

EDUCATIONAL ACTIVITIES TO HELP TRANSFERRING KNOWLEDGE IN NUCLEAR: THE SEMINARS OF SPANISH YOUNG GENERATION IN NUCLEAR (JÓVENES NUCLEARES)

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INTRODUCTION

From its creation, Spanish Young Generation in Nuclear (Jóvenes Nucleares, JJNN), a non-profit organization that depends on the Spanish Nuclear Society (SNE), has as an important scope to help transferring the knowledge between those generations in the way that it can be possible. To try to have success in that goal, some educational seminars and conferences have been organized by Jóvenes Nucleares in the last years:

THE SEMINAR OF NUCLEAR SAFETY IN ADVANCED REACTORS

Finishing 2009, JJNN and the Universidad Politécnica de Madrid started to plan a new and first-of-a-kind Seminar in Nuclear Safety focused on the Advanced Reactors (Generation III, III+ and IV). The scope was to make a general description of the safety in the new reactors, comparing them with the built Generation II reactors from a technical point of view but simple and without the need of strong background in nuclear engineering to try to be interesting for the most number of people possible.

After a great effort from JJNN with the support of the UPM, the Seminar took place in April 2010 at the Industrial Engineering School (ETSII). The lessons were conducted by young professionals, experts in the field, that belong to the Young Generation of the Spanish Nuclear Society and to companies and institutions related with the nuclear energy.

The Seminar was structured in four sessions. In each of them, a comparison between previous and new technologies was done, regarding safety perspective.

The Seminar was very popular, with nearly 70 assistants each day, from the university, nuclear companies and research centers. After each session there were very interesting and animated discussions between the lecturers and the public that demonstrated the interest of the assistants for the subjects taught.

The assistants were asked for a highly detailed feedback of each one of the lessons and those opinions have helped to improve the program for the 2011 Seminar.

Spanish Young Generation in Nuclear (Jóvenes Nucleares) is a commission of the Spanish Nuclear Society (SNE), whose main goals are to spread knowledge about nuclear energy among the society.

One of the scopes of the seminar was to make a general description of the new reactors from the point of view of the safety and in reference with the operating reactors. The course lasted four days and was divided in two lectures of one hour each day, except the last day that consisted of a two hours lecture.

In the first and second lecture a review of the principal systems of a Westinghouse and a KWU PWR of and their design differences was done, including their different behavior against transients. Those characteristics were compared with the AP1000 ones, to clearly seen the advances in the new design.

The same analogy was done in the following two lectures with the BWR of GE and ABWR and ESBWR of GE. The third day two lectures were given, the first one was

about operation and the safety systems of the EPR of AREVA. The second one was an introduction to the ADS and the physics of transmutation. In the last lecture of two hours, an introduction to the new Generation IV designs was done from the point of view of the advances in nuclear safety that this new generation incorporates.

The objective of the seminar is to show clearly the advances that have been obtained in the section of safety with the new reactors, from a technical but simple point of view and without needing great previous nuclear engineering knowledge.



Figure 1. Seminar Poster

Seminar Development

The opening session was chaired by the Vice-rector of the Universidad Politécnica de Madrid and full-professor of Nuclear Technology Dr. Emilio Mínguez and by the Spanish Young Generation in Nuclear president in that moment, Miguel Millán.

The Seminar was highly crowded every day, with more than 70 daily attendees. There was a very active audience participation with animated debates after every lecture. The closing session was presented by the president of Jóvenes Nucleares and the president of the Spanish Nuclear Society, D. José Emeterio Gutiérrez.

After the brief speech of each president, the diploma ceremony started with the documentation given to the audience. To finish the closing act, it took place a Spanish wine, courtesy of the University.

Surveys results

The participation filling the surveys was estimated into 50% of the attendees. It is a satisfactory result due to the voluntary aspect of the surveys.

