Two Years Experience of the Web Site NEMIS - “Nuclear Energy – Mysticism and Reality”

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ABSTRACT

Results of the 2007/08 survey “Energy – the present and the future” conducted on a population of 1439 students from Zagreb University have shown that after school and television, internet is the third major source of knowledge for the participants. Therefore, "NEMIS" web site (www.nemis.zpf.fer.hr) was launched at the end of the 2008. NEMIS is a Croatian acronym for "Nuclear Energy - Mysticism and Reality". The site was envisioned as a place where interested visitors could get information, prepared by experts, on all the issues relating to nuclear energy. The main objectives of the work reported in this paper are to present the structure of the NEMIS web site, and analyze the activity on the site during the last two years. Based on the performed analysis, future activities on the site are set and discussed.

1 INTRODUCTION

During the academic years 2007/08 survey “Energy – the present and the future” [1] was conducted on a population of 1439 students from Zagreb University. That survey was a continuation of a series of surveys entitled “Nuclear energy – the present and the future” that have been conducted throughout the period 1999 up to the year 2004 [2, 3, 4, 5]. One of the questions in the 2007/08 survey explicitly asked the participants to select the main origin of their knowledge. The analysis of the survey results has shown that after school and television, internet is the third major source of knowledge for the participants. That finding was compatible with the findings of the analyses of the previous surveys. In those surveys the question of the main origin of knowledge did not exist. However, there was a question asking the participants to identify the reasons for positive/negative attitudes towards nuclear power plants. One of the offered answers was the “Public media influence” which included television, printed media, and the internet. Throughout the years, the percentage of the participants selecting that particular answer increased as the source of knowledge for building positive attitude towards nuclear power plants from 9% to 16% in the period 1999-2004. It remained constant at about 25% as the source of knowledge for building negative attitude towards nuclear power plants in the same period.

In an effort to increase nuclear knowledge of the student population, as well as general population, and based on the findings of surveys’ analyses "NEMIS" web site (www.nemis.zpf.fer.hr) was launched at the end of the year 2008. NEMIS is a Croatian acronym for "Nuclear Energy - Mysticism and Reality". The site was envisioned as a place where interested visitors could get information, prepared by experts, on all the issues relating to nuclear energy. Materials for the web site were prepared on multiple levels, which should
enabled visitors obtaining only general information on the subject or progressing to more
detailed coverage.

on a population of 622 students indicated that launching of the NEMIS site was justified,
since internet was ranked second main source of knowledge with only school being in front.

Technical background and the structure of the NEMIS web site, including original
content and the one added during NEMIS upgrade conducted in the year 2009, is presented in
Section 2. In Section 3 we analyse the activity on the site during the last two years, including
responses of visitors to the on-line survey, quiz, and forum. Based on the performed analysis,
future activities on the site are set and discussed in Section 4. Referenced literature is given at
the end of the paper.

2 NEMIS WEB SITE

2.1 Technical background

NEMIS web site was developed in the year 2008 using ASP server technology
accompanied by Visual Basic and Java scripts. Testing of the functionality of all components
incorporated into the technical structure of the site was performed in Internet Explorer 6 and
Mozilla Firefox 3.

As in the initial development, the development of the NEMIS web site upgrade
performed in the year 2009 was also performed using ASP server technology, and Visual
Basic and Java scripts. Testing was done using Internet Explorer 7 and Mozilla Firefox 3.

NEMIS graphical design, as well as technical solutions for typical web development
problems, was done by the same team responsible for material preparation. The team
consisted of nuclear experts, which resulted in design being rather unimaginative. As far as
technical solutions are concerned, a number of free available codes and scripts were
incorporated into NEMIS.

At the moment all the materials on the NEMIS web site are in Croatian.

2.2 Structure of the NEMIS web site

To enable easier comprehension of offered information, materials prepared for the web
site were separated into several levels. The first level contains only basic information on the
subject of interest and requires only minimum prior knowledge. For web site visitors
interested in learning more, materials of the second and third level were prepared offering
deeper understanding of the subject, but also requiring some prior knowledge. Thematically,
original materials prepared in the year 2008 were divided into ten main sections given in
Table 1. Each of the main sections consisted of a number of subsections. As mentioned
earlier, every particular topic presented in a subsection was covered by materials of different
levels. We present the multi-level concept using subsection “General information on
radioactivity” which is the first subsection of the main section “Radioactivity”. The article
begins with a short abstract written in bold typeface to allow reader easier distinction before
proceeding to the main text (Figure 1). The main text contains basic information on the
subject and finishes with four titles indicating sub-articles of the second level (Figure 2).
After activation of the link, i.e. title additional text appears beneath the title. If the third level
texts are available, then new titles will be displayed, as is in the analysed example material
(Figure 3). After activation of the third level title the text will appear in a yellow filled textbox
to distinguish it from the rest of the material (Figure 4).

