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Setting up of a web educational video-clips exhibition related to the implementation of virtual experiments in Sciences education

Gabriel Gorghiu^{a*}, Laura Monica Gorghiu^b, Mihai Bîzoi^a, Ana-Maria Suduc^a

^a*Automatics, Informatics and Electrical Engineering Department, Electrical Engineering Faculty, Valahia University Târgovi te, 18-24 Unirii Blvd., 130082 Târgovi te, Romania*

^b*Sciences Department, Faculty of Sciences and Arts, Valahia University Târgovi te, 18-24 Unirii Blvd., 130082 Târgovi te, Romania*

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Abstract

The paper emphasizes the principal steps developed for setting up of a web educational video-clips exhibition, composed by 50 representative *video-experiments* related to the implementation of the virtual experiments in Sciences education, as this was done in the frame of the Socrates-Comenius 2.1. European project: “*VccSse - Virtual Community Collaborating Space for Science Education*”. The *Exhibition* represents a web interface that contains the best virtual experiments produced by the in-service teachers who finalized the *Virtual Instrumentation in Science Education* training modules, carried out as a main output of the mentioned project. Beside the educational video-clips, other 9 *on-line / remote simulating laboratories* (produced by the project partnership) allow teachers and students to work directly inside the experiment.

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1. Introduction

Sciences Education area is deeply related with experiences, observations and experimentally or practically facts. Together with the theoretical support which assures the necessary knowledge for developing specific cognitive competencies, the practical knowledge based on observations or experiments became indispensable in scientific investigations (Gorghiu et al., 2009).

Taking into consideration an important aspect manifested in the last decade - the falling of the interest in Mathematics and Science studies in the European countries - many educational decision makers recommended to the teachers to adjust the way of how Sciences subjects are taught, by introducing different degrees of simplification. Even so, the uptake of those subjects by pupils is lower than expected: it can be seen in the attitude of young people and parents to Sciences subjects and later in the level of new recruitment to research and related professions.

However, the experiments are still playing an important role as part of Sciences lessons. In many cases, the students are working individually or in groups and experimenting based on a clear teacher guiding. Once the

* Gabriel Gorghiu. Tel.: +40-245-217683; fax: +40-245-217683

E-mail address: ggorghiu@yahoo.com

experiments have been completed, the students took notes and concluded on the results as well as the overall experiment procedure itself (Tłaczala et al., 2009).

Appeared like an alternative of proceeding traditional experiments, simulations can be easily used in the classrooms with the help of proper software applications. In this sense, Sciences experiments can be presented also like educational video-clips. In Mathematics, the use of specific video-clips offers the possibility for investigating student mathematical thinking (Sherin, Linsenmeier, & van Es, 2009). In many Physics and Chemistry lessons, real experiments are successfully represented as digital video demonstrations (Kirstein, & Nordmeier, 2007).

In this sense, the paper emphasizes the principal steps developed for setting up of a web educational video-clips exhibition composed by 50 representative video-experiments related to the implementation of virtual experiments in Sciences Education, in the frame of a Socrates-Comenius 2.1.European project “*VccSSe - Virtual Community Collaborating Space for Science Education*”. The *Exhibition* is a web interface which contains in fact the best virtual experiments produced by the in-service teachers who finalized the *Virtual Instrumentation in Science Education* training modules carried out as a main output of the mentioned project (Suduc, Bizoï, & Gorghiu, 2008). Beside the educational video-clips, other 9 *On-line / Remote Simulating Laboratories* (produced by the project partnership) allows teachers and students to work directly inside the experiment (Gorghiu, 2009).

Near the details concerning the pedagogical aspects of virtual experiments implementation in the classrooms, two different approaches were overtaken: the first one is related to the step-by-step realization of the virtual experiment and the second one is targeting on the presentation of the experiment itself.

