Options for CSIRO Education and Outreach

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Context

A review of the education and outreach activities of CSIRO is timely given the fundamental changes occurring across all education systems in Australia. These changes relate to:

- curriculum and the introduction of a national curriculum;
- the application of technology to teaching with the roll-out of high speed broadband, the development of digital repositories of learning objects and resources through Education Services Australia and the proliferation of student -owned mobile technology;
- new funding arrangements for schools and the injection of additional funding for schools by the Commonwealth.

Further changes to curriculum, teaching and learning in the mathematics, sciences and technology are likely if education systems respond to the recommendations of the "Starting out in Stem" (IRIS Project, 2012) and "International comparisons of science, technology and mathematics (STEM) education" (Marginson et al, 2013) produced for the Office of the Chief Scientist. Of most relevance to CSIRO are those findings in the reports related to:

- the need for discipline specific professional development
- the need to make students aware of career pathways in science
- provision of work experience opportunities for students.

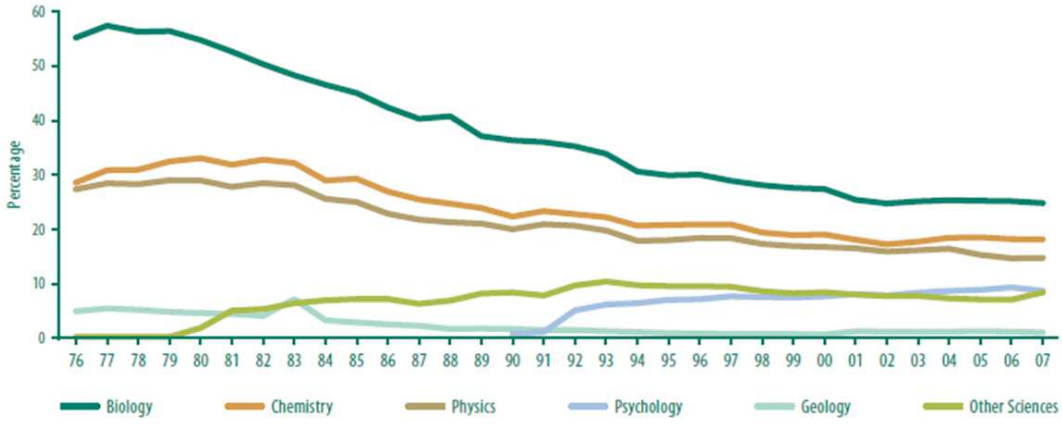
Science Education – a crowded space

As science has achieved greater prominence for its potential to improve the economy and the lives of Australian people science education has become a matter of national concern. Numerous reports have been generated along with recommendations as to how declining enrolments in science subjects might be arrested, how science teaching can be improved and the science literacy levels of young Australians raised (Goodrum, Hackling and Rennie 2001; Garnett, 2003; Harris, Jensz and Baldwin 2005; Tytler, 2007; IRIS, 2012, Marginson et al, 2013). There is a general consensus in the reports that Australia is not producing sufficient science, and in particular STEM graduates, but there is some disagreement as to why the number of enrolments in both upper school science and university science degrees continue to fall. Some reports identify poor quality science teaching, others point to the lack of positive role models in science careers and too much subject choice in the final years of schooling.

There are many organisations, educational and non-educational, engaged in promoting the study of science, offering professional development for science teachers, rewarding excellence in science studies through awards and prizes, and improving students'

understanding of and engagement with science. The PMSEIC Working Group on Science Engagement and Education lists 46 providers of science outreach (excluding CSIRO and universities) programs across Australia. Science Centres in each state are heavily engaged in science education initiatives. Universities in every state, mostly in an effort to recruit students, have developed science outreach programs for secondary and, in some instances, primary schools. Some universities run programs for school students in the campus laboratories and during school holidays. Science teachers have their own professional body in each state and a national organisation and these groups are active in professional development, the production of resources to support science teaching and the promotion and management of science awards, competitions and festivals. Alongside teachers and CSIRO some of the large resource and manufacturing companies like Rio Tinto, Intel, Chevron, Shell and BHP Billiton are active in promoting and supporting the study of STEM subjects.

