
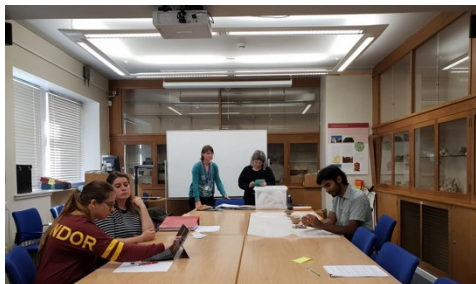


Section A		
Institution: University of St Andrews		
Unit of Assessment: UoA29: Classics		
Title of case study: Archaeological resources enhancing education and well-being: Through a Glass Darkly (<i>TAGD</i>)		
Period when the underpinning research was undertaken: 2009 - 2018		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Rebecca Sweetman	Role(s) (e.g. job title): Professor	Period(s) employed by submitting HEI: 01 September 2003 - present
Period when the claimed impact occurred: 2015 - 31 December 2020		
Is this case study continued from a case study submitted in 2014? No		
Section B		
1. Summary of the impact		
<p>As resources for education, cultural and creative arts dwindle, it is becoming increasingly important for academics and practitioners to make existing assets available in a range of interactive ways. Sweetman and her team introduced hands-on experiences with archaeological artefacts into various Scottish communities (12 primary schools totalling over 1,000 people (children), 2 marginalized groups and 7 prison visits as part of Cellblock Science). They have achieved key outcomes such as improvements in literacy, self-worth and confidence in their participants. For example, after the literacy and archaeology sessions at a local primary school, the teacher noted a 63% rise in the students' (aged 8-9) confidence, measured through frequency of speaking in class. The team have ensured that hands-on experiences continue through Continuing Professional Development sessions (3 were undertaken before Covid) and the creation of loan boxes of archaeological material (for use in schools in Fife and Tayside, Scotland) and lesson plans (this is being developed for on-line use since Covid). Furthermore, their research has resulted in changes in attitudes and associated practices in heritage (museums) and creative art (poetry and pottery) sectors locally, nationally and internationally. Sweetman and her team have trained heritage professionals ranging from US military cultural advisers, to museums, such as the Te Papa in New Zealand and the Scottish Maritime Museum (12 people). They have presented and demonstrated their work to some 960 people (museum and museum-related professionals). They have also inspired 29 people (poets and potters) through workshops with the Bridges collection. 4 'artefact' poems have been commissioned. These changes are sustained through the creation of 131 virtual artefacts and 'how to' guides which are freely available online via the project website (https://thebridgescollection.com/about/) and through the Institute of Conservation Newsletter.</p>		
2. Underpinning research		
1. Modes of engagement with archaeological material		
<p>Over the last 15 years, Sweetman's research has made significant gains in increasing the pedagogical potential of virtual reconstructions. Most recently, she has focused on the value of digital archaeology for accessibility and interpretation, thereby raising awareness of the facts that digital reconstructions are not necessarily useful for understanding and retaining information contrary to perceived ideas. Moreover, her research found that a variety of sensory engagements, in particular touch, enabled an enhanced understanding of material culture and associated context, while stimulating wellbeing and enjoyment.</p> <p>These results came from a series of collaborative experiments (Through a Glass Darkly, <i>TAGD</i>), between April 2016 and October 2018, using the Bridges Collection of just under 200 physical artefacts dating from the Bronze Age to Byzantine period. It is on display in the School of Classics at the University of St Andrews. The first experiments tested perceptions of material culture using different sensory engagements: visually from behind a glass case; virtually-visually via 3D digital</p>		

reconstructions; haptically (within sensory boxes); and, finally, by simultaneous haptic and visual experience (handling). The results were unequivocal. Objects that were only viewed and not touched were deemed 'art' rather than artefact. Those that enabled interaction through touch were more likely to be considered artefact (R1), thereby encouraging more considerations of the people who made and used the object.

In a second collaboration with neuroscience, the team tested memory recall using three of the sensory experiences. The 2018 experiments showed that touch led to a heightened ability to recall information about the object, while 3D and viewing were about the same (R2).

2. Accessibility of archaeological material



The work above has shown that virtual, visual and haptic modes of experience have different effects on users' cognition, inspiration and memory retention. To date, however, there has been little empirical testing on the effect/s resulting from different forms of experiencing objects. The TAGD team have taken their research into the community to show how engagement with material culture contributes to overall wellbeing. They are helping to inform teachers, museum specialists and professionals of its

value. This work builds on Sweetman's long-term interdisciplinary and collaborative projects geared to making archaeological material and its interpretation accessible to wide audiences. Examples of this include St Andrews Cathedral and the Sparta Basilica (based on her excavations, R3 & R4), as well as the creation of a virtual excavation (R5) and the Virtual App of Mediaeval St Andrews (R6).

