

SECONDARY STUDENTS' INTEREST IN SCIENCE AND TECHNOLOGY UNDERSTOOD AS A MEDIA EFFECT

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ABSTRACT

Young people's interest in science and technology and their attitudes towards those knowledge fields has been an object for research for a long time. Current research points to cultural aspects and informal learning as important to understand these questions. In this study I use content analysis to compare what secondary students want to learn about in science and technology with what international popular science television program broadcast and present important similarities. I discuss the results from media theory as modernity having an effect on young people's experiences and that this can be important in understanding the way they encounter school science.

Keywords: *Students' interest, Science, Media*

INTRODUCTION

In a modernized world, science and technology play important parts in culture and affects everyone. This is the starting point by Durant, Evans & Thomas (1989) when investigating the public understanding of science. Furthermore, decision making in society today involve science and should therefore, in compliance with democratic processes, be debated. Also, science itself rests and relies upon public support which is based on public knowledge. This is why we should care. But in a world of many learning opportunities, what stands out as relevant and by whom?

There is a substantial volume of research concerned with secondary students' interest of science and technology. The majority of those studies pay attention to school science. Fewer have presented a picture related to informal settings. In a recent review of students voice in science education, Jenkins (2006) point out that when it comes to what is perceived as being relevant content to learn in school, it is mostly adults perspectives that have had the monopoly. A lot of students in many countries have trouble with apprehending this content as relevant for their lives and personal needs. In addition, there are important similarities between countries in the way young people experience school science (Lyons, 2006). These are some of the reasons why studies into students' perspectives on school science in different countries are important.

The relevance of science education study (ROSE) is the largest research project investigating the students' voice on those issues. One of the results reported from ROSE is that secondary students have interest in science and technology. Their interest is oriented towards specific content, and not towards broad categories like subject areas (Jidesjö et al., 2009) and can be understood as an effect of societal development that have an effect on youth culture (Schreiner, 2006). Schreiner showed this to be the case for many developed countries which imply that there are cultural factors behind questions concerned with students' interest in science and technology. There are more studies pointing in this direction. Baram-Tsabari and Yarden (2005) investigated young people's spontaneous interest in science and technology by analyzing their questions sent to an 'ask a scientist' television show in Israel, followed up by a study analyzing children's

questions sent to an 'ask a scientist' web site, from several English speaking countries (Baram-Tsabari, Sethi, Bry & Yarden, 2006). In both studies they discuss young people's interests for science as being strongly influenced by societal development which among other things mean that today you can learn about science in many ways outside school. Young people use media because it is fun and they have grown up with it and there are commercial interests behind as well. By such processes, the way science is treated in educational systems is challenged (Brady & Kumar, 2000; Weigold & Treise, 2004). As several studies are pointing to societal development and the way those circumstances change young people's out-of-school experiences and thereby what is perceived as relevant to learn, informal science learning is important to investigate in relation to school science learning (Braund & Reiss, 2006).

Science meets public in the media which is the new social contract (Gibbons, 1999). The stories are contextualized by journalists who try to make them intelligible, often in ways that appeal to people's sense of feeling, to entertain and frame but also manipulating. In the case of cloning, which is one example, science is portrayed from science fiction, described in dichotomies and contributes to cultural fears instead of enlightening the public (Huxford, 2000). The way science meet the public on TV in a modern society, is a consequence of political and economical realities but with a keenly alive to customers wants (Cottle, 2004). There are several factors involved in the process from production to reception and the content is affected even before it reaches the press room (Holliman, 2004). Journalists know what attract their users and present their stories with elements that people need to make them purposeful. This of course, has consequences for science citizenship. It is not one single institution that will contribute to a vision of a scientifically literate population (Dhingra, 2006). Media is not only about entertainment. It should be understood as a contributor to young people's views on science (Ormerod, Rutherford & Wood, 1989). This is not to say that educational settings should try to emulate media. There are evidence of stereotypical sex roles and narrow portrayals of scientists and scientific work (King, 2000). It is more a question of understanding what the development of communication media mean for the experience of science and consequently, what that implies for authentic learning environments (Roth, 1997). Media science and science education can benefit from each other (Salleh, 2001), remembering that the governing body on teacher work are quite differently from ways science knowledge is restricted in other areas (Treagust & Harrison, 2000).

