

GAME OF THRONES TO LEARN SCIENCE. AN EXPERIENCE WITH SPANISH PRE-SERVICE SCIENCE TEACHERS

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Abstract: The most consumed media in Spain in 2018 was television, with fiction series being the favourite among young people. This work shows how this medium can be used as an educational resource in science education by studying problematic situations of interest, presenting the results of an experience carried out with 52 pre-service science teachers (PST) who worked with the television show Game of Thrones in an educational innovation subject of the Master's Degree in Secondary Education Teaching at the University of Málaga (Málaga, Spain). The PSTs were asked to watch several sequences from the TV show, from which they had to select frames and propose driven questions on physics, chemistry, biology and geology for secondary school students, explaining how to approach them in the classroom. The proposals were categorized by scientific disciplines according to the contents used and the explanations given. The experience was assessed from a questionnaire that included items about the learning achieved, the educational possibilities of the resource and the emotions felt. On their learning, they highlighted how a playful resource can be converted into an educational resource to motivate students. The resource was well received with a score of 8.53 out of 10, increasing the average knowledge of the PSTs of their educational possibilities from 1.96 to 4.54 (on a scale of 5 points) before and after the experience. The PSTs highlighted interest, satisfaction and concentration as the main emotions felt during the experience. This study is considered novel since it applies this strategy to teachers in training, analysing their capacity to teach and their perceptions. Finally, it should be noted that the educational use of television as a resource in the classroom allows us to connect scientific and school knowledge, can motivate disinterested students and provide a pedagogical tool that enhances instruction.

Keywords: teaching innovations, initial teacher education (pre-service), science education

INTRODUCTION

Different educational resources to motivate and improve the learning of science and scientific attitudes of students can be found in the literature. Among these is the media, and particularly television, a medium which, along with Internet, is one of the most widespread in the current population due to its diffusion, power, influence and consumption (AIMC, 2018). Different studies have explored the use of fictional resources (films, television shows or novels) in formal and informal science education settings to teach science concepts or enhance critical-thinking skills (Li and Orthia, 2016). The educational use of TV shows, as the main preference of adolescents, is shown as an interesting alternative since it can make science learning more effective and motivating, can be a good way of getting students interested in science (Allday, 2003) and can contribute to the scientific and television literacies. Despite its potential, the number of research carried out to teach science or to create positive attitudes toward it are considered insufficient. The teacher's role in implementing the resource into practice is also crucial, as he or she must be aware of its educational possibilities, as well as know how to guide the students discussing the science implied in the TV shows. This paper presents the results of an experience with pre-service science teachers (PSTs), which aims

to study their ability to teach science through Game of Thrones and their perception of the resource to transfer it to the classroom as future secondary school teachers.

METHOD



A total of 52 Spanish PSTs of the Master's Degree in Secondary Education Teaching of the University of Malaga (Malaga, Spain) participated in this study. The 59.6% were women and 40.4% men, aged between 22 and 44 years. The PSTs studied a subject of innovation and educational research in the specialities of Physics-Chemistry and Biology-Geology during the academic year 2018-2019. The experience presented here is framed within a teaching unit dedicated to educational innovation where different resources for the classroom were shown. The method used is based on the use of fictional series in science teaching through the study of problematic situations of interest.

Game of Thrones was the TV show chosen by the large number of followers in the ages of the participants. PSTs were asked to watch several sequences from the episode 7x06, totalling no more than 3 minutes of duration, including the ambush of the white walkers on Jon Snow in a frozen lake, and the rescue of the dragon from the bottom of the lake by the white walkers. Working in groups, the PSTs should prepare a report explaining how they could use this resource in secondary science class. To do so, they should select different frames and propose scientific driven questions to pose to the students. They had to work 3 contents of physics, chemistry, biology and geology, clearly explaining how to approach them in the class. The results were categorized by disciplines according to the contents used and the explanations given. In order to know their assessment of the activity, each PST completed a questionnaire after the experience where they had to explain what they had learned, the evolution of their knowledge of the resource before and after, assess the best and the worst of the task, give it a score, and choose between several emotions how they had felt in their development justifying why.

