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Effectiveness of Online Cancer Education for Nurses and Allied Health Professionals

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Table 1 Kirkpatrick Evaluation Levels

Author	Aims/ research question/s	Theoretical Framework	Intervention	Research methodology	Findings	Kirkpatrick Level
10: Doorenbos <i>et al.</i> (2010) USA	Description of the theoretical foundation, development and content of a Web-based educational intervention to improve cross-cultural communication about end of life concerns for social workers.	1) Based on 3-dimensional model of cultural congruence, 2) LEARN model.	Created web-based training called 'Culture and End - of-Life' composed of 6 interactive case studies enriched with photos and audio recordings, with focus on problem solving, interactive exercises and instruction. Content delivered in small increments with text-boxes for reflection and comparison to best-practice examples.	Sample size 21 Preliminary evaluation using a qualitative design with non-structured questions with convenience sample of 12 hospice providers. Focus group one (n=6) and two (n=7) focused on case studies while focus group 3 (n=8) reviewed all case studies and usability of the training. Analysis and coding explained	Themes: Content- generally helpful More emphasis required on communicating core hospice information; coping with communications; using interpreters; expanding the content for decision – making. Identifies key factors that influence applicability and use: Functionality; presentation; navigation.	1
11: McNally <i>et al.</i> (2012) UK	Perception and impact of a blended online module in paediatric oncology.	None	Participation in a blended online paediatric oncology module.	Phenomenology Sample size 7 Purposive samples were interviewed. Semi structured interviews lasted an hour and the participants used a reflective diary.	Participants perceived that modules had positively influenced their practice; quality of care given to patients and family; own personal development. Participants felt they gained more from the face-to-face education. Using the technology; insufficient time to complete, lack of confidence in the technology, felt isolated and disconnected.	1
12: McGuigan <i>et al.</i> (2008) UK	Evaluation of an e-learning programme specific to the care of patients with Oesophageal cancer.	None	CancerNursing.org package delivered in the surgical setting caring for Oesophageal cancer.	Nurses in 2 general surgical wards. Phase 1- survey of sample group (n=22 with 20 women and 2 men with <6 months to >20 years' experience in area) Phase 2- Delivery of web-based programme with pre- and post-testing of knowledge and skills using	E-learning can impact on practice through knowledge gain and application. Barriers to engagement include IT skills, access issues, organisational barriers, lack of protected study time.	2 b

				MCQ and vignettes (simulations) (n=9) Phase 3- focus group and individual interviews (n=8 included 6 who completed the programme and 2 who did not)	There were statistically significant increases in post-programme scores in MCQ (p< .01) and vignette (p< .01)	
13: Koczwara et al. (2010) Australia (NSW)	Development of a 7.5-hour online educational programme on palliative oncology with a focus on rural providers; process evaluation.	None	Project developed in five phases including: needs assessment (38 took part in focus groups); content development; production of material and recruitment of facilitator; program launch; program evaluation. Program content included: introductory unit; case studies; didactic presentations; resource toolkit; interactive learning; facilitator kit.	Sample size 90 Participants were requested to rate achievement of learning goals on a five-point likert scale in terms of perception of meeting learning needs – understanding, approach, pain assessment, confidence . 90 respondents- 82 (91%) indicated they partially or entirely met all learning goals. 97% indicated the program confirmed their practice or starting point for review of practice; 75% were planning to review or change their practice as a result. 98% found it easy to navigate; 96% found lectures easy to access; 99% found cases very useful; 83% found the facilitator enhanced the experience	769 users accessed the program between 1 August 2007 and 31 July 2008 (501 enrolled and 268 ad hoc). 62 completed the entire program. Researchers received a completed evaluation for 90 (18%) of those enrolled.	2a
14: Blazer et al (2012) USA	Comparison study of learning effectiveness of web based case conferencing to face to face training	1) <i>Situation learning theory.</i> 2) <i>Legitimate peripheral participation, community of practice.</i>	Intervention group (n= 52) engaged in web-based case conferencing during distance learning; the comparison group (n=44) participated in the course as originally designed. Cohort 2: intervention was the 5 web-based case conferences live or recorded and a reflective learning worksheet.	Quasi- experimental design compared pre to post knowledge, skills, and professional self-efficacy. Comparison group ran in 2009 Intervention group ran in 2010.	Both groups increased knowledge (p< 0.015) but were higher in the intervention group; skills (p<0.33) and self-efficacy (p< 0.30) were comparable between the intervention and normal group.	2 b

				96 participants. Comparison group (n =44) Intervention group (n= 52). Of the 52 participant in the intervention arm only 7 attended live webinars and 12 in the recorded webinars. 33 participated in a combination of live and recorded.		
15: Brink <i>et al.</i> (2004) USA	Pilot test project: Can 'Cancer CAM' increase knowledge, perceived communication support and communication self-efficacy amongst nurses and health educators?	Adult learning theory	Online prototype module called Cancer CAM relating to prostate cancer patient; text-based instruction, web-links, printable handouts; summary sections with key points, tips and resources	42 Registered nurses and health educators completed 1) pre and post test; 2 tailed paired t-test applied. Included: 2) demographic data 3)10 knowledge questions 4) self- efficacy questions 5) 4CAM communication support questions 6) usability 7) qualitative analysis of free-text comments	Knowledge: improved (p=.000) Self-efficacy: improved (p = .000) Communication support: improved (p = .000) Flexible access valued by professionals; some technical difficulties. Key improvement in confidence in communicating about CAM to physicians	2b
16: McLeod <i>et al.</i> (2011) Canadian	Comparison of knowledge and attitudes as a result of a Web-based course on psychosocial oncology	Social construction of knowledge	A course entitled 'Interprofessional Psychosocial Oncology: Introduction to Theory and Practice' approved by 11 Canadian universities and cancer agencies in 8 provinces. Focus on and Inter-professional collaboration. Funded by Health Canada. Graduate and continuing education version. Participants join a national cohort of learners forming small inter-professional learning groups, meeting in	293 health professionals and students took part between 2008-2010 with 158 (54%) nurses. 53 completed pre-post surveys (49%)Pre (T1) and post-course surveys (T2) were administered and a non-parametric Wilcoxon signed-rank test was used to compare changes in pre and post-course knowledge and attitudes. Post-course survey included narrative questions about learning, planned changes in practice and suggestions to improve the course. Narrative data were thematically analysed.	Authors report that the course significantly improved knowledge of other professional roles, confidence and satisfaction with interprofessional collaboration and psychosocial oncology practice.	2 b

weekly, real time, and web-
based seminars.