2. Materials and Methods

The *VccSSe Exhibition* was designed as a special part of the *VccSSe* project. It is composed by two specific sections: *Virtual Experiments (Video Tutorials)* and *On-line / Remote Simulating Laboratories*. Its structure is defined using a *Perl* code that generates the *Exhibition* web-structure. The code reads the specific parameters of the objects presented in the site, from a specific *VccSSe* database. As an example, the code used for the *Virtual Experiments (Video Tutorials)* section is presented below:

```
print $q->p($q->b("Virtual Experiments (Video Tutorials)"));
my $sql = "select pmatrix.id,leson_en,area,org,image from pmatrix, exhibition where pmatrix.id=exhibition.id order
by area;";
my $sth = $dbi->prepare($sql) || die ("Query error!\n");
$sth->execute();
print $q->start_table({-border=>"0", -align=>"center", -style=>"text-align:center; width:702px;"});
while ( @field = $sth->fetchrow_array )
{
if ($count%3 == 0) { print $q->end_Tr, $q->start_Tr; }
print $q->td({-style=>"vertical-align: top; padding: 10px;"},
[$q->a({-href=>"?lang=$lang&op=mv&mv=$field[0]"},
$q->img({-src=>"/exhibition/$field[4]",-alt=>"Area:
$area->{$field[2]}",-width=>"214",-height=>"161",-border=>"1", -style=>"border: black solid 1px;"}),
$q->br,uc($field[1])]);
$count++;
}
print $q->end_table;
$sth->finish;
```

The organization of the *VccSSe Exhibition* respects a special design for the *Virtual Experiments (Video Tutorials)* section. The educational video-clips are grouped as a 3 columns matrix, taking into account the envisaged Science areas: Mathematics, Physics and Chemistry. Each video-clip has a generic introduction frame that contains the name of the project and its logo, the Socrates programme logo, the name of the video-clip and a specific image which represents the presented subject. An example of a generic introduction frame is illustrated in the figure 1.

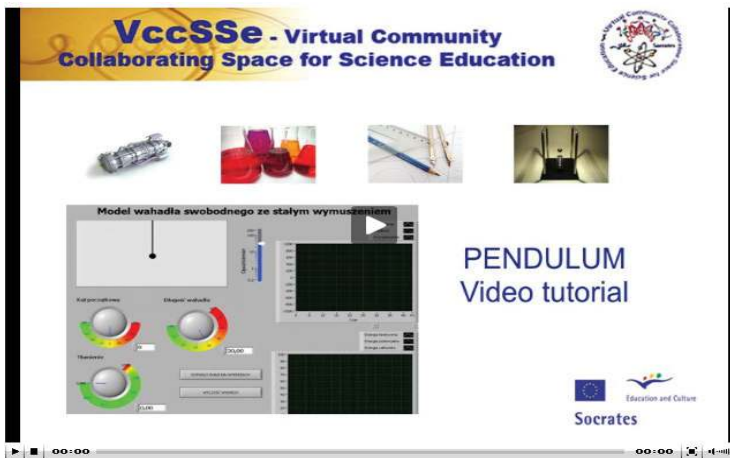


Figure 1. The introduction frame for the *Pendulum* educational video-clip

All the video-clips were made using the screen recording facilities proposed by Camtasia Studio 5 software application. This application represents state of the art screen recording software with several features:

- a. It records real, full-motion video of anything on the screen. It can be obtained in such way both high-quality screen recordings and small file sizes.
- b. It is ideal for recording and publishing PowerPoint presentations. All the elements of the presentation, including slide timing, animations and voice narration are recorded. In addition, it can be published the complete presentation (not just the slides) on CD/DVD or Web in any of the popular formats that Camtasia Studio supports.

