A significance study of the University of Canberra's geological collection

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Abstract

The process of applying a collection level significance assessment to the entire geological collection at the University of Canberra reveals an interesting and unique collection that reflects past academic endeavors at the former pre-university institution focused on the production of industry ready graduates to feed historic economic booms in Australian mineral exploration. The collection is ungoverned, lacks relevance to contemporary university activity and is at risk. Significance study illuminates characteristics of the collection that could be developed to be of value to the university. We argue that all legacy collections in higher education could benefit from this standard museological process.

Introduction

The University of Canberra is one of Australia's 43 universities. The institution achieved university status in 1994 having previously been a College of Advanced Education prior to the introduction of government reforms in Australian higher education designed to simplify the variety of tertiary education institutions.

Geology has been taught as a specialized tertiary level program at the University of Canberra, and previously at the Canberra College of Advanced Education, for a number of decades. This paper stems from the development of a report on the results of a site investigation looking at the dispersed geological collections on the campus of the University of Canberra, in response to a consultant's brief for a project funded by Heritage ACT (Australian Capital Territory).
The aims of the original investigation were twofold:

1. To undertake a significance assessment of the collection as a whole, guided by principles of museum practice and professionally recognized significance analysis (RUSSELL & WINKWORTH, 2009) and the Burra Charter, the set of principles adopted to create a nationally accepted standard for heritage conservation practice in Australia.

2. To undertake a preliminary audit of the collection based on available data to test current information management practices and accordingly make any recommendations for future work.

The collections were housed in a number of teaching and storage locations in the University's Faculty of Education, Science, Technology and Mathematics (ESTEM). They are primarily used for service teaching in undergraduate programs within the ESTEM Faculty's Department of Environmental Sciences, principally for the undergraduate major and minor in Earth Sciences.

The collections were started in the late 1960s by Ian Mathias in the Canberra College of Advanced Education. They were established to be a teaching collection, this was the impetus for collection development in many institutions (SIMPSON 2012a). The School of Applied Science commenced teaching in 1970, geology was initially not included but commenced in the early 1970s as a result of the nickel mining boom and a rapidly increased demand for professionally trained geoscience graduates. Others involved in early collection development included Cliff Ollier, Max Brown and Eric Best.

Because of the focus on supplying graduates for a minerals-based mining boom, collection development was oriented at an early stage towards ore suites and materials that would aid conceptual understanding of ore genesis. As a result of the personal contributions of staff, the fledgling geology program at the Canberra College of Advanced Education had access to much ore material from Broken Hill in western New South Wales. The significant quantity of duplicate Broken Hill material and the extensive professional contacts of the early staff, allowed this material to be used as a basis for exchange. This resulted in rapid growth and international coverage of the ore suites represented in the collection.

While many university geology collections commenced through the personal contributions of staff members, the University of Canberra example is a case of the right people with the right subject focus for the time (ore mineralization) being prepared to work together to leave a collection legacy for future generations of staff and students. This reflects the aspirations of a tertiary education institute, prior to the unification of higher education in Australia, in this case a College of Advanced Education (CAE), with a strong commitment to serving industry through the production of work-ready graduates. There is ample evidence of a close industry-academic alliance that remains associated with the material today, this includes the historic compilation of related resources with ore suites in the collection.

The demand for graduates, however, fluctuated markedly over the ensuing decades and, eventually, Earth Science programs at the University of Canberra ceased in 2005 (SMITH 2008) with only service teaching remaining for the undergraduate major.

Nature of the collection

The collection can be divided into a number of related categories. This is common for scientific teaching collections that are used for different purposes over time during the life of an academic program. It is important to remember that the same specimens may perform multiple functions during the life of a program. There is evidence this is the case in the associated card and folio files that represent the information management of the University of Canberra's geology collection.

A summary of collection components is given below.

Current teaching sets: - There was a good supply of well catalogued and sorted material in a teaching laboratory indicating comprehensive coverage of igneous, metamorphic, sedimentary rock types and the majority of common rock-forming minerals. Storage of teaching sets in the laboratory is shown in figure 1.