Figure 1: Year 12 science participation as a percentage of the year 12 cohort in Australian schools, 1976 to 2007



Source: Ainley, J, Kos, J & Nicholas, M 2008, *Participation in science, mathematics and technology in Australian education*, Research Monograph no. 63, ACER, Melbourne.

Despite so much effort to promote the study of science to school students the most recent report compiled by Marginson et al (2013) states that the percentage of year 12 students enrolled in higher level studies of STEM subjects (mathematics, physics, chemistry, biology, geology and earth sciences) has continued to decline. In the period 1992-2010 the proportion of year 12 students in biology fell from 35 to 25 per cent, in physics from 21 to 14 per cent (Marginson p. 16). Reasons for the ongoing decline in enrolments in science and mathematics have been canvassed in the various reports and include:

- inadequate preparation of teachers
- teaching out of field
- a dull curriculum
- lack of awareness of career opportunities in the STEM areas

- lack of career role models
- a perception that science subjects are too difficult
- overly broad range of subject choices in years 11 and 12

CSIRO's charter

Arguably, education is not a core function of CSIRO. The Science and Industry Research Act (1949) makes mention of education only once and that occurs in reference to the need to collaborate with tertiary institutions:

"(d) to train, and to assist in the training of, research workers in the field of science and to co-operate with tertiary-education institutions in relation to education in that field;"

The CSIRO Strategic Plan 2011-2015 mentions education only once but in that mentions says that the Science Education Centres reach 1.2 million students each year. [It is not clear how this figure is arrived at. There are about 3.5 million full-time equivalent students in school in Australia (ABS 2010 cited in Gonski, 2011)]

The CSIRO Operational Plan states in relation to the function of education:

"Through the science outreach programs, CSIRO promotes the importance of science and its application to students, parents, teachers and the Australian community. The outreach programs include the CSIRO Discovery Centre, CSIRO Education Programs and CSIRO Publishing." (p.11)

The current Engagement Strategy is more specific about CSIRO's goals in the area of education and nominates schools, students aged 5-18 years and teachers as the target audiences in which it hopes to develop positive perceptions science; about the value-adding role CSIRO can play; and its contribution to the development of science teaching resources.

Despite the low profile ascribed to education in the functions of CSIRO the organization has a long history as a provider of science education in Australia. The organization takes multiple roles as an education provider. It:

- runs science education centres,
- teaches classes in primary and to a lesser extent high schools,
- operates visitor centres,
- produces science curriculum resources,
- manages the scientists and mathematicians in schools projects
- publishes science magazines,
- runs national programs supporting science education,
- funds teacher development activities and

- provides financial and human support for science competitions, awards and events.

However, it is impossible to judge the effectiveness of CSIRO's education activities because there are no meaningful performance measures in place. There is no management approved operational plan for education and outreach, no documented objectives, no performance indicators, and no targets. The number of contacts with students (an input measure) seems to be the only measure reported on but this measure tells us nothing about the impact of CSIRO's activities on student learning or general science literacy or student aspirations.

In the absence of targets and measures we asked staff in the Education Centres about their objectives for science education. Their responses can be summarized as:

- affective: encouraging students to engage with and enjoy science
- cognitive: giving students a greater understanding of science concepts
- aspiration raising: encouraging students to consider pursuing studies or careers in science

We spoke to many staff in the Education Centres in the course of this review. They are energetic, hard-working, committed to science education, knowledgeable in their fields and their input to science education is valued by those who access the resources. Over the years the organisation has developed many education and outreach activities (clubs, forums, holiday activities, competitions,) some in conjunction with other education providers, some supported by Federal or State grants, some in co-operation with corporate bodies. There is no doubt that both students and teachers enjoy and value the services the Education Centres provide to schools but the effectiveness of these activities and whether the aims identified by the staff are being met is doubtful.

We know that enrolments in science in senior school and university continue to decline. Furthermore, there is in fact a substantial decline in Australian students' commitment to science between the middle primary years and the end of secondary school. The TIMSS data for 2011 show that 55 per cent of year 4 students 'like science' but only 25 per cent say so in year 8 (Marginson, p. 17). Given that around 82% of CSIRO Education Centre activities are in primary schools this is a worrying statistic. If student enrolments in science in year 12 or students' enthusiasm for science studies are indicators of success then CSIRO's education outreach has failed as have all the science outreach providers.

