.000
<i>Overall valuation</i>		
Professors agreed they will adopt <i>Ubicua</i> and <i>Dialecta</i> as a tool to support teaching in blended and distance courses	13.748	0.000

to conceptualize and implement new tools that help its teachers improve the quality of teaching at our campus.

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