Fig 1.
Storage of geological teaching samples in laboratory, University of Canberra, 2015
Image: Andrew Simpson

Ore suites: - There were a large number (up to 268) of ore suites or economic mineral sets. The ore suites were groups of material that may include some, or all of the following types of material preparations: hand specimens, thin sections, polished sections and polished thin sections. There was also a filing cabinet full of data that relates directly to some of the sequentially numbered ore suites.

The reason for establishing an ore suite reference set has varied during the life of the collection. Most commonly it was based on the existence of a well-known and well-understood ore body, particularly ones that demonstrate principles of ore genesis that, in the hands of an experienced tertiary education teacher, are excellent pedagogic tools (e.g. fig. 2). There were some very famous and internationally recognized suites in the collection, many of which would be expensive and difficult to replace e.g. Sudbury, Tsumeb, Paraburdoo. There were many other small, lesser known locations, particularly Australian examples that were worked by long-term mining activities and are now either irreplaceable, or would prove difficult and expensive to replace.

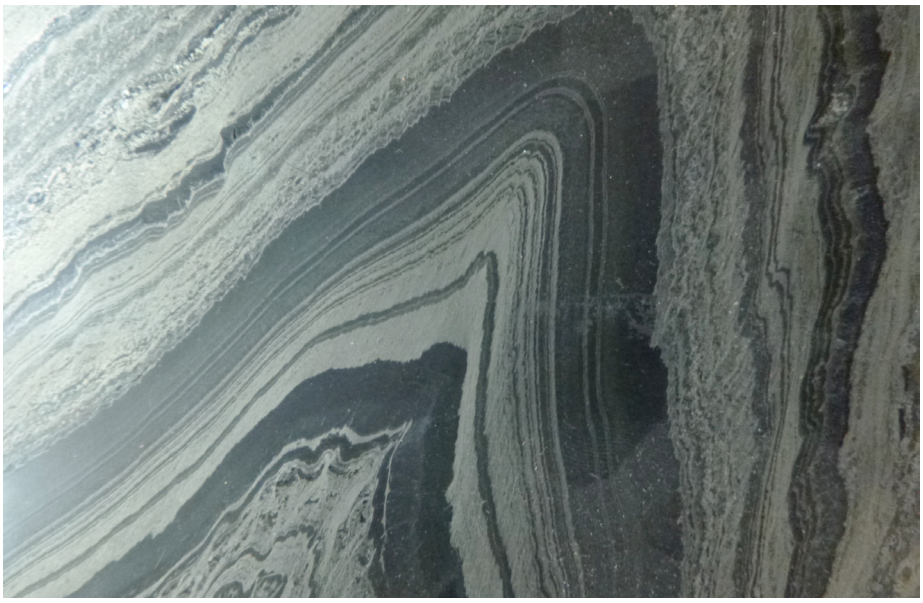

Fig. 2
Cut section of Mt Isa ore from the University of Canberra geology collection
Image: Andrew Simpson

At other times during the collection's history, sets have been compiled based on a specific geographic region or geological terrane. In some cases they have also been compiled based on mineral type, or functional utility (e.g. for specific exhibition purposes). The information about the ore suites was summarized and compiled in ring-bound folios.

Specialised teaching sets: - There was also evidence that specimens had been cycled through different specialized teaching sets during the life of the teaching program. This includes a Regional Tectonic Group (that in some cases equates closely to existing ore suites), and metamorphic, sedimentary and igneous teaching sets.

Context of the collection

The last comprehensive report on geological collections from the Australian higher education sector (SIMPSON 2003a) documented declining institutional-level support as expressed in terms of staff available for collection management. Declining demand for geology graduates left many collections under-utilised as student numbers reduced and academic programs were restructured. This trend is not apparent just in Australia but has also been observed in many other western nations (National Academy of Sciences 2002). In the absence of any national approach[1] to orphaned (or partly orphaned) collections, the future of many of these collections has been decided at an individual institutional level[2].