<p>17: Rashleigh <i>et al.</i> (2011) Canada</p>	<p>A study group led by educator's embraced telemedicine and web-based technology to enable flexibility, different locations, varied learning styles, self-direction to reach nurses across the province. Various small groups linked with a larger group.</p>	<p>1) Adult learning theory, 2) Generational learning 3) Co-operative learning underpinned the design.</p>	<p>Participants connected weekly for 16 weeks by videoconference to the Ontario Telemedicine Network. Weekly sessions included assigned pre-readings, 45 minute guest expert live conference lectures (also recorded), case studies and question and answer sessions. Also one day symposium.</p>	<p>107 participants- 65% indicated to intend to undertake the oncology certification exam. Participants from 17 health care centres and 12 provincial regions. 1)Pre-evaluation, 2) Learner demographics 3) Knowledge and confidence prior to the study group using a short mcq and based on specialist oncology competencies. 4) Post study test suggested an increase in knowledge.</p>	<p>1) Final evaluation- only 31% response. 2) Exam success rate was 94% (n=72) 3) Increased understanding of disease processes and cancer treatments 3) Increased confidence in their work.</p>	<p>2 b</p>
<p>18: Joubert <i>et al.</i> (2002b) South Africa</p>	<p>Evaluate the effect of a computer-based teaching programme on the knowledge, problem-solving skills and learning approach of student nurses in an oncological practice area.</p>	<p>Concept learning approach</p>	<p>Evaluation of online programme</p>	<p>Quasi-experimental design with convenience sample of student nurses in first and second year, including a 2 month placements in oncology: 80 nursing students accessed programme in multi-media center, and 40 during clinical placement. Pre and post-test recorded using 5 instruments: -computer-based data collection programme - Lancaster learning appraisal and course evaluation - MCQ pre and post-test - problem-solving case study pre and post test -guiding and coding form</p>	<p>Responses ranged from 82.5-100% with different outcome measures. The computer-based programme made no difference to problem-solving skills; there was no statistically significant change in learning approach; lecturer input was required with problem-solving and care planning skills.</p>	<p>3</p>

<p>19: Hall P et al (2011) Canada</p>	<p>Development of a total pain module</p>	<p>Theory: 1) Inter-professional education- 2) Engestrom activity theory and 3) Knotworking'; Illerisi's tension triangle; Petrie's idea dominance; and narrative based learning.</p>	<p>4 pilot groups (n= 6,3,6,5) 89% women 11% men Total Pain Module, 12 hours of learning over 2 weeks. Based on a fictional patient. 49 monologues across the domains of physical psychological, social and spiritual. Monologues were supplemented with videos, audiotapes and photographs. Additional tools: referencing material, electronic medical record – inter professional progress reports, discussion forum and private note pad. Learners assigned to groups – assignment is as inter-professional care plan.</p>	<p>Nursing N=5, Medical N= 7 Spiritual care n=4, Physiotherapy n= 2 Other n=2 1) Pre and post module questionnaires on Attitudes Toward health Care Teams Scale 2) Satisfaction – Likert scale Knowledge (designed for the study) 3) Survey – follow up 3 months after (devised by the team)</p>	<p>Different professionals took different routes through the module. Spiritual care focused on spiritual and social aspects; medical on the physical domain; nursing each domain equally but not in-depth. Scores doubled for identification of spiritual domain and physical domain. Explicit identification for inter- professional collaboration. 3 month follow up survey identified benefits to team work, reported sustainable value of the module with application in practice.</p>	<p>2 a</p>
<p>20: Letizia M and Jones T (2012) USA</p>	<p>Develop and deliver 3 modules</p>	<p>Transtheoretical Model (TTM) changing behaviour.</p>	<p>Community of practice based on 3 modules. Divided into three sections over 3 months and 3 modules/month.</p>	<p>99 participants 1) Pre-test and post-test of 50 questions. 2) Self-rating scores on confidence and application to change in practice. 3) Rated: achievement of each objective for each module, guest lecturers' teaching effectiveness/expertise, and current confidence in managing pain and dyspnea in patients receiving palliative care. 4) Additional items included the participant's rating of (1) effectiveness of technology in delivering information, (2) ease of accessing materials in the modules, (3) relevance</p>	<p>Characteristics of the participants Internal consistency of a 50 item post test Cronbach's coefficient (.81), Kuder Richardson 20 (.79). Item difficulty scores Low .657 to high .9990. Pre and posttest comparison t test analysis indicates significant learning gains among participants. Programme evaluation extraordinary positive. Confidence levels were reported as increased by 83.6% and 92.7% participants indicated that</p>	<p>3</p>

				of the content to NP practice, (4) benefit of participation on the discussion board to NP practice, and (5) change in NP practice resulting from learning/understanding the content.	they had changed their practice.	
22: Moore et al (2012) UK	Evaluate an academic module on the management of mesothelioma for health care professionals; skills knowledge and confidence indirectly/ directly enhancing quality of services and improve patient care.	None	Module development and delivery.	First level analysis – module evaluation Second level of analysis – impact measured after a year from the course completion. 26 students.	First level analysis - Students reported increase in knowledge, understanding and confidence. Stating that they favoured the content, networking and learning methods. Response rate was 88%/ 67% Second level analysis – 47% response rate. With 87.5% stating that they had increased confidence; 75 % positive impact on practice and 37.5% developed a wider network of support with 25% stating that it had helped them develop initiatives in their clinical area.	3
23: Kinghorn (2005) UK	Descriptive evaluation of an online delivery of ‘The management of cancer: psychological perspectives.	None	Module on an MSc in Clinical Oncology/Palliative Care, run over 16 weeks validated through University of Newcastle. The group were invited to identify ground rules for the discussions, had access to course materials on Blackboard 6, including 21 full-text articles and 15 weblinks; learning activities were based on work-based	Sample size 23 Evaluation completed by 23 of the 29 staff who undertook the module included: number of hits to each part of the VLE; and 25% completed the module evaluation.	318 contributions to discussion; discussion board as most popular with 73.5% of hits attributed to this. Authors concluded that staff need support with e-learning; vigilance of moderator important so unburdening comments are picked up; work-based activities were useful	1