Current Strategy

The current education activity focusses mainly on primary schools. This is where most demand for services comes from and is thus a major source of revenue for the Education Centres. However, if CSIRO wishes to have an impact on students' aspirations then a focus on primary schools is not likely to be effective. The IRIS report which studied the responses of first year university students in STEM courses found that the most highly rated outreach activity was Work Experience, with around 94% of nominees considering it to have been 'very' or 'extremely' encouraging in their decisions to study STEM subjects.

Students were significantly more likely to rate their most recent classroom experiences (Years 11 & 12) as being very important in their decisions than their earlier high school experiences. Overall, students were more inclined to rate popular science programs such as “Life on Earth” or channels like the Discovery Channel as important (29%) or very important (15%) in their decisions than other nominated media or outreach activities.

The Future

Before considering options for the future CSIRO management could usefully ask itself: If the organization were to commence business tomorrow, would it engage in the direct education of school students, in particular primary school students?

There are four options for going forward outlined in the following pages. They range from leaving the field of education altogether, through suggestions for improvements and enhancements to the current mode of operating, to presenting a radical change of direction. The options are not always mutually exclusive and CSIRO might opt to mix and blend some of the alternatives. The justification for each option is based on the evidence collected, our knowledge of the education field and best practices. An assessment of the risks associated with each option is provided. It is our advice that any changes should be aligned with, and presented as a response to, developments in the education sector. This is entirely possible with all but the first option of closure.

Summary of options for centres and outreach programs

Option 1	**Option 2**	**Option 3**	**Option 4**
Cease delivery of educational programs and services to schools and close the Education centres. Maintain only a limited number of the fully funded, high profile, focussed on excellence awards e.g. BHP-Billiton awards, Scientists in Schools.	Maintain all Education Centres, services and programs with enhance-ments to ensure that they serve the outreach needs of CSIRO. Within this option CSIRO may continue to operate all Centres or attempt to outsource them to another provider.	Maintain funded (or revenue neutral), high profile, national programs such as Scientists in Schools, Mathematics in Schools, Double Helix, CREST, Carbon Kids and retain a capacity to bid for funds for new national programs.	Change focus away from students in schools to the provision of digital science resources, teacher support and develop-ment.

Option 1

Cease delivery of educational programs to schools and either close the Education Centres or seek to find another provider to operate the Education Centres.

Justification: There are numerous other providers of science education programs for school students and for many of these providers science education is a core responsibility. The teaching of school students is not core business for CSIRO. It is not required by the Act, and currently the organisation has no clear vision, nor plan, nor performance indicators for the Education Centres or the programs they deliver to schools. The Act in Section 9 1D requires only that CSIRO train research workers and collaborate with tertiary institutions to train scientists. These functions can be maintained without the need for Education Centres.

The Centres themselves vary greatly in the quality of the physical space and some of them are in such poor condition that they have the potential to do harm to CSIRO's reputation. The equipment in the Centres and in the mobile laboratories, while adequate to the task, is perceived by some staff as not being of high quality and they report schools being disappointed that technology plays almost no part in the delivery of the experiential programs. The current delivery model, whereby Education Centre staff visit schools for a fee and deliver a lesson is inefficient, resource intensive and pedagogically unsound.

Education Centre staff, during workshops conducted as part of this review, claimed that the major functions of the Centres and their programs was to raise students' interest in science and give them a deeper understanding of scientific ways of thinking. However, as mentioned earlier there is no evidence that the current service is effective in raising student aspirations in science or improving their learning outcomes. In both the PISA and TIMSS international student testing systems a benchmark performance level is set, and below this level students are considered to be at risk of having difficulties in participating in work and life as productive citizens. The data presented by Marginson about Australian students' performance is not encouraging:

"In PISA, 16 per cent of Australian students fall below this point in terms of mathematical literacy, and 12 per cent in scientific literacy. In TIMSS testing of mathematics at year 4, 30 per cent of students fall below the specified benchmark. This proportion rises to 37 per cent by year 8. By contrast in science there is little change, from 29 per cent in year 4, to 30 per cent in year 8" (Marginson, 9.16).