Data from 17 collections presented (SIMPSON 2003a, Table 1) indicated that the University of Canberra geological collection is small in comparison with that of other Australian universities (under 10,000 specimens) but comparable with those institutions that were previously Colleges of Advanced Education and were subsequently converted into universities to produce the unified Australian higher education system.

Some of the data reported by Simpson (2003a) was extracted from an earlier report on collections within the Australian higher education sector (University Museums Project Committee 1998). This attributed judgements of "significance" to some university-based collections documented in the report. Of all the former Colleges of Advanced Education geology collections documented, the University of Canberra was the only one in Australia considered to be nationally significant. This is unusual for a collection with a primary focus of industry related graduate education, but justified because of the geologic and geographic diversity of the collection.

1 A good example of a national approach to orphaned geological collections is outlined by de Clerq (2003) wherein criteria were agreed and parts of dispersed university collections were absorbed into a national reference collection.
2 In Australia these responses have been highly variable and range from transfer out of the higher education sector to a state museum through to undocumented disposals.

While it must be remembered that these attributions of significance were self-selective and preceded the development of a standardized process of significance assessment as a common museological tool (ABDUL RAHIM 2014), the context of the collection is still unique in the history of higher education in Australia. This is because it represents a specialized reference collection that reflects both the economic booms and busts of the late 20th century and the aspirations of a higher education institution that was transitioning from College to University with a strong focus on the production of graduates for Australian exploration and mining.

In considering the future of the geology collection, as with any legacy collection in higher education, it is important to align any actions with the current management and governance of material collections at the University of Canberra. The two "Cinderella Collections" reports from the 1990s (University Museum Review Committee 1996, University Museum Project Committee 1998) urged universities to develop a range of institution-wide policies for the management of material collections. There have been numerous new challenges to higher education since the 1990s and not all universities have responded with policy development. Simpson (2012b) devised a four-tier system for describing governance arrangements for university museums and collections. The University of Canberra's geology collections are best described as ungoverned. This is a common scenario for scientific collections that have lost relevance because of changes in Australian higher education.

Any future consideration or proposals for alternative plans for the collection should also be mindful of the geographic and institutional context. There are two other major geology collections in the Australian Capital Territory (ACT), those of the Australian National University and Geoscience Australia. Both of these organisations are enabled by national or commonwealth government legislation, whereas the University of Canberra is a controlled entity under local territory (equivalent of state) legislation. Although the University of Canberra's geology collection is global in coverage, it is also important to remember that there is neither a museum of natural history in the Australian Capital Territory, nor any national natural history museum in Australia.

Information Management

The information management system for the University of Canberra geology collection is pre-digital. Data is stored on individual card files held in metal filing draws (fig 3). Each specimen was given an accession number (AN) which is recorded with basic information on a card. Accession numbers were allocated sequentially, sometimes the date and collector are included, but not as a standard acquisition procedure.

Fig. 3
Card catalogue storage for data on University of Canberra's geology collection, 2015
Image: Andrew Simpson

The use of specimens in different teaching sets is also recorded on some, but not all cards. The card file system of accession data is augmented, and can be cross-referenced, in a number of ways. There is another card file system that records specimen types, a folio file that records ore suites/economic geology sets and, located in a building basement with many of the specimen sets, was a filing cabinet with associated data about the collection.

Filing cabinet information about the ore suite sets included published papers, field notes, maps, assay data, mine plans and, in some cases, unpublished notes. Many similar card file systems from collections of this era also included a locality file, but one was not identified in the University of Canberra's system and not all of the data captured in the various filing systems relates the specimens to recognized geological formations. Nevertheless, the dispersed specimen information through a range of paper-based systems is essentially robust and allows for cross-checking specimen data in a number of ways.