METHODOLOGY AND PURPOSE OF THE STUDY

The purpose of this study descent from two observations. Firstly, several studies concerned with students' interest for science point out that they have interest for certain contents. Young people seem to be oriented towards a specific substance within those knowledge areas. How can this circumstance be understood? Secondly, many researchers concerned with societal development, culture and modernity related to science education, discuss the need for studies giving an account of media and young people's experiences due to their development. In a modernized society, is there a possibility that young people's engagement with science and technology can be understood as a media effect?

The analysis method I have used is founded on results from the ROSE study in Sweden. This empirical data set is part of the international ROSE data reported by Schreiner (2006). Schreiner and Sjøberg (2004) give an account for all details concerning data collection, methodological issues, rationale and underlying ideas in this world wide research project.

The national Swedish data I use have been generated by using the ROSE questionnaire, where 751 students in 2003 in the end of compulsory school have answered 108 questions about 'what they would like to learn about' on a four graded Likert scale. The category contained questions concerning astrophysics, earth science, human biology with sex and reproduction, genetics, zoology, botany, chemistry, optics, acoustics,

electricity, energy, technology, 'Science, Technology and Society' (STS) and 'Nature of Science' (NOS). The questions were put in different contexts such as spectacular phenomena, fear, technological ideas and inventions, aesthetical aspects, beauty, care, health, personal use and everyday relevance. The specific topics young people rank as relevant to learn I call a 'content orientation' and are much the same for students in the whole modernized part of the world (Schreiner, 2006).

Almost all topics that are part of their content orientation play important parts in science and technology but do not follow the way the traditional school subjects treat the content (Jidesjö et al., 2009). They are like two different content orientations. Young people seem to give precedence to other kind of priorities than the traditional school subjects' lay stress on. In trying to understand this split, I search for the content orientation that is put forward by the students among other stakeholders that manage science and technology. In this study I have used the method 'content analysis' to explore the content that is in charge of one international popular science television channel, i.e. 'Discovery Channel' from 'Discovery Communications LLC' (2010). All information about 'Discovery Channel' was downloaded from the Internet. Because of the space limitations I only present one analysis here from one TV-channel. Then I compare what is broadcast on 'Discovery Channel' with the content orientation that is perceived relevant among the teenagers.

RESULTS

In the analysis I have picked out all the programs on 'Discovery Channel' that was broadcasted during one week from 1st of March to the 7th of March in Sweden. Among those, seventeen programs were excluded because of lack of good information (Table 1). Besides, many of the programs in Table 1 did not get much time in the programme schedule.

Table 1. Programs on Discovery Channel in Sweden that were excluded from the analysis because of the lack of good information.

Krig på skroten
Street Customs Berlin
Femmans växel Europa
Fiskefantaster
Från vrak till bubbla
Amerikanska hotrods
X-Machines
Factory Made
Gröna åk
Discovery Project Earth
Mega Engineering
Jag borde varit död
Syna bluffen
Fiskeäventyraren
Rally-VM: Bakom ratten
Extrema bilar
Årets värsta tornados

In the next step I put together eighteen programs with good information and that had their international correspondence, which means that they are broadcasted in several countries and reaches an international audience (Table 2). The short descriptions of the programs stems from official wordings on the Internet (Discovery Communications LLC, 2010) and chosen to give a sense of what the programs are about, what kind of questions they answer. Several of the programs presented in Table 2 are given lots of time in the programme schedule.

Table 2. Programs on 'Discovery Channel' in Sweden with international correspondence presented with short descriptions.