			learning approach including reflection, application of psychosocial frameworks, consideration of best practice, discussion boards, email and assignment submitted to module leader.			
24: Faiman (2011) USA	To educate oncology nurses about the latest treatments and strategies for optimal side-effect management for patients with multiple myeloma (MM).	None	Multiple Myeloma Mentorship Program, linked nurses and educators with a MM expert mentor to design a curriculum to address unmet educational needs. Modules in various formats including Web-based with live webcasts to review progress and answer questions.	Sample size 75 Mentees ranged from novices to experienced educators: 25 expert nurses from 23 cancer centers partnered with 50 nurses and nurse educators from 49 institutions. Mentors compiled anonymised feedback from the webcasts at midyear and end of programme.	Emergent themes identified: preference of learning format; technological challenges with accessing Web-based programs; time challenges to complete Web-based or live programmes; implementation of practices; content ; communication between mentors and mentees; cost-effectiveness of Web-based learning format.	1
25: Chapman and Oultram (2008) Australian	To investigate the effectiveness of e learning compared with the traditional face-to-face methods of education for an in-service educational project for radiation therapists.	1) Adult learning principles and 2) Learner-centred approach	Previously didactic, reading and interactive orientation and planning modules transformed into an e-learning format using Knowledge Presenter authoring software; delivering the same content and activities.	2 cohorts of radiation therapists during intern year after graduation. Evaluation part of a year assessment of interns; assessment completed every 6 weeks. Resource utilization was measured using: - Face-to-face hours spent by the supervisors with interns - Phone calls by interns to seek assistance Data retrieved from a quality assurance system recording daily statistics for clinical educators. Descriptive statistics: median and range	Median hours of face-to-face: E-learning group: 4.5 (range 3.00-6.50) Face to face group: 28.13 (range 9.70-42.00) Median number of phone calls: E-learning group: 0 (range 0-6) Conventional group: 8 (range 2-18) Significant different in face-to-face contact between intern and supervisor (Z = -2.46, P = .14) but not in number of phone calls (Z = -1.50, P = .13).	1

				reported; and non-parametric analysis (Mann-Whitney U-test) to compare face-to-face with e-learning.	Authors suggested that e-learning programmes may free up education time.	
26: Smith and Gordon (2009) UK (Scotland)	A pilot process evaluation- how can competencies and a competency model help educates and guide practitioners?	Course based on a 4 level competency framework for spirituality and adult learning theory delivered on Moodle.	Three focus groups held to determine level and content: 4 themes- self-awareness, communication skills, theoretical knowledge, and professional role. Blended face-to-face (one day) and online activities over 5 weeks; including discussion boards, video clip, self-assessment of competency, case study and reflection.	12 participants; 4 withdrew early and another 4 did not complete. Evaluation included: technical and administrative issues; content and timing of learning activities on face to face day; Moodle activities; access to VLE; navigation of course site and course layout Final reflections at 7 weeks.	Fairly brief descriptive findings. A few had initial technical difficulties; and 2 had anxieties about lack of technical skills. Paper reports narrative data on participants comments collated from end of day discussion which appeared generally positive.	1
27: Arenella et al. (2010) USA	Evaluation to assess the effectiveness of a pilot partnership with Medscape to disseminate a portion of an Education in Palliative and End-of-Life Care for Oncology curriculum.	None	Activity consisted of 10 Web pages including text, graphics, streaming video clips related to preparing for end of life. Printer-friendly downloads. Activity on Medscape Palliative Care Resource Centre.	Sample size 869 Descriptive evaluation using 1) post-activity evaluation surveys posted routinely by Medscape, on user feedback between August 2006 and March 2007.	109,283 unique users and 20,061 earned continuing education credit for completion. Third were doctors and two thirds were nurses from different specialities. 869 responses from participants Table of results suggest they were scored from 1-5 (strongly disagree to strongly agree) with 5 questions: Activity supported learning (mean score 4.62) Organised material (mean score 4.60) Impact on practice (mean score 4.41) Objective material free from bias (mean score 4.59)	2 a

					Recommend to others (mean score 4.60)	
28: Ellman M S et al (2012) USA	Does Inter-professional education work in an online format: How do students from different professions interact with the educational content?	None	Online module format with content on spiritual/ cultural care. Length approximately 30 – 45 minutes long.	50 post graduate nurses The methodology was free text analysis and a questionnaire	The findings suggest that there were differences in reflection on and within the different professions in the online environment. Nursing students found it significantly helpful yet medical students found it least helpful.	1
29:Fenton G (2014) UK	Does the digital learning object of a service user increase awareness, knowledge and satisfaction?	None	Digital learning object	Sample size 40 Review instrument: Acceptability Content quality Motivation Design interaction Reusability learning and reflection	Findings presented in a table format with either agree / Neither /disagree statements for 8 questions. With free text comments for each question. Written comments were grouped into three themes 'Valuing the patients' perspective' 'the nurses' skill' and the 'Learning object'. Nursing students reported that this was a useful addition to their learning and could be accessed through out the module. Giving an insight into the patient journey.	1
30: Trocky et al. (2011) USA (Baltimore)	Article describes the development and implementation of the Web-based modules, review outcomes and discuss potential implications.	None	Breast cancer experts and external consultants developed 7 Web-based educational modules to supplement a full curriculum of a baccalaureate degree program: epidemiology, risk, screening, staging and grading, treatment, survivorship, disparities. Each module has pre-test MCQ and links to other modules and contains some	Sample size 32 An Entry-level curriculum committee evaluated the modules which were integrated into an undergraduate course on women's health, hosted on Blackboard. They were a course requirement and students received a certificate as evidence of completion.	32 students successfully completed the modules during 2007. Formative feedback using a standard course evaluation questionnaire: 'high degree of acceptance of the modules' No issues with accessing materials p values reported relating to difficulties with the	1