3. References to the research

All of these publications have been submitted to REF as outputs and/or appeared in peer-reviewed publications by recognised academic presses.

R1. Sweetman, R. J. and Hadfield, A., 2018. "Artefact or art? Perceiving objects via object viewing, object-handling, and virtual reality". *University Museums and Collections Journal* 10, 46-66. <http://umac.icom.museum/resources/umac-publications/conference-proceedings/>

R2. Sweetman, R. J., Hadfield, A. and O'Connor, A., 2020. "Material culture, museums and memory: experiments in visitor recall and memory". *Visitor Studies*, 23:1, 18-45. DOI: [10.1080/10645578.2020.1731671](https://doi.org/10.1080/10645578.2020.1731671)

R3. Sweetman, R., 2009. "Acropolis Basilica, Sparta: the broader research issues". *Proceedings of the International Conference Sparta and Laconia From Prehistory to PreModern*, Cavanagh, W. G., Gallou, C. & Georgiadis, M. (eds) *British School at Athens Studies* (2009), 331-43. Sparta, 17-20 March 2005. ISBN: [978-0-904887-61-7](https://www.isbn-international.org/product/9780904887617)

R4. Allison, C., Getchell, K., Miller, A., and Sweetman, R. (2009), "Exploring the second life of a Byzantine Basilica", in: Petrovic, O., and Brand, A. (eds) *Serious games on the move* (New York), 165-80. http://link.springer.com/chapter/10.1007%2F978-3-211-09418-1_11

R5. Allison, C., Getchell, K., Miller, A., Nicoll, R., and Sweetman, R. (2010), 'Games, methodologies and immersive environments for virtual fieldwork', in *IEEE Transactions on Learning Technologies*: 281-93. DOI: [10.1109/TLT.2010.25](https://doi.org/10.1109/TLT.2010.25)

R6. Kennedy, S., Dow, L., Oliver, I. A., Sweetman, R. J., Miller, A. H. D., Campbell, A., Davies, C. J., McCaffery, J. P., Allison, C., Green, D., Luxford, J. M. & Fawcett, R. "Living history with Open Virtual Worlds: Reconstructing St Andrews Cathedral as a stage for historic narrative", *Proceedings of the 2nd European Immersive Education Summit*: in: Gardner, M., Garnier, F. & Kloos, C. D. (eds.). Madrid, Spain: Universidad Carlos III de Madrid, Departamento de Ingeniería Telemática, (2012) p. 146-160 (E-iED). ISBN: 978-84-695-6427-1

4. Details of the impact

Drawing on their research into archaeological reconstruction and tactile experience with artefacts, Sweetman and her team have achieved improvements in literacy, self-worth and confidence among 12 schools, 2 groups of dementia patients, 1 mental health group and 2 Scottish prisons. This work continues through ongoing Continuing Professional Development (CPD) sessions, the lending of archaeological loan-boxes, the distribution of lesson plans and the sharing of material (e.g. <https://www.scottishlearninggroup.com/what-we-ve-done-so-far/categories/case-studies>). In

addition, Sweetman's work has led to changes in attitudes and practices in the heritage and creative arts sectors, for 3 museums, 74 people: 1 military adviser, 1 museum software developer, 2 poets and their classes of 31 attendees, and 2 potters and their classes of 37 attendees. Sweetman and her team have also given regular showcases in museum meetings in Tayside, Fife, and the rest of the UK, with total attendees at these events amounting to 960 people (museum and museum-related professionals).

1. Transforming Educational Practice through Engagement with Material Culture

Work done by Sweetman's research group (TAGD) shows sensory engagement with artefacts encourages creative thinking and confidence to promote reading and writing. In 'literacy workshops' at 6 primary schools, the practice of 'reading objects' (haptically and visually) was seen to promote children's understanding of narrative. By allowing children a choice in how they explored the objects, the workshops were said to motivate and empower the children in their literacy (S1).

After an all-day workshop on archaeology and literacy on the 31 May 2019, with 119 people (pupils), one teacher commented, "*I don't think the children felt like it was 'literacy' as they know it and they enjoyed language in a different way.*" (S1, p. 9)

The work on engagement with material and literacy has involved over 1,000 people (children) over a period of 4 years, with an intensive 3-month period from November 2019 to February 2020, whereby the children involved benefited directly or through CPD training and the creation of resources such as the loan boxes of replicas. This loan box provides lesson plans, props and replicas of archaeological artefacts to be used in promotion of literacy based on our studies.

Typical comments from the 25 people (teachers) in 10 primary schools in Fife involved with the work are: "*It gave me practical ideas to the curricular areas above [i.e. linking 'literacy and drama to social subjects (people in the past)']*" and "*Have come away with practical steps to implement sensory elements in my practice*" (Teacher CPD Development 15/11/19) (S1).