How do they do it?	Just when you thought How Do They Do It? had told you everything you had ever wanted to know, Robert gives us answers to even more questions as he gets his down and dirty in his quest to understand modern technology.
Megabuilders	As the world's engineers and planners come up with new ways to solve the increasing demands of life on Earth in the 21st century, there are many amazing engineering projects taking place globally.
Mythbusters	Jamie and Adam are engineering and construction experts who combine science, special effects and technology to determine the validity of countless popular myths and legends through a series of tests and experiments. Welcome to Mythbusters - home of myths, science, experiments and explosions.
American chopper	Real bikes. Real fights. Real man hugs. This cult series tracks the daily tension, tirades and triumphs of a father and son team, as they run a business creating custom motorbike masterpieces.
How it's made	How articles for everyday use are made.
Miami Ink	Follow tattooists Ami James, Chris Garver, Darren Brass, Chris Nuñez, the glamorous Kat Von D and apprentice Yoji as they go about their business. Miami Ink challenges cultural stereotypes of skin art and illustrates the real talent behind the famed 'inkists'.
Time Warp	MIT scientist and teacher Jeff Lieberman - along with digital-imaging expert Matt Kearney - uses new technologies to bring truly never-before-seen wonders into a form that your body can actually process.
Dirty Jobs	Join Mike Rowe when he experience some of the planet's most dirty and dangerous jobs and meet the courageous people who perform these jobs every day.
Topp tio	For example the ten best fighter aircraft, the ten best tanks...submarines, choppers etc.
Chop Shop	See Bernie, Leepu and the team of master mechanics turn bangers into blingers. Supercars for superactors.
Industrial junkie	Jonny Smith take a closer look at how things are made, from oil drilling to super highway construction.
Born survivor: Bear Grylls	What does it take to be a true survivor? Adventurer Bear Grylls demonstrates in each episode, pushing his body (and gag reflex) to the limit. From skinning camels, eating a live snake and drinking water squeezed from elephant dung to building fires, setting up camp and navigating in the middle of the desert, when it comes to survival, nobody does it quite like Bear.
Huge Moves	Transfer of a big building
Storm Chasers	The latest season brings bigger, badder vehicles, monster hail storms and rivalries with other storm chasing crews. As if that wasn't enough, the team had a dream came true in the season finale, coming closer to a twister than ever before!
Destroyed in Seconds	From tower block implosions to rampaging tornadoes, catastrophic mid-air collisions to sudden terrorist attacks and dangerous races to stolen army vehicles, Destroyed In Seconds is the place for your fix of everything explosive.
Fearless Planet	A look at some of the planet's most amazing creations.
Survivorman	Living off the land takes on a new meaning when wilderness survival expert and filmmaker Les Stroud spends nine harrowing weeks in a variety of survival simulations. He takes off alone and heads to a punishing corner in the back of beyond with nothing but a few cameras to document his (often miserable) experiences
Wheeler Dealers	Video clips, photos and Mike and Edd's top tips on buying used cars. Learn how to restore a classic car to its former glory and get the best advice for buying used cars. Listen to these Wheeler Dealers and you might even be able to make a few quid yourself in the used car game.

In the continued content analysis I use results from the ROSE study in Sweden, presented in Table 3, showing the 20 first topics students want to learn about compared with what program on 'Discovery Channel' they can watch to have their wants stimulated.

Table 3. The 20 first topics in the ROSE questionnaire students want to learn about presented with means in falling order with standard deviation (SD) compared with what programs on 'Discovery Channel' that can be watched to stimulate those topics.

Topics in the ROSE questionnaire	Mean (SD)	Program on 'Discovery Channel'
How to exercise to keep the body fit and strong	3.03 (0.96)	Mythbusters, Born survivor: Bear Grylls, Survivorman
How it feels to be weightless in space	3.00 (1.02)	Mythbusters
The possibility of life outside earth	2.93 (1.05)	
Why we dream while we are sleeping, and what the dreams may mean	2.93 (1.06)	Mythbusters
How different narcotics might affect the body	2.84 (1.00)	Mythbusters, Born survivor: Bear Grylls, Survivorman
How alcohol and tobacco might affect the body	2.83 (0.98)	Mythbusters
What to eat to keep healthy and fit	2.81 (1.02)	Mythbusters, Born survivor: Bear Grylls, Survivorman
What we know about HIV/AIDS and how to control it	2.80 (1.01)	
How to perform first-aid and use basic medical equipment	2.79 (1.00)	Mythbusters
Phenomena that scientists still cannot explain	2.77 (1.12)	Time Warp, Megabuilders
Thought transference, mind-reading, sixth sense, intuition, etc...	2.77 (1.11)	
Sexually transmitted diseases and how to be protected against them.	2.77 (0.97)	
Cancer, what we know and how we can treat it	2.74 (1.03)	
How meteors, comets or asteroids may cause disasters on earth	2.71 (1.04)	Fearless Planet, Destroyed in Seconds, Mythbusters
How my body grows and matures	2.69 (1.00)	
How computers work	2.69 (1.03)	How do they do it?, How it's made, Industrial junkie
Sex and reproduction	2.68 (0.94)	
Black holes, supernovas and other spectacular objects in outer space	2.67 (1.11)	
How to protect endangered species of animals	2.65 (1.02)	
Unsolved mysteries in outer space	2.65 (1.12)	

The results show that many students are interested in questions concerned with diet and health, astronomy and cosmology together with modern technology and challenging diseases. Many of the topics that students are interested to learn about are in compliance with what is televised on 'Discovery Channel'. What are missing to have a full match are more health stories and cosmology.