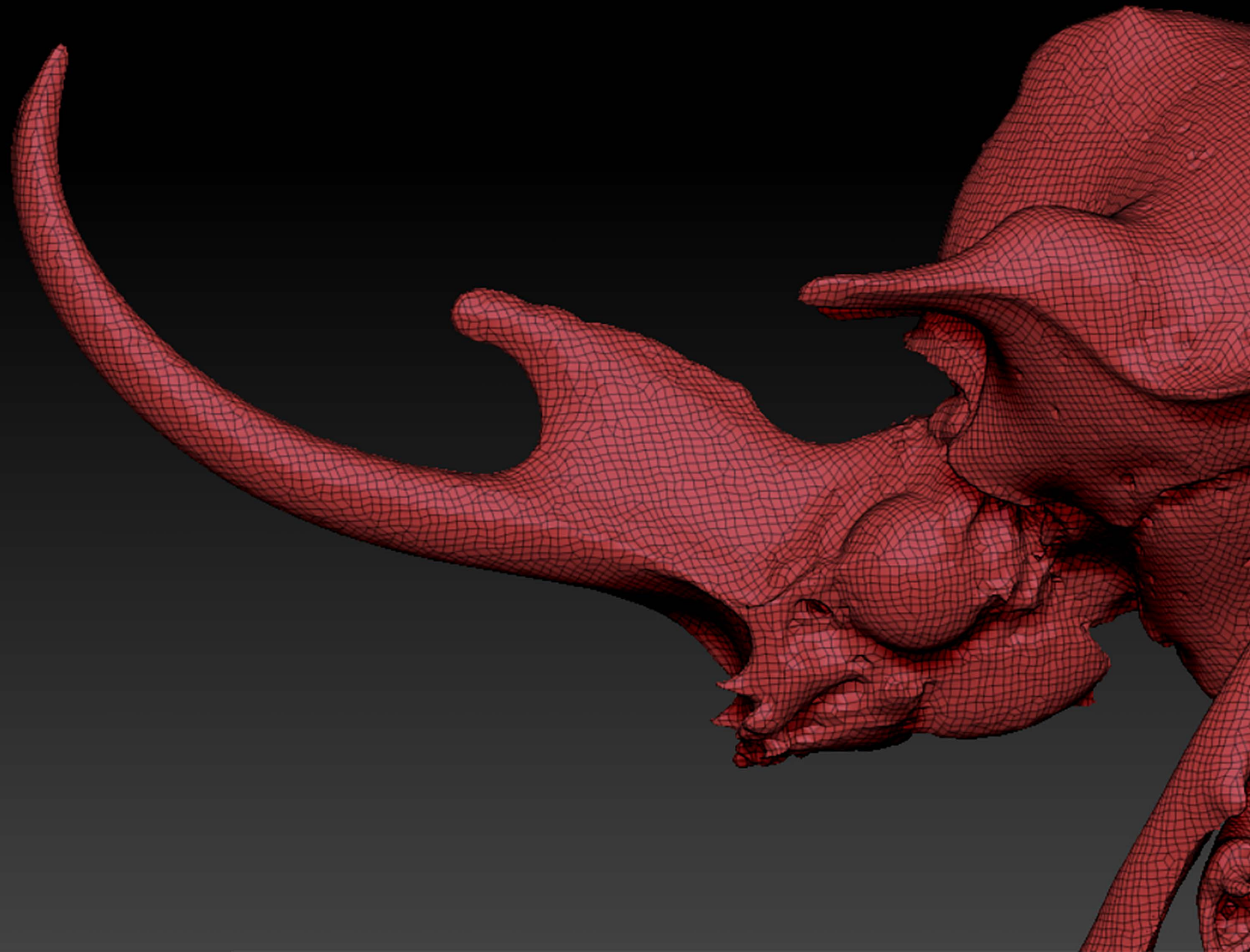
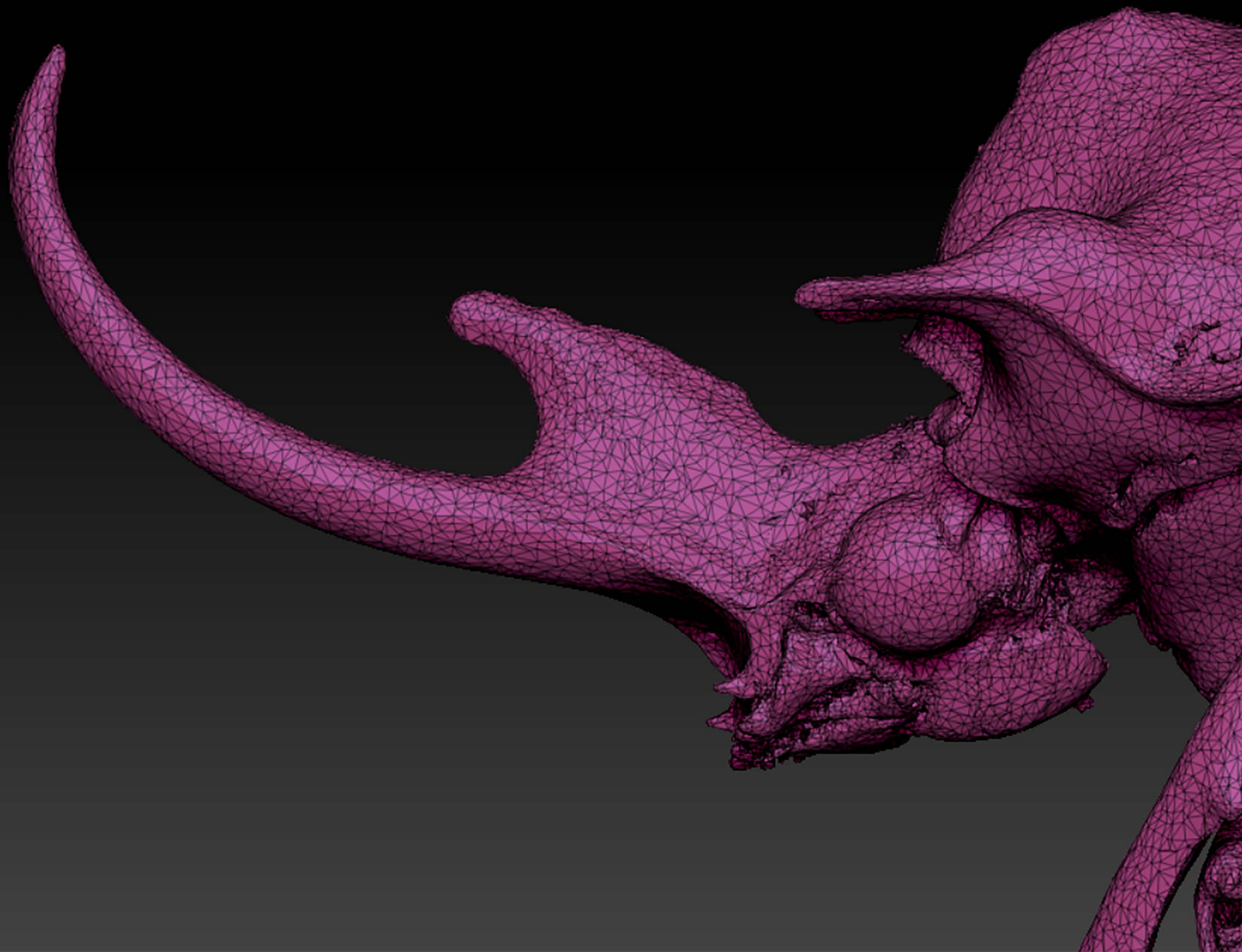
			information on the nursing role		examination questions (vague) In 2008 around 1,600 people accessed the modules and some schools have no integrated them into the school curricula	
31: Cushen <i>et al.</i> (2002) UK	Evaluation (pilot) of a CD ROM used with all staff involved in cytotoxic chemotherapy administration.	None	CD ROM Package: 'Safety in the clinical use of cytotoxics' commissioned by North Thames	Sample size 15 Formative and summative knowledge assessed using MCQs. Doctors, nurses and pharmacists undertook the training; 10 (70%) completed the evaluation questionnaire, which focused on access, quality of graphics, content, re-accessibility. Outcomes: results of knowledge questions and free-text comments.	Content: all found it good or very good in all sections; Comments: repetition/duplication in teaching package; some gaps or information not explicit. Concluded that the package complemented local education and training programmes; use for staff induction along with clinical experience.	1
32: Meade <i>et al.</i> (2006) USA (Florida)	Evaluation of the development and application of web-based modules relevant to communicating cancer and literacy for cancer control researchers	Adult learning theory	Web-based modules on Blackboard including topics such as applied anthropology, literacy, and importance of cultural beliefs in cancer control, cancer genetics. Based on adult learning theory and aimed to create a community of professionals via distance learning in self-paced, motivational and inexpensive format. Included discussion boards, steps to ensure accessibility, weblinks, Crosstalk 30 min discussions with guest scholar, quiz, student tracking.	Module evaluation instrument with 25 mcqs and open ended questions to identify if objectives were met, the appropriateness and relevance of content, satisfaction with the module. Point 1- immediately after the module; Point 2 and 3 at 6 and 12 months. 64 interdisciplinary group of doctoral prepared cancer control researchers including 83% women and 61% racial/ethnic minorities.	Response rate was 89%. Objectives met at Pt 1,2 and 3- 90.5%, 98% and 97.6% Level of content at Pt 1,2 and 3- 83%, 76.5%, 86.6% Appropriateness of materials- 90% found them appropriate or very appropriate. Organisation of materials at Pt 1,2 and 3 identified as excellent or very good- (91%, 75.4% and 94.8%)	1