Table 1: Main NEMIS sections

<table>
<thead>
<tr>
<th>Structure of the matter</th>
<th>Safety of nuclear power plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radioactivity</td>
<td>Accidents</td>
</tr>
<tr>
<td>Nuclear reactions</td>
<td>Public opinion</td>
</tr>
<tr>
<td>Application in generation of electricity</td>
<td>Interesting facts</td>
</tr>
<tr>
<td>Radioactive waste</td>
<td>Links</td>
</tr>
</tbody>
</table>

Figure 1: Example of a multi-level structure: abstract and main text

Figure 2: Example of a multi-level structure: titles indicating second-level articles
In the year 2009 the upgrade of the NEMIS site resulted in a number of new articles added to the NEMIS structure. One additional main section (“Strategies and legislation”) was introduced, and all other sections were enriched with new materials. Due to its comprehensive characteristics, newly prepared “Glossary” was set as a special category placed outside of the rest of the main sections.
Apart from afore mentioned sections and glossary, special features of the NEMIS site, available from the beginning in the year 2008, include forum, on-line survey, and on-line quiz.

Forum was envisioned as a tool to enable visitors express their own opinions and positions. Forum is opened to all visitors to read the messages, but for active participation registration is required. Registration procedure is simple and asks only for first and last name, valid e-mail address, user name and password.

On-line survey is a shorter version of the survey “Energy – the present and the future” oriented only towards nuclear subjects. The survey contains ten questions. After filling in the survey, participants are presented with on-line survey overall results given in graphical manner accompanied with appropriate textual explanation in the following form: “On that particular question your answer was grade a. Altogether xx participants out of yy answered on that question. The average grade is b.” (Figure 5). The part of the survey containing personal information, like gender, age, resident town, etc, is not mandatory.

Overall results of the on-line survey have to be considered with a certain level of caution due to two main methodological flaws. The first one is the control of the possibility for the same participant to answer the questions more than once. At the moment that control does not exist. The second one is selection of the participants, or to be precise, lack of any selection process. Therefore, one could expect that participants are far more likely to have strong opinions towards one side or the other. It is unlikely that the participants of the survey are a good representative sample.

On-line quiz was envisioned as an educational tool, rather than competitive one. At the moment the quiz database contains 77 questions of different complexity. At the beginning of quiz the participant is asked to select educational status and age interval. The quiz algorithm randomly selects 10 question of appropriate complexity. If the participant proceeds without selecting educational and age status, the algorithm randomly selects 10 questions from the entire population of questions. All the questions are selective ones, offering four answers with only one of them being the correct one. After confirmation of selection, the participant is presented with the result sheet containing detailed information on the questions that were
answered wrongly. These data are: the percentage of participants that correctly answered that particular question, and a link to the NEMIS material containing the answer. Quiz introductory site, an example of participant’s quiz, and an example of result sheet are depicted in Figure 6, Figure 7, and Figure 8, respectively.

Debugging process was a continuance one throughout the years of NEMIS existence. Some errors do still exist and despite our efforts continue to evade detection process. One of them is present in the quiz algorithm, resulting in occasional repentance of questions within ten questions given to the participant, and the second one is absence of proper on-line survey result for the last two questions.
3 ACTIVITY ON THE NEMIS SITE

There are different parameters that can be used to examine the activity of the NEMIS web site. Most of the parameters are visible by all visitors. These include overall number of visitors, and number of visitors per specific topic or special feature like quiz and survey. Some of the activity parameters are accessible only by NEMIS administrators. These are personal data of forum, quiz, and survey users that can be used for detailed sociological analysis of obtained feedback information. In the upcoming paragraphs we discuss both types of activity parameters.

Over the past two and a half years NEMIS web site has been visited by approximately 4000 visitors. The count is made when the main page is opened in the web browser. The system places a so called cookie which is active for two hours. That means that an access to the NEMIS site from the same PC will be counted as a new visitor after two hours. We believe that a two hours time frame is adequate for a visitor to examine NEMIS site.

List of most 5 most visited, i.e. popular, topics, as well as 5 least visited topics, accompanied with count number is given in Table 2.

<table>
<thead>
<tr>
<th>Most popular</th>
<th>Least popular</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPP Krško / 4130</td>
<td>Nuclear proliferation / 29</td>
</tr>
<tr>
<td>Nuclear reactors/power plants / 2536</td>
<td>Types of radioactive waste /35</td>
</tr>
<tr>
<td>Types of ionizing radiation / 2054</td>
<td>Transport of radioactive materials /39</td>
</tr>
<tr>
<td>Three Mile Island / 1339</td>
<td>Application of radiation /40</td>
</tr>
<tr>
<td>Radiation detection and protection / 1128</td>
<td>Radon /42</td>
</tr>
</tbody>
</table>

When discussing number of visitors accessing particular topic, a general remark on the counting technology is required. The cookie technique is the same as for the overall number of visitors. However, if the particular topic is accessed directly, for example over some web search engine, like Google, then the counter of that topic will be increased, but the main counter will not be increased. Progressing from selected topic to other NEMIS content will not increase the main counter.

