MOODLE TEACHING STRATEGIES IN ORDER TO IMPROVE THE KNOWLEDGE ON GRAPHICAL REPRESENTATION OF VALVES

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Abstract

The aim of this paper is to show the application of moodle software to help the knowledge of graphic representation of valves with an online application. This online application has being used in a specific subject of the University of Alicante. COMPUTER GRAPHICAL DESIGN OF CHEMICAL SYSTEMS. With this methodology students gain competence in working independently. This kind of teaching is an alternative one to be used within the European Credit Transfer System (ECTS), where the students are expected to work with different materials and in different situations.

The use of this kind of technology becomes essential, because there exist different regulations of the representation of valves, some more widespread than others, depending on the typology they comprise. The increasing use of both 2D or 3D new technologies has influenced the market to promote the increase of 2D and 3D programmes, specially for the representation of valves and pipes, as well as other elements. The majority of those computer programmes have basic libraries and files that include the representation of these elements.

With this tool we aim to offer, in the first place, a compilation of the regulations applied in the representation of valves; in the second place, to improve the learning process, because the students can work by themselves or in a group with the interpretation of different maps with all the elements that they need. For teachers it is a good tool in order to know the evolution of the different groups and also because it becomes easier to apply a continuous evaluation process.

Keywords
Innovation, Moodle, computer graphical design, ECTS.

1. AIM

Creating through _Moodle Platform_ an interactive teaching material to be used in the subject of Graphic Expression, taught within the degree of Chemical Engineering.
The choice for this format of blended learning favours the student's abilities in a subject like Graphic Expression, as it is closely linked with 2D and 3D within new technologies.

The University of Alicante is currently fully involved in the adaptation of its Study Plans and Curricula to the European Space for Higher Education.

The European Space of Higher Education created in the year 1999, started with the sign of the Bologna Declaration, aims at the convergence of the institutions of higher education, in this case sponsored by the European Union, implies the official approval and homogenization of the university studies in Europe and the creation of a open space for students, teachers, administration staff and people with a degree. As well as the homogenization it aims at an exchange of students and staff and it will certainly give a new dimension. This process of joint construction, which will have to finish by 2010, involves a series of legal and institutional changes that are being debated and specified.

It is based on three main concepts:

- The system of ECTS credits: (European Credit Transfer System): Within this system 1 credit will equal 10 theoretical contact hours and 25 practical hours. From the teacher's (lecturer's) point of view there will be a reduction of contact hours in favour of monitored practical hours.
- New Degree Structure: grade/postgraduate/master: higher education will be split in two cycles, a more generalised grade and a more specific orientation (postgraduate).
- Accreditation/verification: This last concept foresees the creation of new systems of verification though both internal and external evaluation, in order to watch and protect the quality of each Educational Centre and its adaptation to the European Space of Higher Education

The European Space of Higher Education will surely become the most important educative framework for the next decades.

The European Credit Transfer System will have to be generalised and used for all European Union students. Therefore, it will become a reference point that will allow achieving the cooperation and team work that are demanded nowadays in order to achieve full transparency and quality.

It is essential to emphasise that adopting the ECTS will imply a conceptual reorganisation of the educative systems in order to become adapted to the new models of formation centred in the student's work. It is precisely at this point where e-learning platforms become very important as within those European credits are included both theoretical (and laboratory work), practical hours, student's personal work and tutorials. One possible way to mark the personal work of each student is though personalised monitoring and through the tutorials. Those tasks would be very difficult to achieve if those authorised self-learning platforms could not be used.

What is Moodle?

Moodle is a free and open source e-learning software platform (also known as a Course Management System (CMS), or Learning Management Systems (LMS), or Virtual Learning Environment (VLE)).

Moodle is designed to help educators create online courses with opportunities for rich interaction. Its open source license and modular design means that people can develop additional functionality. Development is undertaken by a globally diffused network of commercial and non-commercial users, streamlined by the Moodle company based in Perth, Western Australia.

Moodle was created in 2002 by Martin Dougiamas. His design of Moodle, provides pedagogical aspects missing from many other e-learning platforms. Moodle runs with free software, called "Moodle Modular Object-Oriented Dynamic Learning Environment". Nowadays, it has a significant user base with more than 2 million teachers of over 200 countries.

The philosophy of its creator is really interesting, but we must remember that as it always happens in the *www* nothing is yet finished and it has certain limitations.