An example is given here. Rodingite is a massive, dense, buff to pink rock that is typically rich in grossular garnet and calcic pyroxene, that is enveloped in serpentinite. Specimen no., 2209 is a rodingite from Wagga Wagga, NSW, it is recorded in the accession number card file system, the rock-type card file system and as specimen no. 5 of ore suite 114. The card files and folio documents also record when hand specimens (HS) have been made into thin sections (TS), polished sections (PS) or polished thin sections (PTS), these are three different technical preparations for the study of geological material. It is important to remember that some specimens may only be present as preparations and there may be none of the original specimen, as collected from the field, remaining as a hand specimen in the collection.

This form of card file and paper-based information management is highly vulnerable. Disposal of material like this is common-place in universities. Decisions to dispose can often be taken by administrative units without knowledge of the significant loss of information that will ensue. This is particularly a problem in collections that are essentially ungoverned (SIMPSON 2012a). Urgent attention is needed to recreate the card file data in digital form.

Significance assessment

The significance statement below has been developed according to the principles outlined in the introduction. The cultural significance is the sum of the qualities, or values, that the collection has.
In considering a sense of place, Article 1.2 of the Burra Charter includes the five values: aesthetic, historic, scientific, social and spiritual. For the purposes of this report the criteria used in the analogous document for objects and collections, Significance 2.0 (RUSSELL & WINKWORTH 2009), consists of general statements against the following criteria:

1. Historic
2. Artistic or aesthetic
3. Scientific or research potential
4. Social or spiritual

In undertaking a significance assessment it is important to recognize that the process is iterative and progressively incremental. The notes on significance criteria presented below only cover the 2015 investigation into the nature of the collection plus some additional desk research. The additional research allowed some initial contextualization and comparison with other Australian university geological collections from previously published (e.g. SIMPSON 2001, 2003a&b) and unpublished data.

As a continuing process, significance assessment involves analyzing an item or collection, researching its history, provenance and context, comparison with similar items, understanding its values by reference to the criteria and summarising its meanings and values in the statement of significance

Historic

The geological collection of the University of Canberra is material evidence that represents almost 50 years of academic endeavor at an established and nationally recognized Australian higher education institution in the discipline of Earth Sciences (Field of Research Code 0403 – Australian Bureau of Statistics 2008). As such it represents an impetus to prepare graduates for the workforce over an extensive period of time that covers significant fluctuations in the resource-based economy at a national and global scale. Many geological programs in higher education resulted in significant teaching collections that reflect changing educational pedagogy over time including a strong historic reliance on object-based pedagogy typical of the discipline as noted by the Pigott Report (Committee of Inquiry on Museums and National Collections 1975). The collection also represents the interests (academic and general science) of the staff who established and developed the collec-

tion illustrating their changing research interests. The collection is rare among Australian academic geological collections because of the strong focus on global reference material of ore suite deposits. The nature of the information management associated with the collection is pre-digital and therefore of historic value. It represents the standard way collection information was handled through a series of card files during periods prior to the 1980s. It was the most common way of recording data in specialized university collections. Many of these collections are no longer in the higher education system for a variety of reasons, or the associated collection data has been converted into digital forms.

Artistic or aesthetic

The qualities of this collection of geological specimens includes those that have well-developed crystal faces with crystal symmetry and aesthetically pleasing colour and lustre. Aesthetic qualities of mineral specimens that demonstrate rare beauty are strongly sought by an international community of collectors. Such collectible qualities would only be attributed to a small percentage (around 2%) of the University of Canberra geological collection. This is a common situation for most academic teaching collections.

Fossils specimens also attract the interest of collectors, some fossils were discovered but they did not form a significant part of this investigation and are not included in this analysis.

Scientific or research potential

The collection of ore suites has a high scientific and educational value because they are pedagogic tools that exemplify the highly diverse pathways of ore genesis. They are therefore invaluable as practical aids for teaching advanced ore geology in the hands of seasoned tertiary educators with significantly high levels of understanding of economic geology, a subject that was previously more widely supported by Australian Higher Education institutions. They are also of value in teaching elementary geology and mineral economics, these two fields have also seen a relative decline in Australian Higher Education in recent years with a concomitant decline in resources to manage legacy collections from former teaching programs (SIMPSON 2003a).