DISCUSSION

The idea with this study is to put together some of the latest research concerned with students interest of science and technology and consider the matter more closely from a cultural perspective. Maybe, to give expression to students' voices and understand them as utterances of changing experiences due to modernization and globalization, is one important way forward in science education research. This implies an increased comprehension of what changing experiences entail for students' possibilities to learn science and technology when they encounter compulsory school. Even though there are many similarities in developed countries between 'what students want to learn about' and 'what media telecast to satisfy peoples wants' it is not possible with the data presented here to explain the results in a cause-effect relationship. There are several important methodological conditions that may have influenced the results. Yet, only with one single analysis and with simple statistics from the ROSE study, there are congruity between students' wants and media. As this is an ongoing project and kind of new perspectives within science education research, there are more detailed results to present in the future.

The point with this study is to turn the attention to media and specific science content and trying to understand people's engagement with science and technology from ways the content can be experienced outside school. Maybe 'science in society' can assist in understanding students' interest or disinterest for school science (Braund & Reiss, 2006). In this case, 'Discovery Channel' constitutes one example of what parts from science and technology that are brought out and how they are contextualized. Modern technology, how things work, mysteries, wonders, spectacular phenomena, myths and explosions seem to be important. Health issues are not that protruding on this channel as is the case with astronomy. But this is just a look on one channel on one week in Sweden. On the discovery home page there is information that because of NASA's 50th birthday, Discovery Channel is presenting a series of episodes of the space pioneering (Discovery Communications LLC, 2010).

Journalists and program makers present their stories in a way that make people continue reading or not to switch the channel. This is done from a cognizance of production as well as reception (Holliman, 2004). With societal development, several more actors will treat science and technology from the purpose of marketing certain content in narratives that make people want to participate (Dhingra, 2006). I argue that this could be one important factor behind the international similarities in young people's content orientation in modernized countries (Schreiner, 2006). With this study I contribute to this field of research by analyzing specific content and relating to informal science learning. Further studies are needed that pay attention to both formal and informal science learning and what those circumstances means for the experience of school science among youth in different societies. It would also be interesting to continue analyzing and compare with what content is focused in classrooms, curricula and teaching aids.

Students are not talking with one voice (Jenkins, 2006). What I present here is only a broad picture. Questions of ethnicity, gender and age are three examples of interesting continuations. Other methodologies are a second significant perspective. Thirdly, and maybe the most important, is a discussion of the purpose of science and technology as parts of education. I have not said that school science should be like media science. Especially as there is evidence that science in the media sometimes scare people instead of informing (Huxford, 2000). Maybe quite the opposite, school science can benefit from media (Salleh, 2001) and not trying to be in a competitive situation. To prepare people for citizenship should be the main purpose and public function of compulsory education. When science and technology affect everyone's life, it demands on the educational system to be updated and relevant. To handle media, to understand from what purposes stories are told and that many times, there are economical and political realities behind (Cottle, 2004) are of equal importance as learning some science

facts. Science in the media is also the way most people will continue encountering those knowledge fields after formal schooling.

Modernization involved a strong development of communication media and can be traced back several hundred years. In spite of this production and the importance of how it affects people's lives, media studies have been marginalized in social science research and there are several reasons for that (Thompson, 2001). Thompson tries to develop a social theory of the media and one of the most important starting points in his account is that communication media are central in modernization and lead to a world where many experiences are mediated and separated from shared meeting places. In addition, there are many different actors who treat content in different stories from various purposes. People will have to sort through this and structure mediated knowledge in what is relevant from a personal point of view. By those processes, meaning making is not a static phenomenon. It is in constant movement and transformation (Thompson, 2001).

To reach people in a modernized world you will have to explain why they should care, anchoring announcements in people's wants and needs. Those are like new rules in the development of communication. In its basic sense, authentic science learning environments are strongly involved in the development of communication media (Roth, 1997) where mediated experiences reshape traditions. To develop learning environments, where products of a civilization can be discussed, reflected and contemplated is important if education should contribute to empowerment, international understanding and peace. The reversed order can be the feeling of being an outsider, which for science on compulsory level today, is true for many students

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