Primary 5 Teacher at Lawhead Primary School, Fife (10/9/20) follows up: "*It has given me new teaching ideas, especially the cross curricular aspect and the value of resources towards pupil engagement.*" (S1, p. 1) The sessions also impacted on 'extending the idea of literacy' and not just 'being focused on reading and writing' (Learning Support Teacher Cannongate Primary School, St Andrews, Fife 7/2/20) (S1, p. 7).

After the literacy and archaeology sessions, childcare practitioners in Lawhead Primary School noted the children were "*cooperating well, better than usual*" and there was increased participation even by "*those who don't often participate in group activities*" (S1, p. 4-5).

2. Improving learning & wellbeing of prisoners in two Scottish prisons and of dementia patients in Fife



Between July 2018 and December 2019 TAGD undertook 8 workshops in two prisons in Perth, Scotland with 50 people (prisoners) for their education and wellbeing (this work has been on hold since Covid) (S2, esp. pp. 4-5). Following handling sessions and discussions of technology and engagement with their archaeology and literacy programme, 92% of the 38 prisoners surveyed recorded that, as a result of the engagement, they felt 'good' and 'privileged' (S10, pp. 1, 7, 9, 11, 12) and that the activities made them feel 'smart' and 'informed' (S10, p 6, 13, 15, 16).

A key result of the research on sensory engagement has been the development of work with dementia patients. The project has engaged with Fife Museums forum (15 people (museum professionals)) to promote haptic and visual experience of unfamiliar artefacts as a beneficial practice in care for early and middle stage dementia sufferers. The project kicked off with St Andrews Memory Café (February 2020), a support group for patients and families, to launch the programme of work with 12 people (dementia patients and carers). Although this part of our project has been severely disrupted due to Covid, we have been taking it forward by initiating a collaboration with Fife and Tayside libraries, to provide well-being opportunities for dementia patients and their carers through engagement with unfamiliar objects from the Bridges collection.

3. Delivering training to shape material culture and heritage practices

Building on her virtual reconstruction research (R4, R5 and R6), Sweetman converted 131 3D objects from the Bridges Collection into online reconstructions using Sketchfab, the free to use digital platform used by Museum and publishing professionals. The virtual Bridges Collection has had 9,100 views since its launch in 2017. In addition, between October 2016 and August 2020, Sweetman and team have delivered 29 separate events aimed at museum, gallery and heritage professionals. These include hands-on workshops, individual meetings, and presentations given at museum and heritage sector conferences, with a total of 968 people (participants). Altogether, the dissemination work and provision of models on Sketchfab has resulted in at least 5 people (museum professionals) employing TAGD's digitisation training in their work (S3, S4 & S5).

One example is the Assistant Professor-Strategy & Entrepreneurship, Innovation Lab (Citadel Military College, North Carolina, USA), who has trained around 40 people (US military personnel) in recording material culture (since 2018). The Assistant Professor-Strategy & Entrepreneurship spent two weeks at the Bridges Collection in 2017 and again in 2018, to experience 3D digitisation of archaeological artefacts directly. The TAGD team trained the Assistant Professor in safe artefact handling and basic identification as well as in the importance of preservation of archaeological material, which was reported by STV and shown on news bulletins in January 2018 reaching 1,500,000 people (viewers). (S3).

As a result of TAGD's training, and subsequent work in training others, the Assistant Professor-Strategy & Entrepreneurship is now collaborating with 6 people (their students), with the newly launched Smithsonian Cultural Rescue Initiative. This works in tandem with the US military to scan and preserve at-risk archaeological material. *"This last year, the Department of Defence reauthorized the formation of this unit [Smithsonian Cultural Rescue Initiative] and I was selected as one of the pilot study participants largely due to the work we accomplished through the Bridges collection"* (S3, January 2020).

TAGD also provided 3D artefacts and advised the JIX team who developed a Touch Tank, a haptic experience of 3D artefacts, as part of MAHUKI (the Te Papa Museum Innovation accelerator programme) 2018 (New Zealand) (S4).



The Founder and Design Technologist of JIX said TAGD *"gave us significant historical background of the objects and how they handle them with utmost care. This inspired the way we made the collections accessible in the MAHUKI Showcase which otherwise wouldn't have been possible"*. And *"We have found gallons of interest in emulating this project for several other museums. They want to use similar technologies to give access to various other institutions which haven't been traditionally accessible"* (S4, pp. 1-2). JIX have now gone on to develop their technology to use during the Covid pandemic in Christchurch International Airport. Commercial bodies such as Christchurch Casino and Te Pae Convention Centre have showed further interest in creating *"touchless interfaces to combat physical hygiene concerns that have risen in using public touch screen kiosks"* (S4, p. 3).