The Education Centre visits to schools are not demonstrably effective in raising students' awareness of CSIRO. Despite 'touching' 1.2 million students per year (CSIRO Operational Plan) young people's awareness and knowledge of CSIRO continues to decline. In 2013, CSIRO commissioned Ogilvy Illumination to conduct the third on-line tracking survey into community attitudes towards CSIRO. The results showed that knowledge of what CSIRO actually does is relatively low, particularly amongst younger people. This finding is consistent with earlier community attitude surveys. In some ways this is not surprising. While it is quite likely that primary students from R-yr 3 would remember the excitement of the CSIRO visit it is unlikely they would remember the name of the organisation responsible for it. Older age primary school students might have a better grasp of the role of CSIRO but it is debatable as to whether they will remember it three months after the school visit.

Furthermore, although staff in the Centres state that they are 'proud to work for CSIRO' they do not uniformly believe it is their role to conduct what one interviewee described as a 'hard sell for CSIRO'.

The requirement that Education Centres charge for their services means that the services provided to schools are not equitable in that poorer schools may be charged a higher fee than wealthier schools depending on their physical location. In addition, the anxiety to raise money to fund day-to-day operations has resulted in Centres engaging in some activities, such as birthday party science presentations, that do not comfortably fit with CSIRO's image as a serious scientific research body. Similarly, holiday science programs are viewed by some as a child-minding activity available to parents who can pay. The requirement that Education Centres raise a significant proportion of their operating costs probably means that the current system is not sustainable for much longer as salary costs continue to rise. If CSIRO is to maintain Education Centres into the future it will need to urgently review the funding model.

The current educational delivery model of one-off programs conducted in schools or visits by classes to an Education Centre, is not pedagogically sound. It is a model that was widely used by state Education Departments in the eighties whereby advisory teachers or curriculum specialists made on-site visits and conducted demonstration lessons. The approach was abandoned in all states because it was recognised that it had no lasting benefit for students or teachers and it ignored the precepts of constructivist learning, of a sequential learning program and scaffolded learning.

The significant risks associated with closing education centres and programs might prompt CSIRO to look at modifying this option by seeking to outsource the functions of the Education Centres to other providers. It is possible the Education Departments might agree to take on the running of the Centres (they already contribute to running costs in some Centres), or perhaps a university in the case of the Townsville and Darwin Centres. However the sale or transfer of operations will not remove from CSIRO the responsibility of making staff redundant and providing appropriate redundancy measures.

Benefits The benefits to CSIRO in closing the Ed Centres will be saving of the dollar appropriation currently provided for the running and staffing of the Centres. There will be a future saving in that improvements to the physical space of some will have to be made and the equipment in all needs to be upgraded.

Risks A decision to close the Education Centres will undoubtedly upset the staff and raise the ire of teachers who appreciate the services provided. It is quite likely that, as has happened in similar circumstances where schools or universities have closed programs that lobby groups will organise to put pressure on the Minister(s), the management of CSIRO and conduct a media campaign. ECU closed a campus, Swinburne has announced plans to close two campuses and a raft of programs, BHP Billiton closed an entire town when it shut down its operations in Ravensthorpe. In each instance the media interest was short-lived.

Any decision to close the Ed Centres will require a carefully planned communications strategy. The strategy needs to clearly explain that in the future CSIRO will leave science literacy education to those whose responsibility it is and focus on supporting excellence in scientific endeavour as befits

the leading science research centre in Australia. Such a decision will also need buy-in from key influencers such the Board and the Chief Scientist.

Costs There will be a cost for redundancies and a communications strategy.

Option 2

Maintain all Education Centres, services and programs and make the enhancements and changes necessary to ensure that they serve the outreach needs of CSIRO.

Justification: Historically CSIRO has had a long association with school education and there is likely to be an expectation on the part of stakeholders that educational services will continue. Those teachers who access the services express satisfaction with what is provided. However, currently the Centres do not effectively serve the needs of CSIRO in terms of raising its profile or informing the community of its achievements and activities.