Their scientific significance is greatly enhanced by the comprehensive nature in terms of the range of ore geochemistry represented and the diversity and global scale of geographic representation in the collection. Because of the historic nature of the collection, a number of specimens are from localities that are either extinguished (mined out), or inaccessible because of geopolitical changes. While specimens from these types of localities remain in circulation among collectors and institutions, it can be increasingly difficult to find replacement material.

The existence of the collection, even if only as a resource for reference and comparison, also represents a platform of the science undertaken at the University of Canberra. No metrics of research output of relevance to the collection has been undertaken in this study. It should be noted, however, that the A B Edwards Medal by the Geological Society of Australia was awarded to researchers from the institution on two occasions[3].

Social or spiritual

The social significance of the collection is found in the relationships between and among staff and students with the study of geology at the University of Canberra (and previously at the Canberra College of Advanced Education). The collection therefore represents a fundamental anchor point for many graduates and can be seen as representing their link to the host institution both geographically and temporally. Earth Science in higher education involves socialized and communal teaching methodologies and experiences such as collective laboratory work, specimen collection and fieldwork experiences. All of these can build a strong sense of institutional affiliation and connection among participants. In support of this, documents were recovered indicating the existence of a student geological association and numerous images of field work.

3 A. B. Edwards Medal by the Geological Society of Australia is awarded annually for the best paper in ore deposit geology published in the Australasian Journal of Earth Sciences. In 1993 it was won by Sylvie Marshall and in 1996 by Ken McQueen. This is reported in the Minutes of University of Canberra Council Meeting No. 56 held on Wednesday 10 November 1997.

The social significance of the collection is also represented by the fact that it was housed for many years in one room and was a focal point for both formal and informal learning[4] (Fig. 4). Other aspects of institutional identity are present as the material that comprises the University's Foundation Stone is represented in the collection.

Fig. 4
Image of the former "museum" room from when there was an active geology program at the Canberra College of Advanced Education. This is now used as a meeting room
Source of image is unknown

This is supported by the fact that many specimens from the local region are present in the collection and the variety of specimen types is diverse. The Canberra region consists of hilly, upland terrain consisting of a Palaeozoic bedrock (Ordovician and Silurian) sediments, volcanics, volcaniclastics and intrusives. This represents a sequence of emerging deep water sediments that have been complexly folded and faulted and in places metamorphosed. This leads to a significant variety of geological formations in the Australian Capital Territory and surrounding districts, much of this is reflected in the geology collections of the University of Canberra. Apart from including material from Paddy's River, the only mining operation within the Australian Capital Territory, it also includes gossan specimens from the campus itself. It is rare for any higher education campus in Australia to have evidence of mineralization within its grounds[5].

Discussion

Collection data that is controlled entirely by card systems and other paper-based methods with no back-up is highly vulnerable. Converting it into a digital information system is needed to provide collection data sustainability and build value that could help connect the collection to new audiences. In a university context this task should be guided by any information management and/or asset management requirements and policies. In the absence of any such policies, the data should be incorporated into a series of standard spreadsheets that can be converted at a later date into most commonly used museum and collection databases. The University of Canberra has no standardized approach for campus museums and collections and no externally facing policy or guideline documents that could facilitate improved information management.

The process of converting information into a digital form would also be an opportunity to undertake a more complete audit of what remains of the collection at the University of Canberra. While a full audit will not necessarily reveal all the material that originally made up the collections, the process would give as complete a record of the collection as possible. Given the nature of the collection, there is an opportunity, using the ore suites, to build a global reference set that would be of value to researchers and advanced geology students. While digital conversion and a full audit would build value for the collection and will give the University of Canberra a useful resource, it still requires an investment of resources and time by the university.