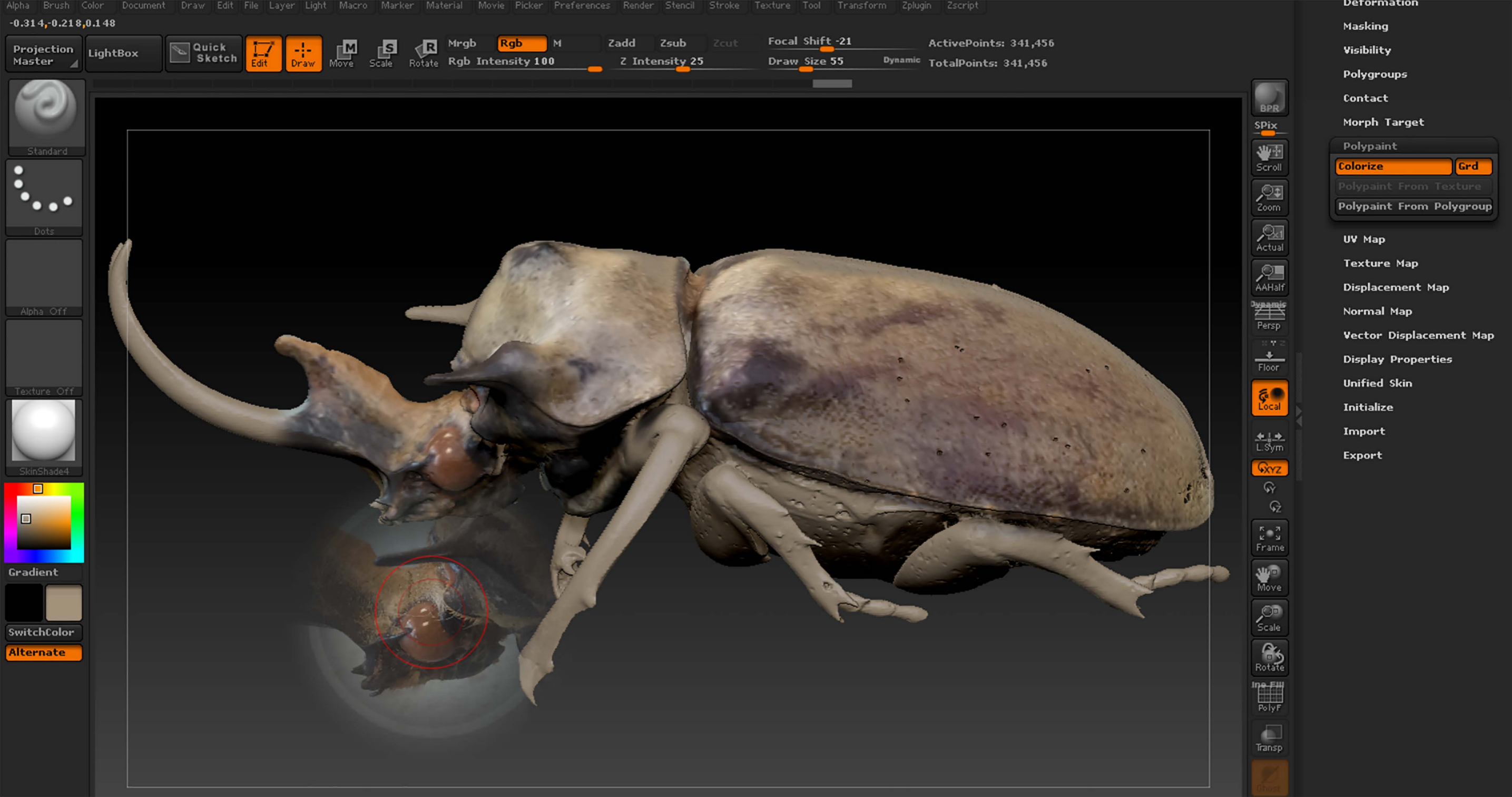
					Flow of content as excellent/very good at pt 1,2 and 3- 88.4%, 84.3% and 95.3%	
					Format satisfaction extremely high to high ranged from 91.4-94.1%	
					Discussion board found fairly useful (53%) or not useful (51.2%) in another cohort	
33: Probst <i>et al.</i> (2009) UK (Sheffield)	Case study to review experience of moving to an online learning approach for a MSc in Radiotherapy and Oncology	Based on constructivism – that knowledge is situated through social experiences and 5 stage Salmon model (active learning based on reflection, construction of knowledge, authentic tasks, assessment for learning)	MSc in Radiotherapy and Oncology for radiation therapists and others. Inter-professional research methods module and cancer-specific- CPD and two new Advanced Practice modules. Use Blackboard with national and international students.	Sample size 75 Students enrolled on traditional and online modules over 2 semesters and 50 completed the pre course questionnaire and 25 the post course questionnaire. Evaluation tool developed from Wilkinson with 8 scales: IT use and confidence; preference for e-learning, orientation to the module, research skills, support through the module, quality of materials, intrinsic motivation, evaluation of the module.	Preference towards e-learning correlated with IT confidence E-learning students had higher scores for intrinsic motivation At completion there was no identified difference in mean assignment scores between the 2 delivery modes and no difference in completion rates. Younger students more likely to complete; module evaluations showed similarity in experience.	1

