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EURO-CARES A PLAN FOR EUROPEAN CURATION OF RETURNED EXTRATERRESTRIAL SAMPLES

Work Package 8

Deliverable 8.7: EDUCATIONAL MATERIALS (post 16 years of age)

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Educational Materials (Post 16 Years of Age)

Change to Deliverables content: Following analysis of the national curricula and education guidelines of several different EU nations, the WP 8 team decided that it was more appropriate to include educational materials for students aged over 16 in the 'Universities' deliverable (D8.7) rather than the 'Schools' deliverable (D8.6). The change has been reflected in a change to the titles of the deliverables, from 'Schools' to 'Pre 16 years of Age' and 'Universities' to 'Post 16 years of Age'. This report covers material for the post 16 years of age students; these students will be the most senior of school students (equivalent to sixth form in the UK), at college or university.

Background: Prior to preparing any educational materials, the Work Package (WP) team had a strategy meeting to decide the best way forward to produce materials that would be (a) relevant for students studying different branches of science at uppermost senior school and university levels and (b) useful for lecturers.

To tackle these criteria (relevance and usefulness), the team looked at the range of subjects studied within the broad category of 'Science', in order to decide where we would be best focussing our contribution. 'Science' ranges from Astrobiology to Zoology, and it would be stretching our resources far too thinly if we attempted to provide material across the entire gamut. The meeting also covered the format of the material, and how it would be delivered or distributed.

Outcome: The following decisions were taken at the strategy meeting, regarding the materials to be delivered to post 16 year olds:

- (i) The subject of the materials would be 'Space on Earth';
- (ii) The materials would be focussed on physical, rather than life sciences;
- (iii) For university-level students, the materials would be designed to complement courses in planetary sciences, which might be taught within an Astronomy, Earth Science or Physics department, or as part of a Natural Sciences degree;
- (iv) For school students (aged over 16; in the UK, sixth formers taking A-Levels in preparation for university entrance), the material would be complementary to the syllabus, designed to stretch the capabilities of the more able students. It would be designed as an enhancement activity for students studying any combination of physical sciences;
- (v) The material would be delivered open access and delivered *via* the EURO-CARES website.

Scientific Content: two main subject areas will be considered in the material under the umbrella topic of 'Space on Earth', and will be covered using different pedagogical methods:

- (i) Introduction to Meteorites: leading to an understanding that meteorites are fragments from asteroids, the Moon and Mars, study of which can help us to understand the origin and evolution of the Solar System. The importance of sample curation, the necessity for planetary protection protocols and the legacy value of meteorite collections for future research will be included. The learning goals of this area will be addressed through guided study of a series of meteorite thin-sections accessed through the Open University's Virtual Microscope website (<http://www.virtualmicroscope.org/>). Links will also be made to material prepared for the MOOC described in Deliverable D8.8.



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- (ii) Sample Return: the complementary nature of materials returned directly from space missions to those found on Earth as meteorites will be discussed through a series of short video interviews with planetary scientists involved in meteorite research, hearing them discussing the pros and cons of sample return and remote sensing missions. The current roster of interviewees includes 5 different nationalities (UK, French, German, Italian and Spanish); each interview will be conducted in English and also, in the non-UK cases, in the relevant native language.

Additional Resources: A virtual Field Expedition to collect meteorites (vFE) is currently in development as part of the Educational Materials (Pre 16 Years of Age) package. Although it is aimed at younger students, older students will also find it useful. Further details of the resource can be found in D8.6.

Next Steps:

- (i) 'Road Test' the resource by inviting small groups of 6th form and university students, and their lecturers, to use the resource, requesting feedback to improve the material
- (ii) Upload the finalised project and associated teaching notes to a dedicated section of the EURO-CARES website;
- (iii) Launch the resource in the UK through announcements in the newsletters and websites of the Association of Science Educators, the Geological Society and the Royal Astronomical Society, as well as the UK Space Agency and the STFC. Complement with announcements on social media, etc.
- (iv) Translate the materials into French, German, Italian and Spanish;
- (v) Launch the resource through appropriate channels in other EU countries.