Staff in the Centres are frustrated by the need to raise operating revenue and are finding it increasingly difficult to find the funds to pay the salaries of the staff currently employed. They also feel isolated from the rest of CSIRO. In some instances the revenue raising activities are not entirely appropriate for a body of CSIRO's standing. There is significant staff churn because of the large number of sessional and casual staff.

If the current centres, services and programs are to be maintained there is an urgent need to:

- Clarify their purpose and function;
- Better integrate the Education Centres with each other and the organisation as a whole;
- Prepare an operational plan complete with deliverables, timelines and key performance indicators;
- Review the current funding model;
- Upgrade the physical facilities in some locations;
- Improve and make consistent the branding of the facilities and services;
- Offer clear direction on what activities Centres may engage in for fund-raising purposes;
- Align a limited set of curriculum offerings to the national curriculum;
- Align curriculum offerings to CSIRO flagship programs where possible;
- Shift the focus of services to secondary education where the outcomes (e.g. enrolments in science, student achievement in science) are easily and regularly measured.

Outreach Programs (Scientists in Schools; CREST, Double Helix Club, Scientrific, BHP Billiton awards, Carbon Kids, Maths by Email, Science by Email)

There is significant support from powerful individuals and bodies for some of the programs and for the most part they perform a useful outreach function. The costs of the programs are either fully covered by grants and/or sponsorship, they are national in reach and involve some high profile collaborations.

The publications Double Helix and Scientrific are lively and interesting although over-designed and in the case of Double Helix the look is too juvenile for the intended audience. It would be more efficient to publish the journals from CSIRO publishing in Melbourne and manage subscriptions through this arm. Serious consideration should be given to:

a) putting the magazines online

b) requiring sections in each publication to be dedicated to CSIRO flagships activities and careers in science. The latter could include profiles and interviews with people (other than bench researchers) who have a science related career. (See Marginson recommendations p.21)

All the programs need to be looked at with a view to establishing a consistent look and feel, a clear CSIRO brand and the production of a poster/flyer/website that presents a coherent and unified view of CSIRO programs.

Benefits: With strong leadership, a defined vision, better integration across Centres and programs and a new emphasis on outcomes the Education Centres and programs could serve to raise awareness of the activities and achievements of CSIRO.

Risks: If there is to be a change in direction of the Education Centres there needs to be a significant cultural change at the grass roots level. Currently many staff see themselves as serving the needs of schools or their own particular program, there is little recognition or understanding of the needs of the organisation. Others are keen to re-think the purpose of educational outreach and will be supportive of change. It may be that they current staffing profile does not lend itself to embracing a cultural shift so there may be staff dissatisfaction and resistance to change.

Costs: The costs will depend on the extent of changes. The current need to raise revenue to meet operating costs means that the Ed Centres focus on the needs of clients not CSIRO. The whole cost and revenue structure needs to be examined more closely.

Option 3

Close the Education Centres but maintain funded (or cost neutral), high profile, national programs such as Scientists in Schools, Mathematicians in Schools, Double Helix, Carbon Kids, CREST, BHP Billiton Awards and retain a capacity to bid for funds for new national programs.

Justification: Some of these programs are in receipt of grant monies and/or sponsorship, some have been positively reviewed (Rennie, 2012) some have taken subscriptions into the future, some are backed by high profile and significant Australian organisations and individuals. It is appropriate that CSIRO as a national body operates national programs.

Key finding 6.1 of the Marginson STEM report relates to initiatives to increase awareness of science, technology and engineering professions. The scientists in schools and Helix and Scientrific publications are well-positioned to "alert young people to the range of possible future STEM – related careers", provide "role models, in the form of student interaction with practising STEM professionals" and offer "career advice that includes images of people working in STEM-related careers" (Marginson p. 21)

A program delivery to schools could be operated without the need for bricks and mortar centres. A state co-ordinator of CSIRO national programs could be located in existing CSIRO locations or a university or a department of education.

With regard to publications and closure of the Education Centres the suggestions under Option 2 apply.

Benefits: A focus on national programs and removal of Education Centres and teaching services to schools would free up resources while maintaining CSIRO's historical commitment to education. There are cost savings in not needing to maintain buildings, equipment, vehicles or conduct school visits inward and outward.