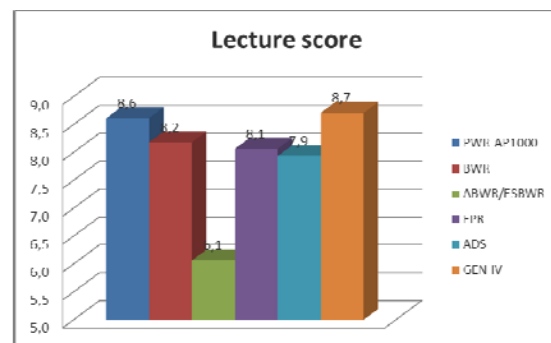


Figure 2. Lecture score

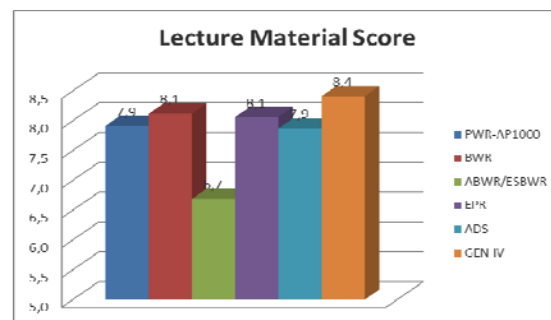


Figure 3. Lecture Material Score

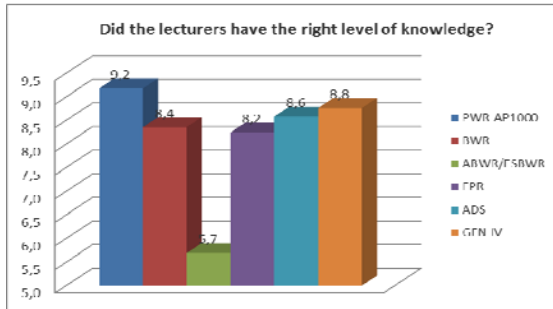


Figure 4. Lecturers level of knowledge score

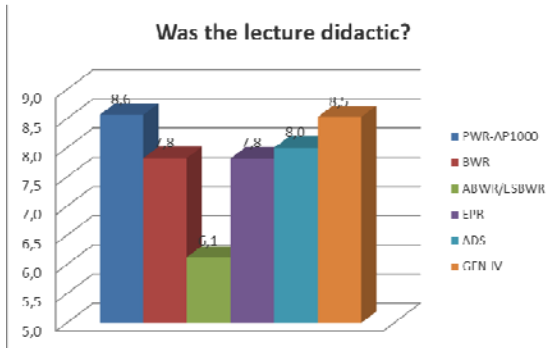


Figure 5. Didactic of the lectures score

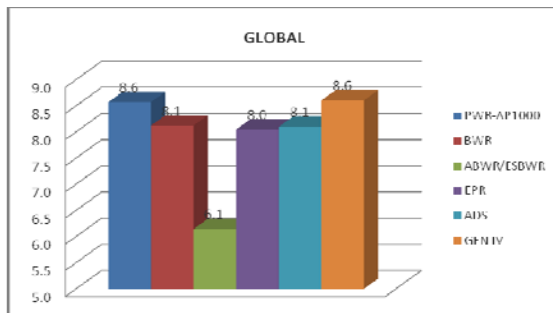


Figure 6. Global Score

The surveys had two different parts: in the first one, some fields were scored from 0 to 10, see Figures 3 to 7, and the second part was a free text one, where the attendees could write down their suggestions and comments about the Seminar.

As a first conclusion of the surveys, the score of the lectures, the lecturers and the lectures material was satisfactory. More important than that, as it was one of the main scopes of the Seminar, the lectures were valued as didactic. This was highly difficult to get, as the level of knowledge of the audience was very varied.

Lessons Learned

From the multiple and very valuable comments from the attendees, some of them have been extracted, as they are lessons learned for the on forward Seminar sessions. For example:

- The Seminar should last more to describe with more details the lectures.
- The timetable should be respected.
- It is important to have all the material available at the beginning of the lecture, to follow it and take notes during the presentation.
- The Seminar should be valued with UPM ECTS.
- It is recommendable to have a more specific introduction of the PWR of Westinghouse, separated of that one about PWR of KWU, as they are too different from each other.
- ABWR and ESBWR are too different to be in the same lecture.
- The time dedicated to the new reactors should be longer that the old reactor's time.
- The detailed systems drawings are too complex to be seen by the audience.
- It could be interesting to see more images of the reactors under construction.
- The technical videos are very good, but some of them are too corporative.

The following comments describe the most valued aspects of the Seminar:

- The ambient and the subjects were very interesting. It was a good point to present different reactors to compare them during the same session.

- Good quality of the debates answers and questions.
- High attendance and audience collaboration.
- Interesting state-of-the-art subject
- The lectures were clear enough for somebody that did not know all the concepts.