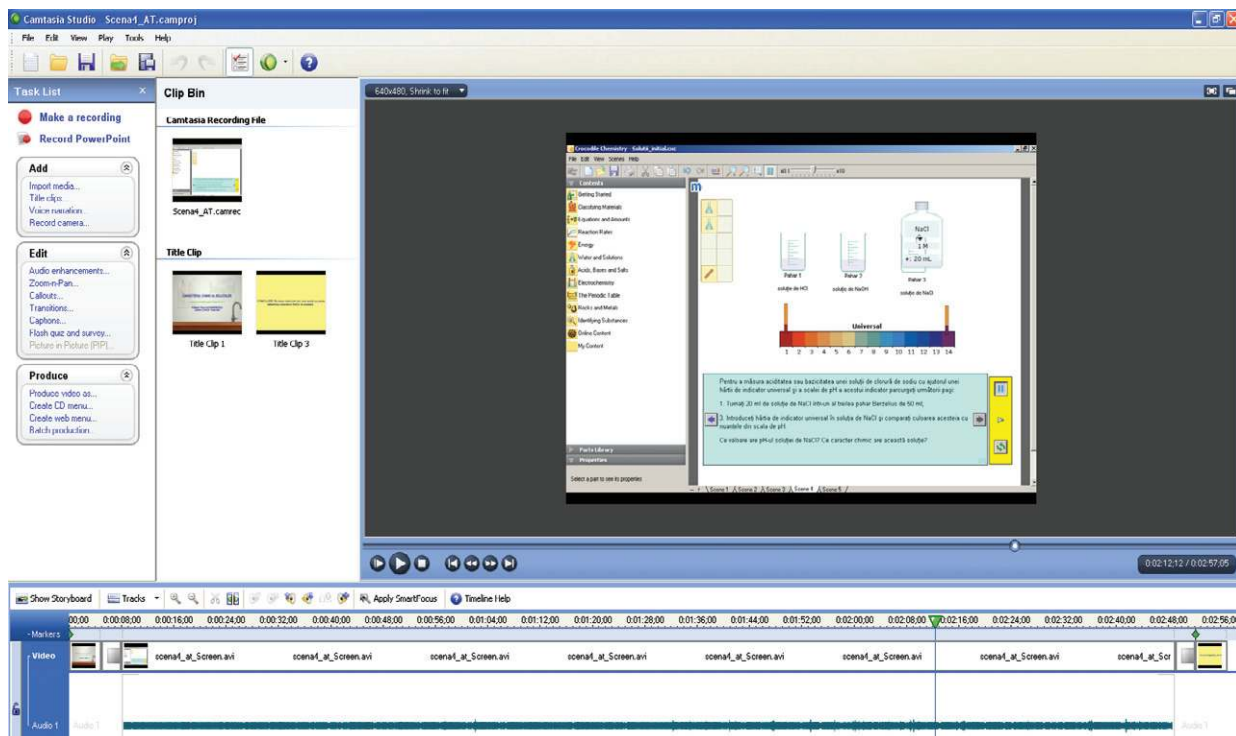


Figure 2. Camtasia Studio screen captured when preparing the *Acid Solutions, Basic Solutions and Neutral Solutions* video-clip

c. It captures video from the webcam and synchronizes it with the screen recording, in this way being recorded both the presentation and the presenter.

d. It captures the voice narration - as well as system audio such as sound effects - from an application, or audio from a Web demo.

An example of a Camtasia Studio screen, captured at the moment when an educational video-clip is prepared, is illustrated in the figure 2.

In the *VccSse Exhibition*, the educational video-clips are played with the help of the Flash Player application, through a specific JavaScript code, presented below:

```
<script type="text/javascript" src="/exhibition/player/swfobject.js"></script>
<script type="text/javascript">
var s1 = new SWFObject("/exhibition/player/player.swf", "ply", "640", "480", "9", "#FFFFFF");
s1.addParam("allowfullscreen", "true");
s1.addParam("allowscriptaccess", "always");
s1.addParam("flashvars", "file=/exhibition/definiteintegral.flv&image=/exhibition/definiteintegral.jpg");
s1.write("container");
</script>
```

At the end of the *Exhibition*, the section dedicated to *On-line / Remote Simulating Laboratories* provides links to specific web-pages in which some Phisycs and Mathematics subject are presented in details: *Gas Laws, Electrical Resonance Studies, Heat Transportation Studies, GeoGebra Workshops, Special Lines in Triangles, Enigmatic Quadrilaterals (1 & 2), The Wonderful World of Angles (1 & 2)*.