This option most closely aligns with the view of the Chief Scientist that CSIRO has a responsibility to identify and nurture the next generation of scientists.

Risks: A move to maintain programs but abolish Education Centres would be seen as a diminution of services by some and incur the same issues with staff redundancies (although to a lesser extent) as option 1.

Option 4

Leverage CSIRO's comparative advantage in scientific research by shifting the focus away from teaching students in schools to providing high-quality digital science resources and supporting teachers to become more confident and knowledgeable in science.

Justification

- Focus on CSIRO science and not teaching children;
- Maintain service to science education across Australia through the provision of high quality digital science resources;
- Contribute to improvements in the quality of science teaching through the provision of appropriate professional development;
- Maintain web-based interactions with school students through online publication of current journals;
- Maintain selected high profile outreach programs.

This option gives CSIRO:

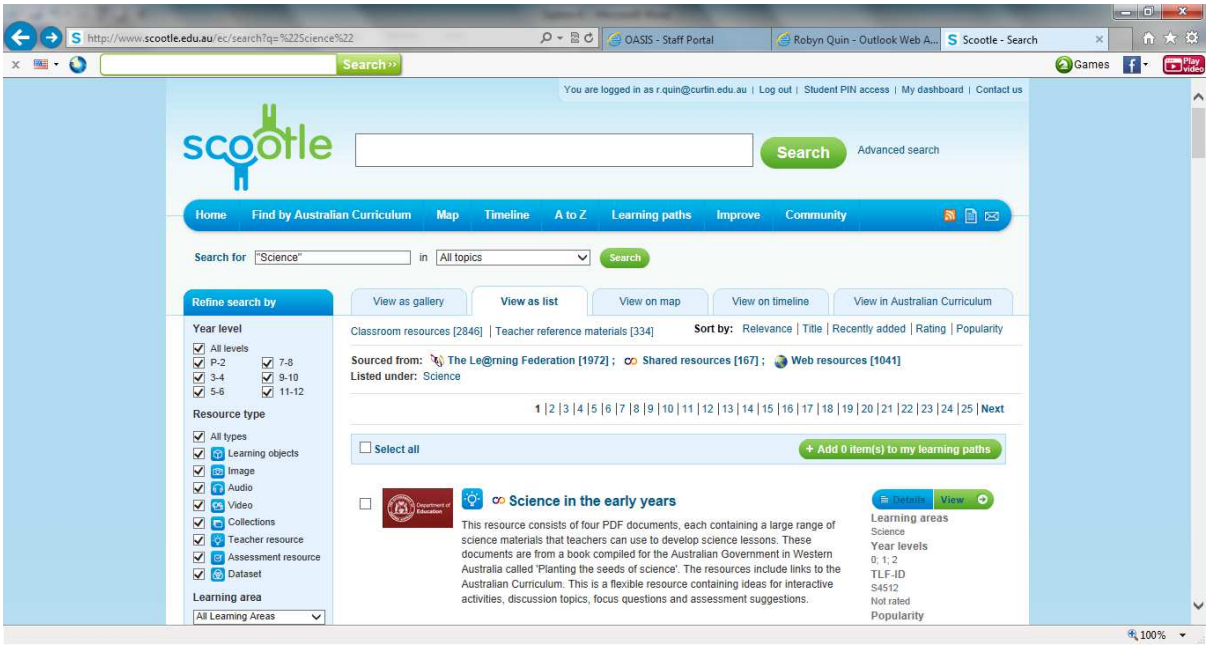
I. greater reach and influence in that it focuses on teachers who have interactions with thousands of students over the course of their career;
II. better alignment with 9AA of the Act which requires CSIRO to "disseminate information relating to scientific and technical matters";
III. the opportunity to more appropriately position itself as the 'science expert' and a key resource for science teachers by making available to teachers digital images, audio, video, data sets and other materials produced in the course of its scientific investigations.

CSIRO is known for its science research and the achievements of its scientists. Its reputation as the pre-eminent science body does not rely on its work in schools or Education Centres. One option is to align its educational outreach more closely with its core business of scientific research by making some of the artefacts and data sets produced in the course of its research available to education. For reasons of reach, efficiency and integrity of the materials the provision of resources should be in digital form.