<p>34: Smith <i>et al.</i> (2010) UK</p>	<p>Descriptive evaluation of an online module relating to end of life needs.</p>	<p>None</p>	<p>A six week online programme developed by Marie Curie Cancer Care called Communication Skills for Effective Patient and Carer Assessment. 90 minutes per week working on the learning materials with key areas in: getting to know each other; access to useful literature; review and online discussion of case studies (audio and visual); and evaluation Online self-assessment of confidence before and after course using modified Wilkinson questionnaire Online post-course candidate evaluation Online post-course moderator evaluation.</p>	<p>30 Practitioners participated in the pilot including RNs and HCA with 12-15 in each group. Required: 6 months experience in the area, access to a pc and able to contribute 2 hours per week. 3 withdrew 1) Increased confidence in explaining the assessment process to patients, summarising the assessment interview and discussing an action plan with patients and carers.</p>	<p>57% evaluated the course as excellent and 43% as good. Online discussion- 60% strongly agreed and 40% agreed this helped develop new insights Moderators found co-facilitation positive but demanding; need to make expectations clear; online presence of tutor as important</p>	<p>3</p>
<p>35: Joubert <i>et al.</i> (2002a) South Africa</p>	<p>To evaluate a computer-based teaching programme developed for student nurses in oncological clinical practice, comparing groups accessing the e learning in two different settings.</p>	<p>Concept learning approach</p>	<p>Interactive online education programme: undertaken over 2 months; or over 6 hours in a multi-media centre. Previous pilot with 3 experts in oncology nursing, 3 experts in computer-based learning and 4 student nurses.</p>	<p>Sample size 60 Comparative, descriptive design with convenience sample of student nurses in first and second year, including 2-month placements in oncology. One group accessed the programme in practice (n=40) and one in a multimedia centre (n=20). Used 67 item questionnaire with Likert-scale rating effectiveness in: Teaching, cosmetic, programme and curriculum.</p>	<p>60 students completed the questionnaire. There were no statistically significant differences between the two groups in all criteria in non-parametric Mann-Whitney test and 95% non-parametric confidence intervals.</p>	<p>1</p>

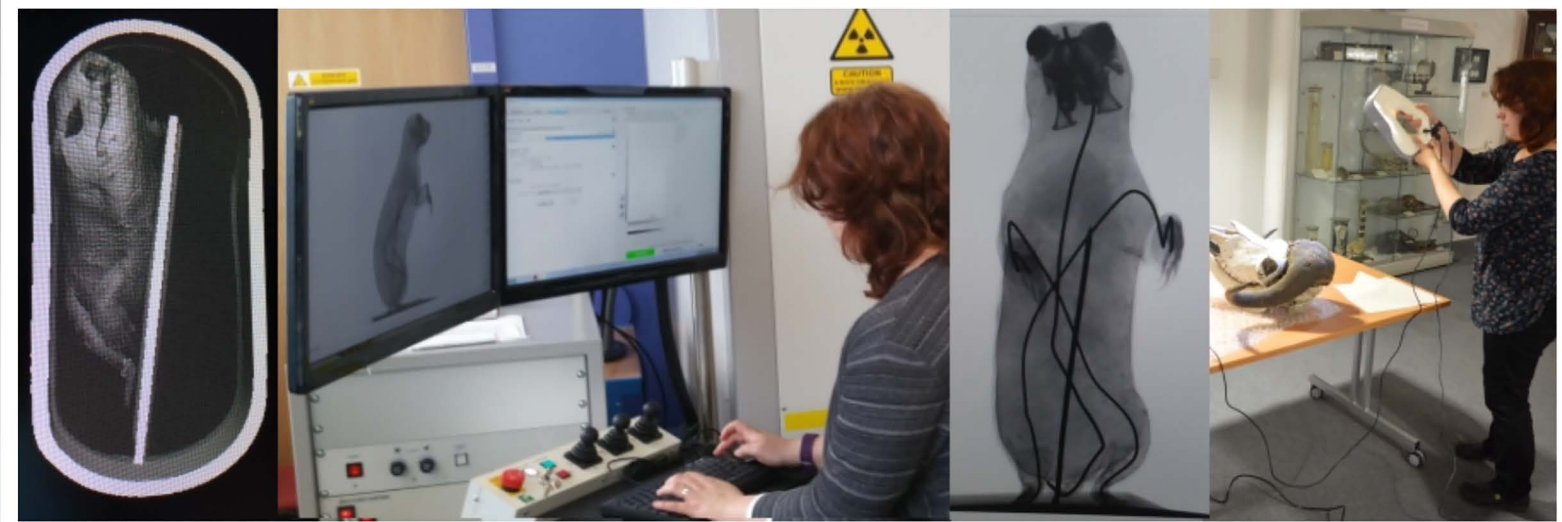
<p>36: Jerome-D'Emilia <i>et al.</i> (2010)</p> <p>USA</p>	<p>Feasibility study to educationally prepare nurse to work with vulnerable rural breast screening mammography population</p> <p>To determine whether patient outcomes change as a result of the education, and if these outcomes can be evaluated at a distance.</p>	<p>None</p>	<p>Four Blackboard web-based sessions: Videoconferencing, Distance learning, Slide presentations, Interaction with experts through online discussions.</p>	<p>8 community health clinics in areas of > 25% African American population: 4 clinics randomly assigned to the education intervention; 4 to the control group. 13-intervention group and 4 in the control. Nurses' breast cancer knowledge tested before and after the programme; technology evaluation survey after each educational intervention; and review of 50/266 anonymous charts of women eligible for mammogram to determine rates of referral and uptake of screening mammograms.</p>	<p>T-tests indicated an increased knowledge about breast cancer in the intervention group.</p> <p>22 nurses logged onto Blackboard but only 1 took part in the discussion.</p> <p>Indication that the intervention resulted in a small increase in likelihood of African American women receiving referral or going for mammogram.</p>	<p>4</p>
<p>37: Kerfoot <i>et al.</i> (2010)</p> <p>USA</p>	<p>Hypothesized that an email-based intervention termed 'spaced education' could reduce clinicians' inappropriate screening for prostate cancer.</p>	<p>None Learning outcomes based on national standards.</p>	<p>Series of four isomorphic cycles of nine e-mails over 36 weeks (0-2 per week). Each presented a clinical scenario and asked whether appropriate to obtain a PSA test.</p>	<p>95 primary care professionals Randomised into two cohorts: intervention group who received emails; and control group received no emails. Primary outcome was number and percentage of inappropriate PSA screening tests ordered- defined as use of PSA in patients aged >76 or <40 years.</p>	<p>In weeks 1-36 professionals receiving the e-mails ordered significantly fewer inappropriate PSA screening tests than control clinicians (p = 0.041). In 72-week period following intervention, the intervention group continued to order fewer inappropriate tests than control group (p = 0.011).</p>	<p>4</p>
<p>38: Philips <i>et al.</i> (2014)</p> <p>Australia</p>	<p>To test the impact of an online pain assessment module on specialist palliative care nurses.</p>	<p>' Spaced education'</p>	<p>Using Q stream mobile application - Intervention was 11 case based pain assessment learning scenarios which were 'pushed' to the participants</p>	<p>103 nurses were invited to participate in two hospital sites. N=74 participated. They used a survey devised to have 17 questions reflecting</p>	<p>The survey – 60% (n=45) participated in the baseline survey and the intervention of those who completed the intervention 75% (n=34) proceeded to</p>	<p>4</p>