Education, as many other aspects of our society is sensitive to the progress of time and the world evolution. It is not just about society, but also technology and ways of studying. Nowadays these changes have resulted in e-learning, a new way of learning, and an unlimited education with no boundaries due to computers. In this particular framework is where Moddle becomes one of the most competent software, as with this programme the lecturer has all the necessary tools to create a course in which the student will have easy access from any computer.

Adapting all courses and subjects to Bologna criteria will imply the reduction of teaching hours, as it will be the case in the subject of Graphic Expression. In order to comply with the assigned number of credits, some topics of this subject will have to be erased and others compressed as the teaching contact hours will be reduced.

This can be the case of standardization, which, in spite of its importance in the design and plan of projects can be relegated to favour other topics in the subject programme.

2. NORMALIZATION IN THE SUBJETCT OF GRAPHIC EXPRESION

There is a growing interest lately on the improvements of communication. Special attention is being paid to the importance of normalization and communication in the field of Engineering.

It is such the case when writing regulations and instructions in order to use signs and symbols when drawing maps and plans. Amongst the advantages:

- It makes the designs simpler

- It increases interchangeability and it improves interpretations

- It saves time, as predefined symbology is used, thus using less time when writing projects

It could be agreed that a regulation is an accessible document agreed by several parts. It also has to be accepted and approved by a normalisation organisation.

There is a high percentage of maps and plans with systems of representations of valves and pipes, in Chemical Engineering and related industries. It is in those fields where technicians develop their competencies. It is, precisely, within this type of plans and maps where there is a need for regulation their representations, as valves are key elements that must appear in those representations.

There is an elevated number ot types of valves, and more and better types are being developed. There are several ways of classifying them. Amongst the main ones would be:

STOP VALVES

Stop valves are used to shut off or, in some cases, partially shut off the flow of fluid. Stop valves are controlled by the movement of the valve stem. Stop valves can be divided into four general categories: globe, gate, butterfly, and ball valves. Plug valves and needle valves may also be considered stop valves.

GLOBE VALVES.- Globe valves are probably the most common valves in existence. The globe valve derives its name from the globular shape of the valve body. However, positive identification of a globe valve must be made internally because other valve types may have globular appearing bodies. Globe valve inlet and outlet openings are arranged in several ways to suit varying
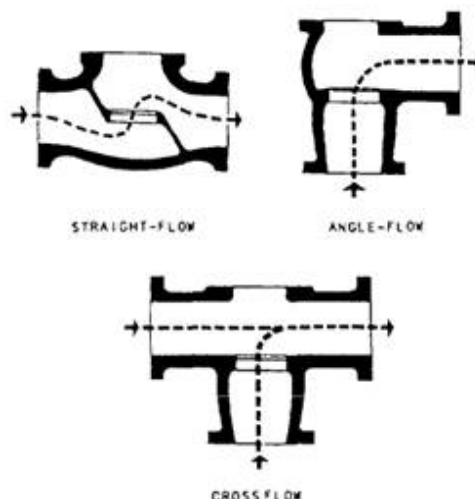

STRAIGHT-FLOW   ANGLE-FLOW

CROSS FLOW

Fig. 1.-Types of globe valve bodies

GATE VALVES.- Gate valves are used when a straight-line flow of fluid and minimum restriction is desired. Gate valves are so named because the part that either stops or allows flow through the valve acts somewhat like the opening or closing of a gate and is called, appropriately, the gate. The gate is usually wedge shaped. When the valve is wide open, the gate is fully drawn up into the valve, leaving

an opening for flow through the valve the same size as the pipe in which the valve is installed. Therefore, there is little pressure drop or flow restriction through the valve.
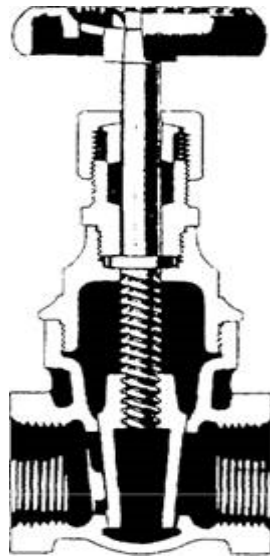
Fig. 2.-Cutaway view of a gate valve (non-rising-stem type).

BUTTERFLY VALVES.- The butterfly valve, one type of which is shown in figure 3 may be used in a variety of systems aboard ship. These valves can be used effectively in freshwater, saltwater, lube oil, and chill water systems aboard ship. The butterfly valve is light in weight, relatively small, relatively.