There are a number of ways CSIRO could approach a digital future in educational outreach: through the establishment of its own educational portal or by using the services of Education Services Australia [ESA] (the not-for-profit company owned by ministers of education across Australia). ESA manages a wide range of education and training projects on behalf of the Australian Government, State and Territory governments, education bodies, government agencies, education bodies, schools and the private sector. It provides a platform for the storage and access to digital materials to all teachers across Australia. The latter option, through ESA, would be cheaper and ensure wider dissemination of materials to teachers and schools.

ESA manages and operates Scootle; a 'one stop shop' that provides teachers with access to more than 20,000 digital curriculum resources in the National Digital Learning Resources Network. Scootle provides easy ways for teachers to find, organize and use the digital resources. Materials available

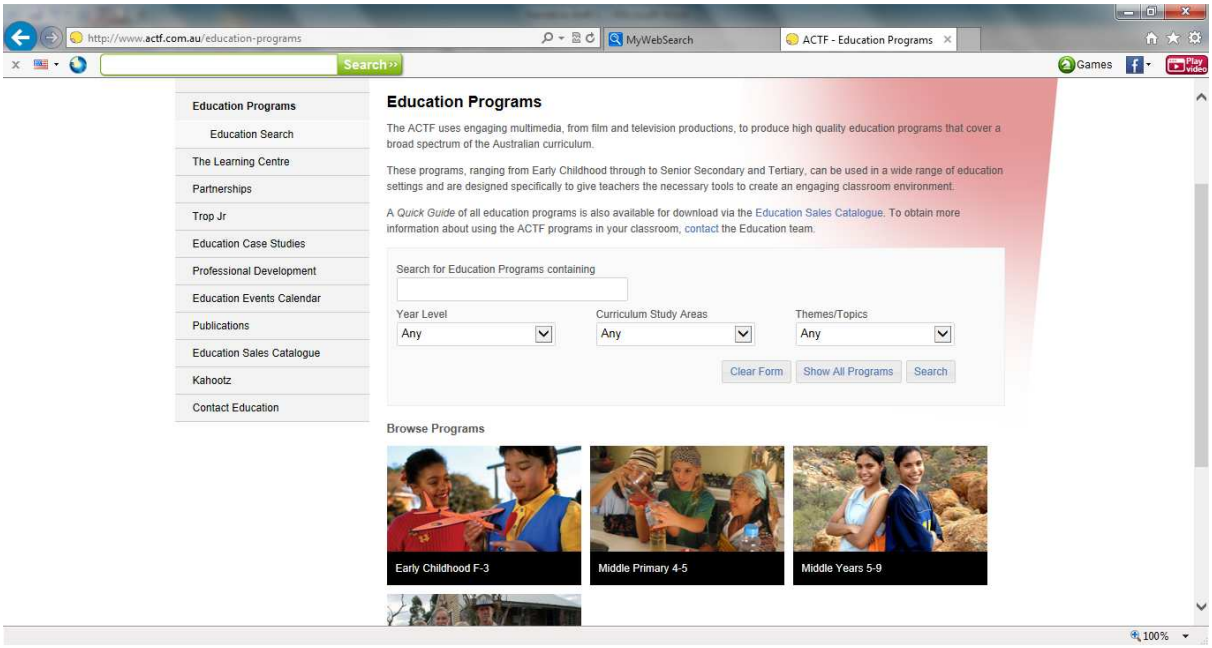
via Scootle include learning objects, videos, still images, audio, collections and datasets. If copyright free the materials can be located on the Scootle portal or if copyright is involved behind a pay wall known as PREX. The CSIRO publications could also be placed on PREX and accessible via subscription. The materials are discoverable via a meta description.