4 Interview with Professor Ken McQueen, long term staff member, Feb 2, 2015. With the discontinuance of a course in geology the room, once a small teaching museum, is now used for staff meetings and the specimens not deployed in service teaching are in storage in a number of different locations on campus.
5 The University of Queensland has for many years run an experimental mine for the training of mining engineers. This however is not located on the original campus at St Lucia.

As this hasn't occurred as yet, it is obvious that attempting to extract maximum benefit from a legacy collection such as this is not perceived as a current priority by the institution's leadership. Imaging all the specimens in the collection should be undertaken as part of a full audit. While this is time intensive work, many museums have successful digital volunteers programs that undertake similar work. These should be investigated to produce a model that suites image capture at the University of Canberra. This work, in combination with data entry, under supervision could be a valuable student experience in the university's museum studies program as both represent standard museum practice.

At the time of this investigation (2015) the collection was dispersed in a number of buildings that had multiple uses. Secure housing should be found for the collection if further work is to be carried out. The many pressures on building spaces in the modern university make this situation understandable, nevertheless, failure to provide secure housing places the collection at a long-term, low level risk particularly for one that is essentially ungoverned and in an institutional setting without guidelines or policy.

Devising a future for the geology collections at the University of Canberra is dependent on the support of the current faculty and university executive. The university needs to consider if it wants to develop a relevant cultural policy covering material collections on campus as is the situation in some other Australian universities. There is an opportunity here for the university and the faculty to show good stewardship of a significant collections by actively planning a future for it (and other University of Canberra) collections. Good stewardship can still be demonstrated even if it is decided that the collection is no longer seen as a relevant part of the institution (REYNOLDS et al. 2000).

To make the collection of value to researchers and advanced students in the future, the data needs to be checked to upgrade all information to currently accepted geological nomenclature. The great advantage in having a digital system is upgrading data when units are renamed or reclassified is an easy process. Specimen data needs to be aligned with current geological units through Geoscience Australia (for Australian materials) or other geological information agencies. Specimens also should be linked to online mapping resources. Consultation with information agencies and specialist geological expertise would obviously be needed for this task.

Although the ore suites appear to have had primary purpose as reference material, there were obviously a body of staff and students who were research active. Analysis of research outputs in the form of theses and publications should indicate the value of the collection in the past as a general reference resource. As noted above, University of Canberra geological research has won some awards. A university collection that has supported research carried out in the institution's name is of greater value than one that has not. A university should invest in the material results of intellectual advances undertaken in the university's name (Australian Research Council Evaluation Program 1995) through resourcing collection management as research infrastructure. Archival data from the geology program should be available to provide some insights into these questions.

This study identified a large amount of diverse material from the Australian Capital Territory and the surrounding region. Because there is no natural history museum or centralized collection within the territory, there is valuable social and educational context that can be built around this material as a mechanism for community engagement (SIMPSON et al. 2005). Support could be enlisted to develop a number of off campus displays and educational resources for community engagement.

Images recovered from a filing cabinet during the investigation indicate the previous existence of a very active and engaged geological student society during the various mining booms that probably implies consequentially large relative enrolments in geoscience programs at the former College of Advanced Education. Archival material relating to this student group should be sourced and researched. Many of the University of Canberra former geology graduates could have moved on to successful industry careers. These alumni need re-engagement with the university. In the face of declining public support for higher education, private philanthropy is becoming an increasingly important financial source. Links between former geology students and the ESTEM faculty can be built through social media, functions, exhibitions and other forms of community outreach.

We believe this case study demonstrates the value of applying a significance assessment process to university collections. It requires the institutional contextualization of collections and testing their value propositions against changing institutional priorities. It has been noted that the uses of material collections in a higher education setting can change significantly with changing pedago-

gies and research questions. What was once of value to the front-line of institutional enterprise can be quickly overlooked and forgotten (MEADOW 2010). But the material collections themselves are an embodiment of institutional history and heritage and a creative university leadership team in association with staff and students can always find innovative ways to put legacy collections to work in support of the university's tripartite mission of teaching, research and engagement. We would recommend the development of statements of significance for every university collection.

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Key Words

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