Their classification depends, on some case, on their function, but others on the way they are operated and used, or even on the ways they are actioned (by hand or automatically).
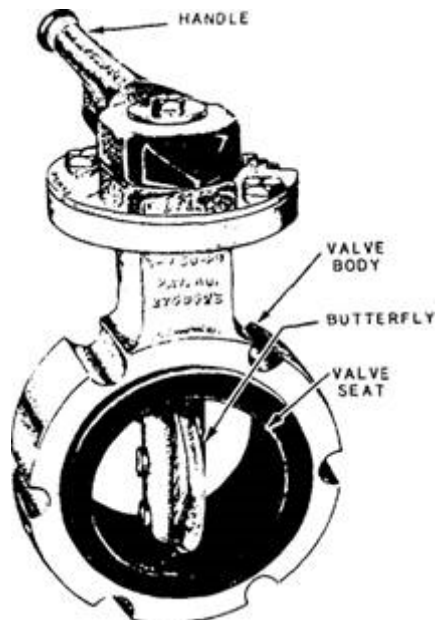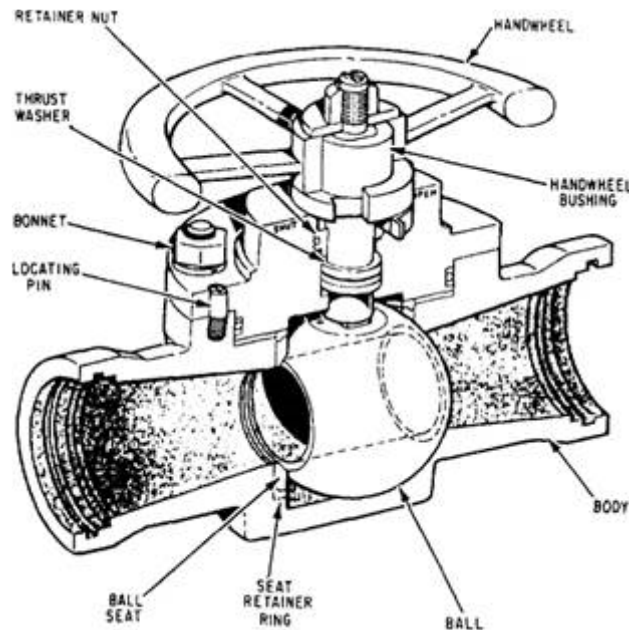
Figure 3.-Butterfly valve.

Figure 4.-Typical seawater ball valve

BALL VALVES.- Ball valves, as the name implies, are stop valves that use a ball to stop or start the flow of fluid.

3. EXAMPLE OF A PIPE REPRESENTATION COURSE OUTLINE ACCORDING TO DIFFERENT REGULATIONS

There is a good number of examples for the design of on-line courses. Distance learning is very complex within the education system for a series of reasons: there is a great amount of people that contribute with their own social and personal traits; there is a coexistence of different sources of influence and knowledge; there is a convergence of different experiences; the use of varied resources, means and strategies.

This example contains the following phases:

3.1 Identifying needs.
3.2 Aims and objectives.
3.3 Theme structure.
3.4 Teaching and learning methodology.
3.5 Development of content and selection of materials and resources.
3.6 Design of exercises and activities and learning evaluation.
3.7 Transference to the Moodle Platform.
3.8 Tests of effectiveness of the virtual platform.
3.9 Introduction, monitoring and evaluation.

The above model is a proposed guide in the process of converting study materials to a digital format in order to make its implantation possible, by using technology as a complementary resource to face to face class materials. It can also be used to prepare courses for other subjects.

3.1 Identifying needs

This is the very first step in any education programme. When analysing the real situation of formation and education it can be seen that the majority of students that attend the first courses of Engineering have never studied technical drawing. Therefore, they know nothing about the normalisation concepts

and terminology. This lack of knowledge may dishearten the students, specially when having to work on distance essays and assessments, as this is the first time they are facing those subjects.

3.2 Objetives

To promote the usage of new technologies of information in order to facilitate the assimilation and learning of normalisation concepts.

3.3 Theme structure

What is a norm/regulation? Who makes regulations? How are regulations made? Normalisation in the world. Compilation and collection of regulations applied to valve representation. Test on line, applied to valve symbols. Examples of real project maps and plans.

3.4 Teaching and learning methodology

Once the different ways of graphically representing valves have been analysed, it can be seen great heterogeneity amongst the different regulations for representing them. That is the reason why there must be a compilation of all the regulations applied to valve representations. Following this, it will be essential to show a series of real projects and sketches where the types of valves and their normalisation will be identified. This will allow lecturers to show their students the reality of all the Engineering projects through an interactive and useful way. Through this, the students will also become closer to their future profession and career. Finally, the realisation of a final project has to be considered, as its evaluation will become an important part of the final subject mark and assessment.