			<p>email over a 28 day period. 'Spaced' and 'repeated' over time. Multiple choice and short answers. The correct answer was provided as soon as answered. Participants were allocated 20 minutes per week to undertake the content and exercise. They also provided designated computer to complete the session.</p>	<p>essential elements of comprehensive pain assessment.</p> <p>Also collected audit data on 60 patients admitted with pain – charts. The audit data was collected 1 month before the intervention and then again 6 weeks after the intervention finished.</p>	<p>complete the second survey.</p> <p>A significant difference was found associated between the mean competency scores across all three domains when comparing the T1 and T2 surveys.</p> <p>Pain assessment knowledge, pain assessment tool awareness, and pain assessment confidence.</p> <p>Audit data – reported a significant reduction in reported pain ratings, however this is only reported in the paper as a mean pain score so hard to determine by patient type or relevance to reason for admission.</p>	
<p>39: Lewis (2008) UK</p>	<p>An audit to compare face-to-face with online delivery as identified in the number of inadequate smears, and pick up of transformation zone cells from the cervix.</p>	<p>None</p>	<p>E-learning programme to deliver theory prior to attendance at a one-day theory/clinical delivery and practical skills training in a clinical setting.</p>	<p>Group 1: 135 participants undertook 3-day theory course face to face in 2003.</p> <p>Group 2: 153 undertook an e-learning programme during 2004-5.</p> <p>Cervical Screening Wales audited individual smear-taker activity using their unique codes to identify numbers of inadequate smears in < 50 year old women.</p> <p>Level of study accessed and completion rates also recorded.</p>	<p>Inadequate smears:</p> <p>Group 1- 0-9.5%</p> <p>Group 2- 0-7.7%</p> <p>Transformation zone sample:</p> <p>Group 1- 33-94.4</p> <p>Group 2- 65-93.9%</p> <p>The academic achievements of both groups were similar.</p> <p>Author suggests that a move to e-learning did not alter the characteristics of sampled material or disadvantage patients.</p>	<p>4</p>