RESULTS

PSTs' proposals: The PSTs made numerous proposals to bring this resource into secondary classroom. Table 1 shows several examples of sequences, the associated scientific content and the driven questions.

Tabla 1. Examples of scientific contents and driven questions.

Discipline	Sequence	Scientific content	Driven question
Physics	Jon Snow's group crosses the icy lake. In their chase, the horde of walkers fails and break the ice	Forces	Why Jon Snow and his friends manage to cross the frozen lake and when the white horde walkers pass the ice is broken?
Chemistry	Jon snow seems to be having difficulty breathing during the chase	Oxygen concentration	Why Jon Snow has difficulty breathing in the mountains?
Biology	When rescuing the dragon from the ice you can see that the colour of his eyes has changed to blue	 Genetic	Why do some dragons have blue eyes and other blacks?
Geology	The horde of walkers appears from a narrow gorge	 Formation of relief	How could a crack have formed in the middle of the mountain? Why isn't a mountain a perfect, smooth, seamless mass?

Two sequences related to the dragon are discussed in detail below, which allowed different contents to be discussed through driven questions in the field of biology.

Sequence 1: The eye of the dragon rescued from the ice has changed to blue. Content: Mendel's Laws. Some PSTs proposed to work the laws of genetics to explain the colour of the eyes and how the transmission of

characters takes place. It is intended to introduce the concepts of dominant character and recessive character. Some driven questions were: why do some dragons have blue eyes and others black?, what colour do you think their parents and grandparents have? or can two dragons with black eyes have a dragon with blue eyes? If so, why?

Sequence 2: The flight of the dragon. Content: Taxonomic classification of the dragon. To study the classification of the kingdoms and their classes, they asked: to which kingdom of living beings would a dragon belong?, within the animals, to what class?, or does the dragon resemble any animal we know?

PSTs' Assessments: On the learning achieved, the PSTs highlighted how a playful resource can be converted into an educational resource to learn science by making a good selection of scientific contents. The average knowledge of the PSTs of the educational possibilities that the resource can offer increased from 1.96 points (before its use) to 4.54 (after) (fig. 1) on a scale of 5 points.

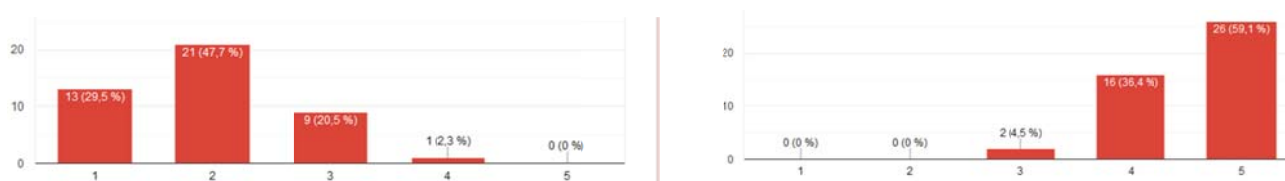


Figure 1. Evolution of the educational possibilities of the resource before (left) and after (right) its use.

The average score of the resource was very good (8.53 out of 10 points). The most highly rated characteristics of the resource were its ability to motivate and innovate, its simplicity or its connection with everyday aspects. As negative aspects they cited the previous knowledge required by the students to solve some driven questions. Regarding the emotions felt, 81.8% of the PSTs showed interest as the main emotion felt. Satisfaction (59.1%) and concentration (56.8%) were other major emotions. Only 2.3% felt bored and 4.5% rejected the use of the resource.

CLOSING REMARKS

We agree with Raham (2004) and Perales and Vilchez (2005) that the results obtained from this kind of experience are encouraging and show the effectiveness of this resource, although they also highlight the obstacles encountered by secondary school students in explaining phenomena. This experience has attempted to provide the PSTs with the necessary training to take the resource to the classroom, stressing the possible difficulties of the secondary students. Likewise, the method used does not intend to make an exhaustive follow-up of each chapter of the TV series, but only tries to analyse some situations from the perspective of science. Finally, the fact of having used an adult series does not imply that it will also be used with high school students and the PSTs are aware that they must use a TV series according to the preferences of their students.

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