3.5 Development of content and selection of materials and resources

In this phase is where the compilation and writing of all materials that the course/subject comprises takes part, paying special attention to plan/sketch/map conversion into a real compatible format for the Moodle platform.

3.6 Design of exercises and activities and learning evaluation

Once all the theoretical content is written, the following step is to prepare a variety of activities (individual and in groups). Also it is the time for preparing the tests on line. Some of those tests will immediately give the answers and results, for the student to be aware of their level of knowledge throughout the course.

The integral and whole formation of the student is implemented and complemented through a variety of texts, documents, resources and materials that are made available for the students to consult and download. Otherwise those issues would not be seen, due to the limited time of contact hours.

With the above mentioned materials, students are encouraged to carry out a series of activities that will have to be send/ post (emailed) to the lecturer though the resource called "task". Those activities will be part of the student's final evaluation as will be marked.

Through the usage of "forums" the student is encouraged to take part in debates about some of the topics and issues dealt with the subject. Their participation will also be assessed and evaluated.

Through the usage of self-evaluation forms (questionnaires), the student can control his/her own learning process, and the final command he or she is acquiring, with views to be well prepared for the final assessment or exam.

Through the usage of Moodle, students are encouraged not to, exclusively, rely on a final exam. On the contrary, they are motivated and encouraged to express their own opinion about an idea, theme or topic (forums) and to carry out research on the proposed themes and topics. With this it is also achieved the fact that the student can have his/her own opinion about a topic, discussing and debating it with his/her peers and lecturer. Finally, the student also learns to establish relationships in a virtual way and without the need for a physical gathering space.

3.7 Transference to the Moodle platform

In this phase all the subject contents in their diverse forms are integrated so that they can be transferred to the Moodle platform.

In other to achieve that, the web administrator, needs to previously have installed Moodle, in order to create a new empty course to start with. In order to gain access to a new course it must be accessed through an account with an admission entry, and once the course is identified, it is created by adding resources, activities that can always be re-edited if needed.

When writing in Moodle, one can choose amongst different text formats, including HTML. It also permits the usage of other interactive programmes such as Hot Potatoes, and the inclusion of videos, sound archives, and so on.

3.8 Tests of effectiveness of the virtual platform

It is essential to make an effectiveness test of both, the materials and the virtual surrounding before it becomes implemented. In other words: to be able to foresee possible problems, and to check materials and the correct functioning of the virtual classroom. This test can help, on the one hand, the development of the course and its right functioning, and on the other hand it can enable its administrators to collect a series of useful information to improve the course and its resources for future editions, so that the materials can become even more effective.

3.9 Introduction, monitoring and evaluation

This step consists of putting into practice the elaborated design. This process has to be cyclical, as once it has been implanted, there must be an academic tracking and monitoring, in order to establish an integral system of evaluation and continuous improvement. In order to achieve that, questionnaires will be made, in order to obtain the appropriate feedback

4. APPLICATION OF THE REGULATION RELATED TO VALVES

Regulation regarding valves' representation is wide in relation to the rules to apply. However, those regulations are not always fully developed. The classification for each regulation applied to the different type of valves is different from case to case and this makes that there are more differences between one another. It would be very convenient to boost the generation of a more agreed regulation. In order to unify them, it is essential to start from a similar classification according to the types of valves, which can be widened in some cases.

The usage of the regulation that comprises the representation of valves in all computer programmes must be boosted and promoted. Especially if those computer programmes use valves in their design or in certain parts of their programmes. There must exist a graphic differentiation between the types of valves, encouraging that in the menu selection choice appear always the same agreed and consented models of valves.

Finally, it is the job of the lecturers to promote especially, their students' knowledge and usage of graphic valve representation signs. Therefore, the students will be able to correctly interpret different maps and plans.

5. CONCLUSIONS

It is essential to look for new teaching ways, methods and tools based on new technologies in order to make changes to traditional teaching methodologies. E-learning is a proven efficient and effective alternative of education for many fields of study. It provides the necessary tools to facilitate searching, exploring, analysis and reinforcement techniques in the learning process. Nevertheless, we must take into account that, as in any education modality, it must have its own elements of administration, its

own resources, costs and objectives. Only in that case the efficiency of the educational offer will be guaranteed.

6. REFERENCES

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