Once all the surveys were processed and all the comments were classified, some improvements were implemented in the 2011 edition of the Seminar:

- The Seminar lasted more hours (15 h) and it was valued with ECTS
- The structure was changed to 1h of the old reactor + 1.5 h of the new one
- There was one lecture for PWR-W and another for PWR-KWU
- There was one lecture for ABWR and another for ESBWR
- All the documentation was given at the beginning of the Seminar.
- A first day lecture about “Introduction to Nuclear Safety” was created.
- A new lecture of High Temperature Reactors was created.

In this 2011 edition, the Seminar is still alive, open to comments and evaluated with surveys, to make it better year after year.

THE TECHNICAL CONFERENCES

Jóvenes Nucleares has a long tradition of interacting with the media, that is why the topic of two really interesting conferences promoted by Jóvenes Nucleares was “communication”. To get over the subject, it was a need to find somebody enough talkative and friendly to connect with the audience and this person was Piluca Nuñez, communication director of the Spanish Nuclear Forum. In the first conference, “*How to manage with the journalists?*” she talked about the difficulties that the nuclear energy has in terms of public acceptance. She reminded that one of the problems is the

lack of adequate information in the media, which is not always enough clear and reliable. The main goal was to learn how to communicate effectively with the journalists to give the adequate message to them.

In the presentation some examples and experiences were related to show how difficult can be to give a message of calmness when everybody is trying to find a message of alarm, which is very typical in this field. The conclusion was that is very important to have the message clear before starting the communication to avoid boring or confusing the interviewer with technical explanations that could be not so clear for the people outside the nuclear field.

In the second conference called “*Communication in crisis*”, she focused the attention on how to be efficient in the communication during a crisis, which is especially relevant and useful nowadays. The conference was very popular and well appreciated by the audience, with many interesting questions.

Some years ago, the Spanish electricity market became a free-basis one and Jóvenes Nucleares saw the need of inform to the people about the new situation. In the conference called “The Spanish Electricity Market”, the lecturer Víctor Niharra Hernández, from the Spanish Market Operator, explained the audience with simple words but very clear how the market is composed.

The lecturer talked about the different laws of the market and the comparing between the Spanish Electricity market and some European ones. After the lecture, there was an animated discussion with the lecturer.

As the nuclear Renaissance is becoming a fact, Jóvenes Nucleares thought that it could be convenient to do a series of conferences to inform the public about the different aspects of the nuclear new age.

The first conference “UK and the Nuclear Renaissance” was based on the new ideas of construction in Europe from the perspective

of one of the utilities that are going to build plants in the UK, the international Spanish company Iberdrola. The lecturer, Manuel Prieto Urbano, started the lecture talking about the beginning of this new age in UK with the energy planning of the Government in 2008, with the decision of starting the dismantling of the old power plants and the construction of new ones in the next decades.

The main part of the conference was based on the Generic Design Assessment process, which is the licensing basis of the new reactors, very different one from the old licensing ones.

Finally, he spoke about the different energy planning of the political parties, trying to guess if a Nuclear Renaissance is possible in Spain.

The second conference of the “New Age” was about the AP1000 construction in China and the Spanish collaboration through Westinghouse Electric Spain. The lecturer, Miguel Palazuelos, spoke about the challenges and success of the Chinese four unit construction and the lessons learned for the future constructions in Europe and the USA. As the construction is modular based, the making of the equipment and the site works are parallel, so the planning is going very well and it is expected to finish on time.

The third conference was called “Uranium for the Nuclear Renaissance”. In this conference, the lecturer, Francisco Tarín from ENUSA, the Spanish fuel company, spoke about the uranium resources that are actually available and the future perspectives.

The key issue was the fact that with this planned development, it will be enough fuel for the future, as there are many unexploited resources that will be used if the uranium is more expensive in the future.

In the last series of thematic conferences, Jóvenes Nucleares faced the big challenge on every debate about nuclear energy. In a project called “Chernobyl 2009”, four

different conferences were planned plus a trip to Chernobyl paid by Jóvenes Nucleares. The conferences were: “Chernobyl vs. TMI2” by Juan Manuel Blanco, “Facts and hypothesis of the Chernobyl “experiment”” by Luis E. Herranz, “Chernobyl: effects on the population” by Eduardo Sollet, “RBMK reactor design and the Chernobyl accident” by Agustín Alonso



Figure 7. Jóvenes Nucleares at Chernobyl

CONCLUSIONS

Many young professionals and students have learned really valuable lessons from the most experience persons and from people that have started some years ago thanks to those educational activities sponsored by Jóvenes Nucleares in the last years-