Sweetman's team have been disseminating good practice (S3-S6) by working closely with colleagues to provide advice on scanning. One colleague, Curator of the Scottish Maritime Museum, called the team's advice *"a crucial influence on our writing the successful funding application to Museums Galleries Scotland - the Creating 3D Models Quick Guide was a great starting point for us non-experts and gave us the confidence to write the bid for the project"* (S5, p. 3).

The underpinning research (R1 & R2) has informed museum curatorship and management on the value of multi-sensory engagement opportunities at Fife and Tayside Museums (Scotland), the Te Papa Museum (New Zealand), Maritime Museum, Ayrshire (Scotland), and the Fisheries Museum, Fife (Scotland) (S5, P1-2): *"My goals in collaboration with the TAGD team were to experiment with*

different methods of interpretation for existing materials in a museum gallery, and to create an effective, interactive display to enhance one of our galleries. These goals have been met – we have decided to create a multi-sensory display in the gallery.” Curator, Fisheries Museum 23/01/20. (S5, p. 1)

Sweetman produced a *Quick Guide to creating 3D models*, which is available on the project website for free download. This guide was also shared by Routledge’s Journal Editor, in the [member newsletter](#) (S6 p. 20) of the International Institute for Conservation with 1,800 views of the website announcement, linking to the guide, and the Institute of Conservation’s [news blog](#). The IIC newsletter is distributed in print and online to their approximately 1,500 people (members). (S5, p. 3, S6)

The National Museum of Scotland included *TAGD* as a case study at the launch of their National Strategy (October 2017) and our work has been highlighted as best practice to museum professionals during the UNIVERSEUM Digital Initiatives Working Party (June 2018), and as part of Scotland’s archaeology strategy (July 2018) and of the *New Futures for Replicas* publication which provides guidance for museum and heritage <https://replicas.wordpress.stir.ac.uk/files/2020/07/NewFutureReplicas-leaflet-proof6-spreads-low-res.pdf>. *TAGD* is also promoted on the Collections Trust website (<https://collectionstrust.org.uk/blog/through-a-glass-darkly-museum-memory-and-senses/>) (S5 & S6).

4. Encouraging use of diverse media in the creative arts



Plank Figurine
Moon Mama, halo head,
how many cradles have you rocked?
How many lullabies hummed?
Time traveler, grave survivor,
tell us your riddles, your histories.
Who linked arms with you?
Clay enigma, marked with cuts,
your gold earrings missing,
what will you reveal to our touch?

Angela Topping
Inspired by plank figurine. 18/07/2019
Poems copyright: Angela Topping. Image copyright: University of St Andrews.

Through A Glass Darkly Project
www.thebridgescollection.wordpress.com
www.st-andrews.ac.uk/classics www.stanzapoetry.org/festival



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In the arts, the research on different modes of experience of artefacts was used in 2018 and 2019 as the inspiration for creative writing workshops at StAnza, the annual St Andrews poetry festival with 31 people (poets) attending and with two poets leading the sessions. Four people (poets) were commissioned to write poems inspired by the objects (S7). The session leaders encouraged different interactions with the material culture to inspire new poems and ways of writing as noted by the poetry festival director (S8, pp. 1-3). One poet wrote (9/9/20) “As soon as I was able to examine the figurine from all sides,

something clicked for me and the first line of the poem came into my head.” (S8, pp. 3-4)

Between 2017 and 2019, Two potters (A&B), have worked independently with the Bridges Collection to create replicas of the archaeology and our work has inspired their practices. “*Interacting with the collection has inspired me to further explore incorporating domestic objects into the work as a way to look at the perceived role of women in ancient and modern society. The objects have given me fresh impetus and new ideas to feed into my work.*” (S9, p. 2)

5. Sources to corroborate the impactS1. Education Sources: P5 Teacher, Lawhead Primary School (CPD & Classroom) (15/11/19 & 10/9/20); Lawhead After School Club Childcare Practitioners (13/12/19); Learning Support Teacher, Canongate PS (7/2/20); Literacy Day Teachers (31/5/19) and analysis

S2. Evaluation of Cell Block Cellblock Science Jenesys Associates 4/3/20)

S3. Assistant Professor-Strategy & Entrepreneurship, Innovation Lab. Citadel Military College, North Carolina <https://culturalrescue.si.edu/>

S4.The Founder and Design Technologist (JIX, Christchurch, New Zealand) <https://www.jix.co.nz/the-bridges-collection-1>

S5. Museum Sources: Curator, Scottish Fisheries Museum; Curator, Scottish Maritime Museum

S6. IIC Newsletter: ‘How to create a 3D model of heritage artefacts.’

S7. Poetry and Archaeology postcard publications

S8. Director, StAnza poetry festival (19/9/20) and poets’ testimonies

S9. Potters A & B

S10. Cellblock science participant feedback (Perth and Polmont)