Based on analysis of the counter technique and number of visitors per particular topic, we conclude that the true number of NEMIS visitors is higher than indicated by main counter. If we assume that the most popular topic, “NPP Krško”, was accessed the same number of times through NEMIS main page, as through some web search engine, then the estimated overall number of NEMIS visitors is around 6000.

Approximately 100 visitors participated in NEMIS quiz, as well as in NEMIS on-line survey. Due to the method of assembling the list of questions given to the participant, which is based on random algorithm, the distribution of the number of times the question has been asked is not even, ranging from 4 to 29. Overall average of correct answers is approximately 44%, with the questions given in Table 3 being the easiest ones and the most problematic ones. Most of the quiz participants (65%) did not fill in the personal information introductory sheet. Out of those whose personal data are available, majority is from Zagreb. Therefore, geographic analysis is not statistically valid at the moment.

Detailed analysis of on-line survey results is somewhat difficult because very few participants answered all the questions in the survey. As the survey progresses, the questions are answered by the decreasing number of participants, as if they are getting tired of answering. Therefore, statistically it is hard to estimate the deviation of particular results. However, in general, the results follow the tendencies of prior conducted surveys - attitudes and choices made by most of the participants are in contradiction to the scientific facts on
nuclear energy; participants believe that the nuclear energy is non-economic, environmentally unacceptable and operationally unsafe source of energy; as far as the radioactive waste management is concerned, the tested population is linking it with nuclear power plant radioactive waste ignoring other sources of radioactive waste and the need for its proper management and storage; the participants are not aware of realistic potential of renewables.

The largest disappointment of the NEMIS team is the activity on forum. So far, apart from the administrator introductory post, not a single post has been placed by visitors.

Table 3: NEMIS quiz easiest and most problematic questions

<table>
<thead>
<tr>
<th>Easiest questions</th>
<th>Problematic questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question</strong></td>
<td><strong>Times asked</strong></td>
</tr>
<tr>
<td>When did Chernobyl accident happened?</td>
<td>15</td>
</tr>
<tr>
<td>• 1969</td>
<td></td>
</tr>
<tr>
<td>• 1976</td>
<td></td>
</tr>
<tr>
<td>• 1979</td>
<td></td>
</tr>
<tr>
<td>• 1986</td>
<td></td>
</tr>
<tr>
<td>Country with the largest production of crude oil is:</td>
<td>7</td>
</tr>
<tr>
<td>• USA</td>
<td></td>
</tr>
<tr>
<td>• China</td>
<td></td>
</tr>
<tr>
<td>• Iran</td>
<td></td>
</tr>
<tr>
<td>• Saudi Arabia</td>
<td></td>
</tr>
<tr>
<td>What type of power plant is environmentally most unacceptable?</td>
<td>11</td>
</tr>
<tr>
<td>• fossil</td>
<td></td>
</tr>
<tr>
<td>• wind</td>
<td></td>
</tr>
<tr>
<td>• gas</td>
<td></td>
</tr>
<tr>
<td>• nuclear</td>
<td></td>
</tr>
<tr>
<td>What is the INES ranking of the TMI accident?</td>
<td>10</td>
</tr>
<tr>
<td>• 4</td>
<td></td>
</tr>
<tr>
<td>• 5</td>
<td></td>
</tr>
<tr>
<td>• 6</td>
<td></td>
</tr>
<tr>
<td>• 7</td>
<td></td>
</tr>
</tbody>
</table>

4 FUTURE ACTIVITIES ON THE NEMIS SITE

The primary motivation of the NEMIS team in constructing the web site was to improve general knowledge on nuclear energy. The activity on the site observed in the last two and a half years is below expected indicating that a strong effort by the team members is required in order to increase the popularity of the NEMIS site.
In general NEMIS site is passive mostly based on static materials which are difficult to upgrade on daily or hourly basis. Some elements of NEMIS structure allow limited creation of dynamic content. But, to implement full dynamic characteristic of the site, drastic changes would have to be introduced.

The graphical design of the site is rather classical. Changes are necessary to improve the visual appeal of the site content.

It is very unlikely that these changes could be introduced without the help of professional, or at least more experienced web designers.

The initial creation of the NEMIS site, and the upgrade performed in the year 2009 were financially supported by Croatian utility. Improvements done in the last year are the result of voluntary activity of team members. We plan to continue with NEMIS improvements, but without financial support, these activities will be very limited, mainly focused on further debugging and occasional addition of new topics.

REFERENCES