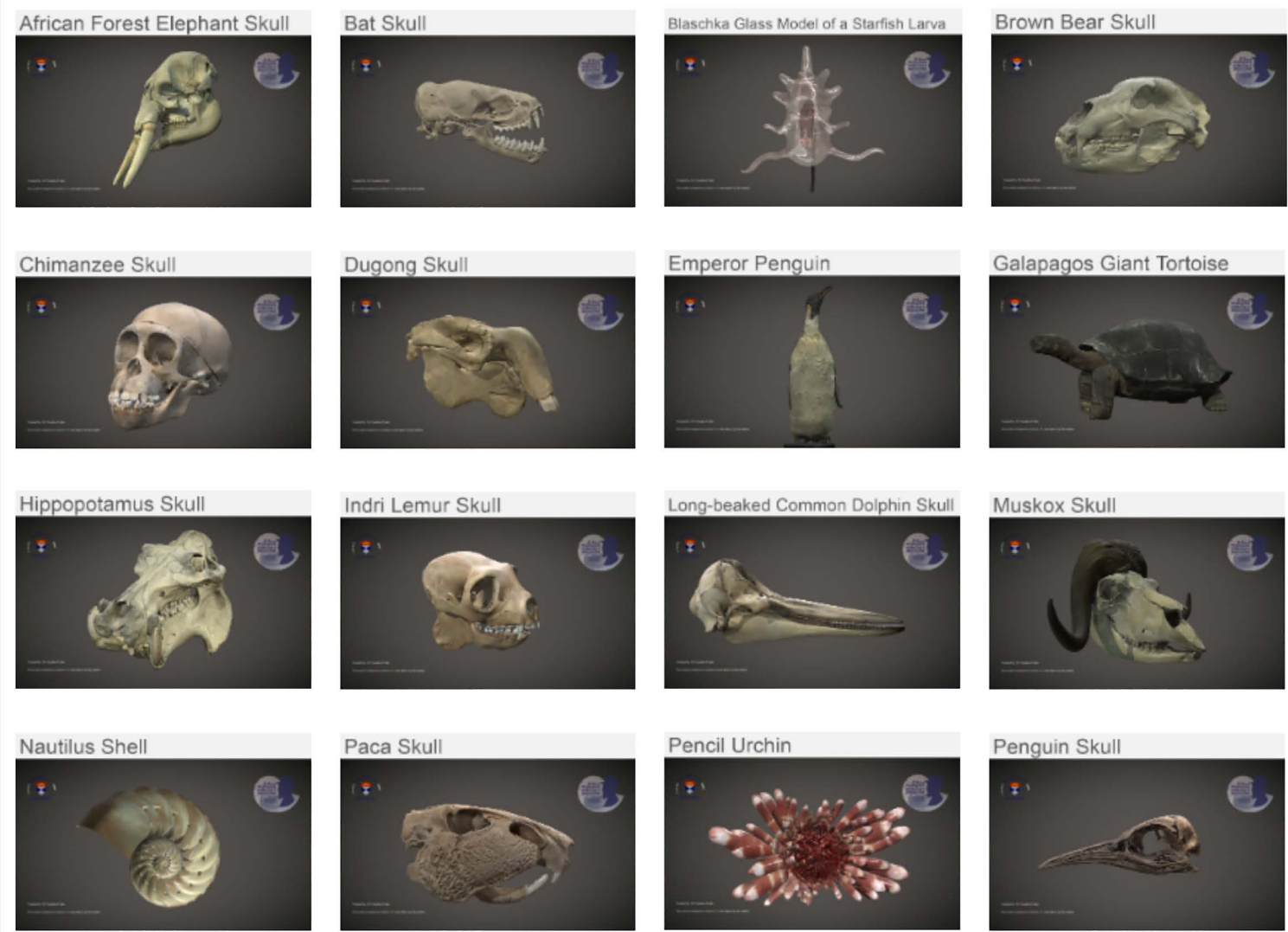
D'Arcy Thompson Zoology Museum 3D

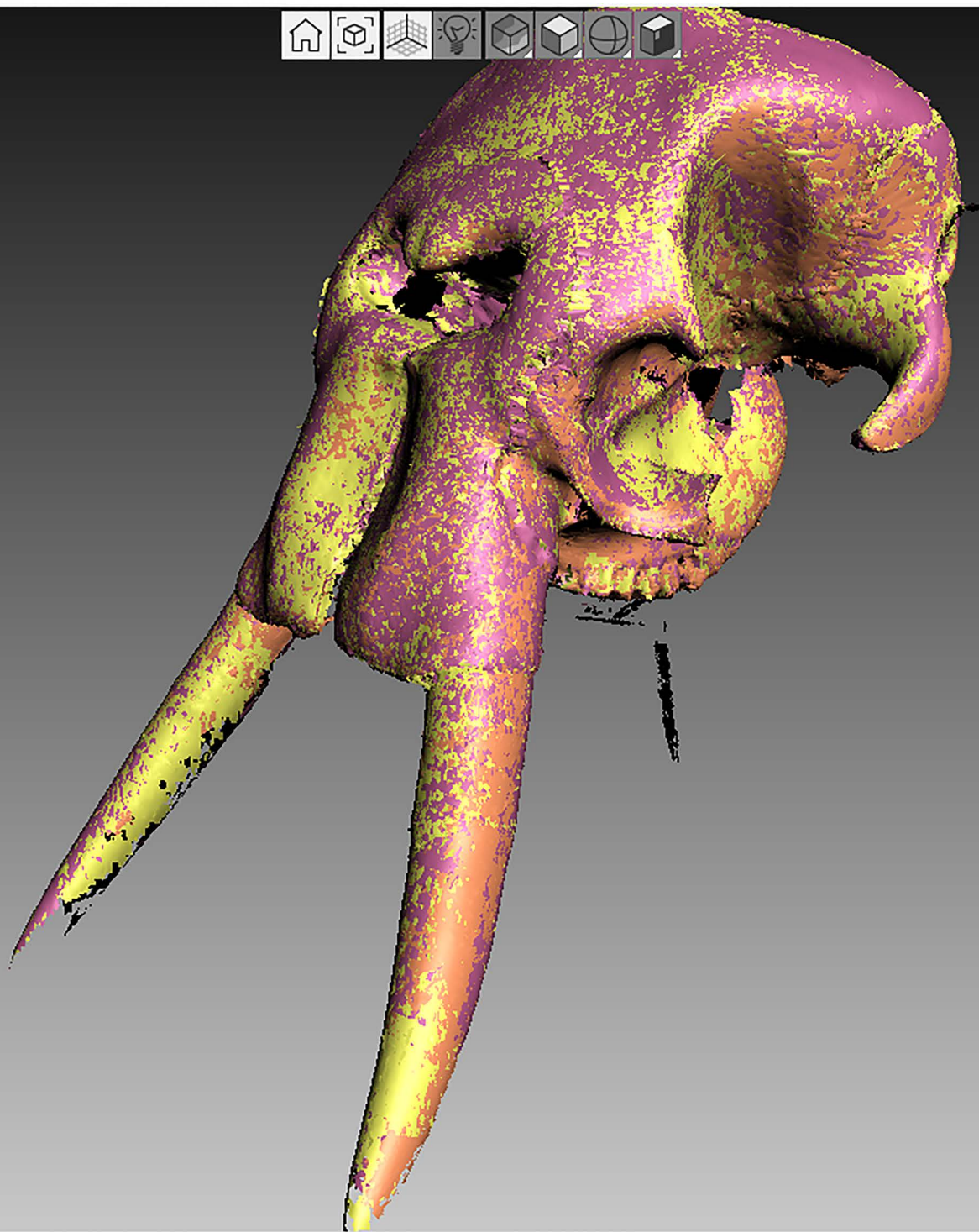


About the Project

In 2016 we began a project in collaboration with the University's [Centre for Anatomy & Human Identification](#) to digitise specimens from the D'Arcy Thompson Zoology Museum. Smaller specimens were scanned using a Nikon XT H 225ST micro CT scanner, while larger specimens were captured using hand-held structured light scanners (Artec Eva and Artec Space Spider). The resulting 3D models are hosted online via [Sketchfab](#) and are available for viewing and downloading worldwide under a creative commons licence.

Click on any of the images below to be taken to a page containing the 3D model and information about the specimen.





	ID	Title	Load...	Total	Max ...
	1	Scan1	709	709 / 721M	0.3
	2	Scan2	311	311 / 292M	0.3
	3	Scan3	522	522 / 511M	0.2
	4	Scan4	703	703 / 725M	0.3