CoReflect
Digital support for Inquiry, Collaboration, and Reflection on Socio-Scientific Debates

KRISTIANSTAD UNIVERSITY

Using STOCHASMOS to scaffold students in discussing key issues while retaining ownership of their learning processes

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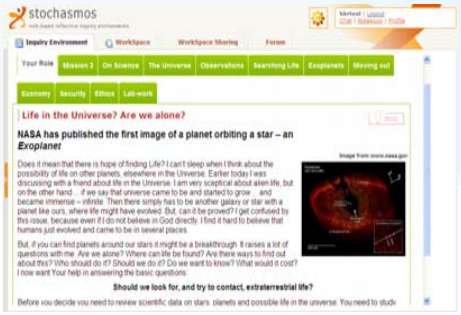
The Swedish group chose socio-scientific issues from Astrobiology, an expanding research field with new findings frequently reported in the media. Astrobiology captures the interest of youths today (Sjøberg & Schreiner, 2006). The two socio-scientific driving questions are:

- *Should we look for, and try to contact, extraterrestrial life?*
- *Should we transform Mars into a planet where humans can live in the future*?

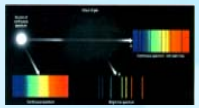
Socio-scientific issues include a scientific dimension, but also economical, aesthetic, ethical and social aspects.

- *Scientific aspect:* The probability of finding life/intelligent life? What are the demands that have to be fulfilled for life to exist? Where should we be looking?
- *Social aspect:* Safety if we establish contact –for us and for them
- *Economical aspect:* On what should we spend our economical resources?
- *Ethical aspect:* How should we be looking for life? From Earth or through sending things out in space? Leaving footprints? Are we allowed to interfere in the natural order?

The first mission begins with a youth expressing concerns about possible life on other planets. The text is adapted from a real blog in Swedish, see below. The second mission starts up with an interview with the first Swedish astronaut Christer Fuglesang where he describes his thoughts about space travels and the possibility that humans can live on Mars in the future.



The astrobiology inquiry environment consists of ten tabs besides the two mission-tabs, where the students find information . The tab "On Science" contains texts on the Nature of Science, focusing on presuppositions, theories and models. There are two sessions in the laboratory. The first is about the measurement of distances in the Universe .The second is about to the analysis of element abundances by spectral analysis.

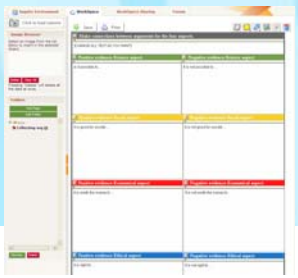


The student worked freely in triads and chose their own paths through the material, scaffolded by

- the teacher circulating in the classroom
- the design of the learning environment. The texts include challenging questions for the student groups to discuss, see figure above *On Science*
- the designed activities. There are activities on the presuppositions associated with science, Drake's equation and habitual zones
- the workspace with templates helping students structure their work and focus on relevant questions.

The students do all their creative work in the workspace. There are templates to help students

- keep track of their chosen path through the materials
- make notes on their discussion
- with the activities (*Presuppostions and Habitual zones*)
- fine tune their arguments
- formulate their final standpoint
- connect the hands-on labs to STOCHASMOS



The learning environment was implemented in a student group in the last year of compulsory school (15-16y). There were 30 students in the group. The number of lessons was 13 including three lessons with the detective story.

Empirical data consists of written pre- and post-tests, video & audio recording of group discussions , logging of computer activities and follow-up interviews of individuals in selected groups

Most student groups decided that we should not look for extraterrestrial life, and neither should we try terraforming Mars. We have seen that the students in their statements put forward arguments of different kinds. Many of the students' arguments are related to science, for example risks, chances of success and practical problems. Economical and social arguments are present in many of the groups. Ethical arguments are used to a limited extent.

DRIVING QUESTION	YES (# of groups)	NO (# of groups)	NO STATEMENT (# of groups)
Should we look for, and try to contact, extraterrestrial life?	2	6	2
Should we try to transform Mars into a planet where humans can live in the future?	1 (but not possible)	7	2

GROUP	RISKS	COSTS, RESOURCE PRIORITIZING	CHANCE OF SUCCESS, PRACTICAL ISSUES	CURIOSITY, PLEASURE/ AMUSEMENT	TECHNOLOGICAL, DEVELOPMENTAL ISSUES	ETHICAL ISSUES	NUMBER OF DIFFERENT KINDS SUPPORT USED
Group 1*	X	X	X				3
Group 2	X	X	X	X			4
Group 3		X			X		2
Group 4	X	X	X		X	X	5
Group 5	X	X	X	X	X	X	6
Group 6	X	X	X		X		4
Group 7	X	X	X	X	X	X	6
Group 8	X	X	X				3
Group 9	X	X				X	3
Group 10	X	X				X	3
# of groups	9	10	7	3	5	5	

The students liked working in STOCHASMOS. They profited from the collaborative setting when working with these open and controversial questions. They shared and commented pages within pair-groups – in writing and through chat. The teacher experienced an increase in students' motivation and found it fruitful to be able to comment student pages between lessons. The students liked using computers during science lessons – it is a familiar environment to them.

REFERENCES

Redfors, A., Hansson, L. & Rosberg, M. (2009). Socio-Scientific Collaborative Inquiry in astrobiology – The Design and Implementation of a digital learning environment. *Esera 2009.*

Sjøberg, S., & Schreiner, C. (2006). How do learners in different cultures relate to science and technology? Results and perspectives from the project rose (the relevance of science education). *Asia-Pacific Forum on Science Learning and Teaching*, 6(2), 1-17.

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