As an example of the opportunity afforded by ESA, currently ESA is collaborating with the ABC to deliver ABC Splash, an online education portal funded by the Australian Government which is providing students and families with access to an extensive library of educational resources aligned to the Australian Curriculum. A significant amount of the content is rich video and audio materials from collections of the Australian Broadcasting Commission. ABC Splash is making available streams of digital content:

- over 250 hours of contemporary and over 1,100 hours of archival ABC content enhanced for maximum educational value and directly aligned to the Australian Curriculum. English, mathematics, science and history resources have been published and more will be released in 2013 and 2014. Resources for geography, languages and the arts resources will be made available in 2013 and 2014
- interactive educational resources commissioned by the ABC that demonstrate and use the additional capacity provided by the National Broadband Network (NBN).

Alternatively, CSIRO could establish its own educational portal in the same manner as did the Australian Children's Television Foundation. The ACTF offers a gateway to educators called The Learning Centre http://www.actf.com.au/education/learning_centre which houses a searchable website of curriculum-aligned materials and lesson plans directly linked to all its television programs. In this way the ACTF provides a service to education while publicising and promoting the use of its own materials.



CSIRO is soon to host the TechnYou Education Resource http://education.technyou.edu.au/ a biotechnology and nanotechnology educational resource aligned with the National Curriculum and searchable by topic. This resource could become the foundation for CSIRO's digital resources.

If CSIRO were to provide digital science resources it would be advised to focus on the secondary side of the curriculum given that the the Victorian Department of Education and Early Childhood Development (DEECD) has already contracted Education Services Australia (ESA) to work with six Victorian Science and Mathematics Specialist Centres, the Australian Synchrotron and DEECD to develop sustainable digitised science outreach programs for students in years 5-9 in:

- space sciences
- gene technology
- environmental sciences
- biosciences and health sciences
- renewable energies
- physical sciences.

Teacher development

Depending on how much effort CSIRO wanted to expend to support education it could be the provider (either online or face- to-face) (alone or in partnership with universities or Science Teacher Associations), of the discipline–specific professional development for teachers called for in the Marginson report to the Chief Scientist: "discipline-specific professional development could address methods of problem-solving, inquiry-based approaches, critical thinking and creativity" (p. 118).

Online professional development could also be delivered through the services of Education Services Australia and its Scootle Community. This is a professional digital community for teachers to discuss and share ideas about the Australian Curriculum with their peers across the country, to assist them to implement the Australian Curriculum. Through Scootle Community, teachers can also access digital lesson plans, curriculum resources and research. Scootle Community can be used anywhere

and at anytime using a desktop computer, smart phone or tablet. It was released in May 2013 and is accessed via Scootle.

Benefits: This option gives better coverage for less money by investing in teachers rather than students; CSIRO complete control of the look and feel and branding of the curriculum products; the ability to segment the market (primary/secondary teachers) by way of the meta data descriptors and the opportunity to focus materials on CSIRO flagships. There is the capacity to outsource production to external bodies.

Costs: There will be an outlay to identify those images, data sets and audio-visual material that align with the needs of the national curriculum and are suitable for loading onto the websites and the cost of employing a person to write the meta descriptors so that the materials are discoverable. There may be an opportunity to apply for a federal grant or get support from State Ed Depts or corporates to fund this work.

There will be costs in redundancies and communication and advertising.

Other considerations

Discovery Centre – Canberra

One of the strengths of the Discovery Centre is its focus on CSIRO science and is effective in raising awareness of CSIRO activities and achievements. It is a key part of the ACT's education tourism initiative and hosts many thousands of visitors every year. The Discovery Centre should be maintained and might in future become the headquarters for preparing CSIRO materials for an online presence.

CASS Education Activities

CASS would benefit from education co-ordination across its various sites.
CASS could be included in the global Education and Outreach plan for CSIRO

Before management decide on a future strategy for education and outreach it needs to decide what is the purpose of E&O for CSIRO? Currently on all indicators CSIRO is failing to:
Increase young people's awareness of CSIRO;
Increase enrolments in science;
Improve learning outcomes.

The current need to raise operating funds is forcing Centres to engage in some activities which have the potential to damage CSIRO's reputation.

The absence of a meaningful E&O plan with clear strategic directions is a problem resulting in staff doing what they "think" is a good idea in the absence of determined directions with meaningful performance indicators.

It is possible that CSIRO, at a cost, could become a leading provider of science professional development to teachers and a major provider of digital teaching resources for science.

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