Results and Discussions

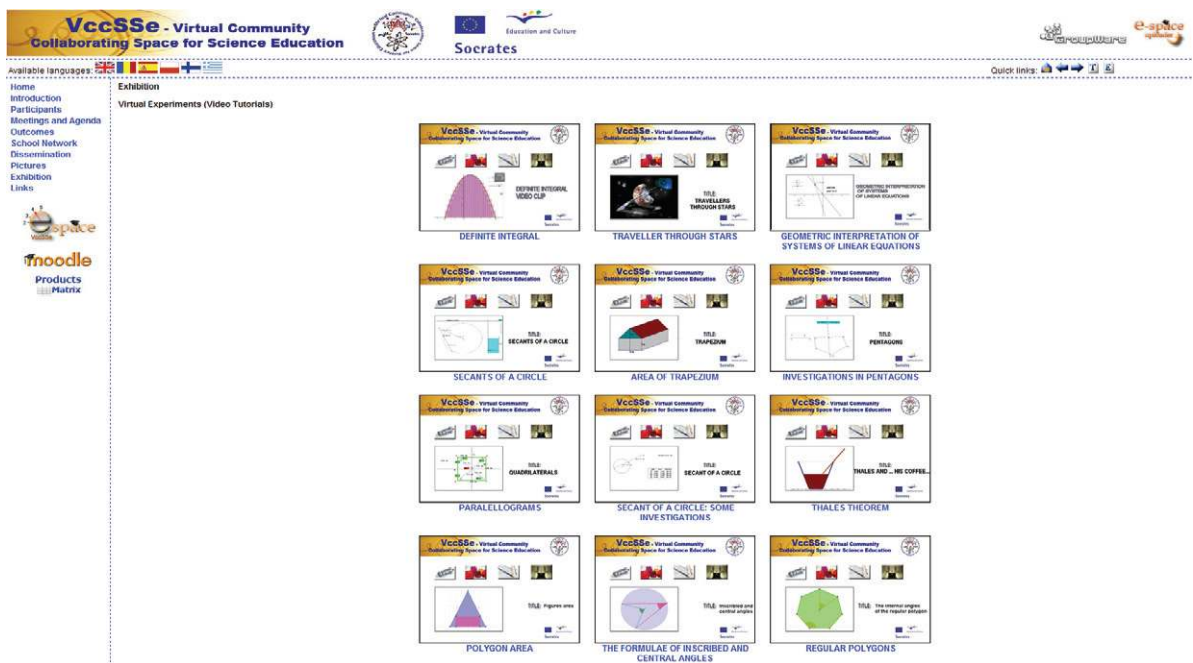


Figure 3. The beginning part of the *VccSse Exhibition*

The preparation of the *VccSse Exhibition* came to its end before March 2009, when a meeting with European Science teachers (using sharing and videoconference tools) took place. During the videoconference, 5 educational video-clips included in the *Exhibition* (together with 2 on-line simulating laboratories and 1 remote lab) were presented. All the participants had the opportunity to find out details concerning the *VccSse* project, and also to see for the first time the content of the *Exhibition*. Figure 3 illustrates the beginning part of the *Exhibition*.

The participants expressed their good feed-back concerning the educational video-clips and noticed that the *Exhibition* provided interesting examples about how to visualize challenging topics for the pupils and students. It

was generally appreciated the length of the video-clips (around 3 minutes) - all of them are short enough to keep the attention of the pupils and students. From the technical point of view, the video-clips were prepared carefully and pointed out on the main aspects of the presented subjects. The *Exhibition* structure has a simple design, with a user interface very easy to follow.

3. Conclusions

In general, Sciences experiments are easier represented as educational video-clips, some of them offering the possibility for investigating student mathematical thinking and others being used as simulations that replace the real experiments.

In the frame of the European project “*VccSSe - Virtual Community Collaborating Space for Science Education*”, a *web educational video-clips Exhibition* (composed by 50 *video-experiments* and other 9 *on-line / remote simulating laboratories*) was designed, following specific steps for its realization. The final image of the *Exhibition* can be accessed from the project web-page, being opened to all the interested educational actors.

All the educational video-clips and on-line / remote labs presented in the *Exhibition* provide evidence about the innovative teaching and learning strategies when using ICT. Virtual Experiments are also offering an innovative sense on teaching and learning, especially in cases where such laboratories are still not used.

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