Digital Dentistry Online Symposium

Continuing to Bridge the Clinical Gap

4th November 2020 @ 19:30 London time

ADEE
ADVANCING EDUCATION AND ORAL HEALTH

The University Of Sheffield.

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

VIRTEASY DENTAL BY IRV

Digital Dentistry Online Symposium

Continuing to Bridge the Clinical Gap

Programme

Welcome and overview of the Bridging the Clinical Gap working group and outputs ***Dr James Field***	5 Minutes
An introduction to how simulation is used at The University of Sheffield to Bridge the Gap ***Mr Ashley Towers and Mr Jonathan Dixon***	10 Minutes
Redefining simulation, with meaningful clinical feedback ***All partners***	20 Minutes
An introduction to DigEdDent: an online resource for dental educators ***Dr James Field***	5 Minutes
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How Simulation is used at The University of Sheffield to Bridge the Gap

Continuing to Bridge the Clinical Gap - 4th November 2020

Mr Ashley Towers

University Teacher in Dental Skills Simulation & Informatics

Mr Jonathan Dixon

Clinical Academic Fellow in Restorative Dentistry

VR Teaching Team

The University Of Sheffield.

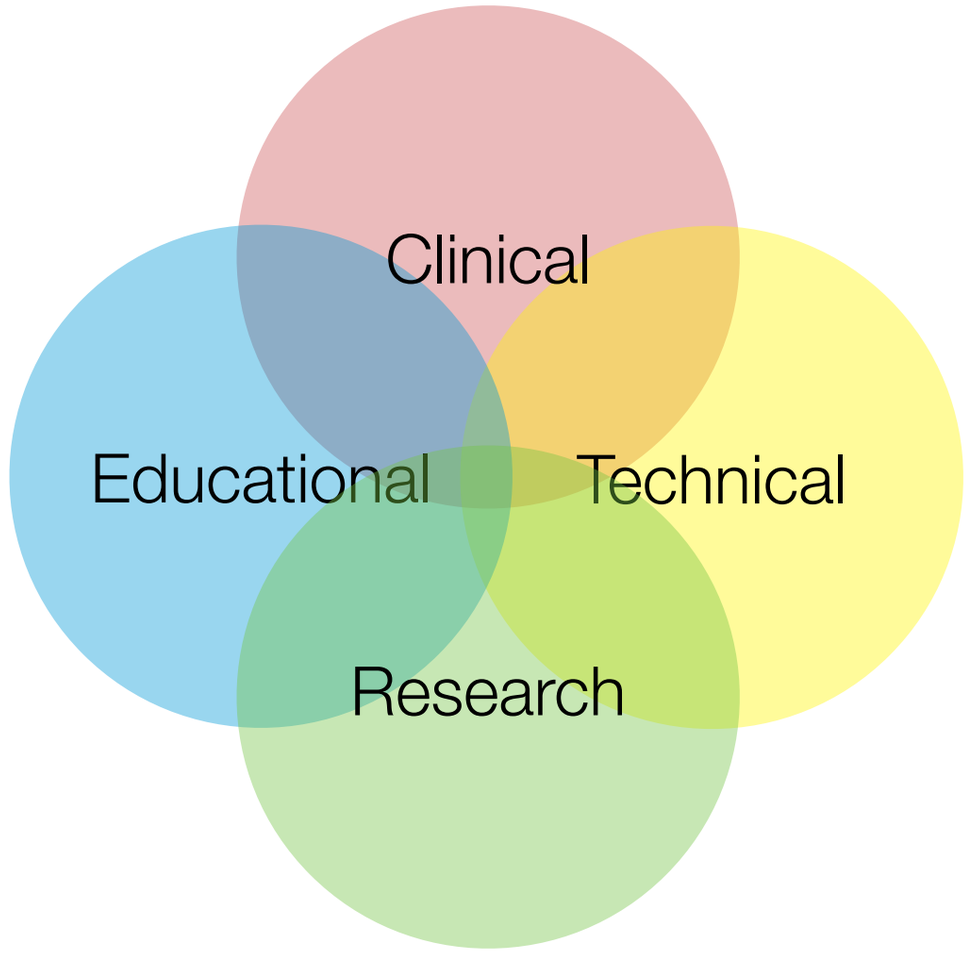
Roles

Project Lead

Curriculum Integration Lead

Technical Lead

Research Team (optional)



VR Teaching Team

The University Of Sheffield.

Project Lead

Prof Nicolas Martin
Overal Project Lead

- Senior level driving force
- Enthusiastic lead with vision for how it will support L&T
- Able to allocate resources to project

VR Teaching Team

The University Of Sheffield.

Curriculum Lead

Mrs Rachel Martin
Curriculum Integration Lead

- Integrate teaching across curriculum
- Educationally focussed - able to spot opportunities for appropriate use of VR
- Organise the teaching team and resources

VR Teaching Team

The University Of Sheffield.

Technical Lead

Mr Ashley Towers
Researcher/Technical Lead

- Collaborate with curriculum lead to integrate in to teaching
- Local support for teaching and keeping the suite running
- Technical background for effective liaison with manufacturer

VR Teaching Team

The University Of Sheffield.

Research Team (Optional)

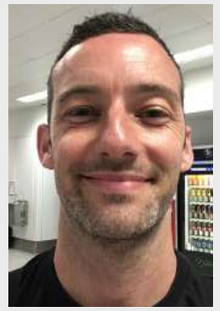
Prof Nicolas Martin
Overal Project Lead

Mr Ashley Towers
Researcher/Technical Lead

Mrs Rachel Martin
Curriculum Integration Lead

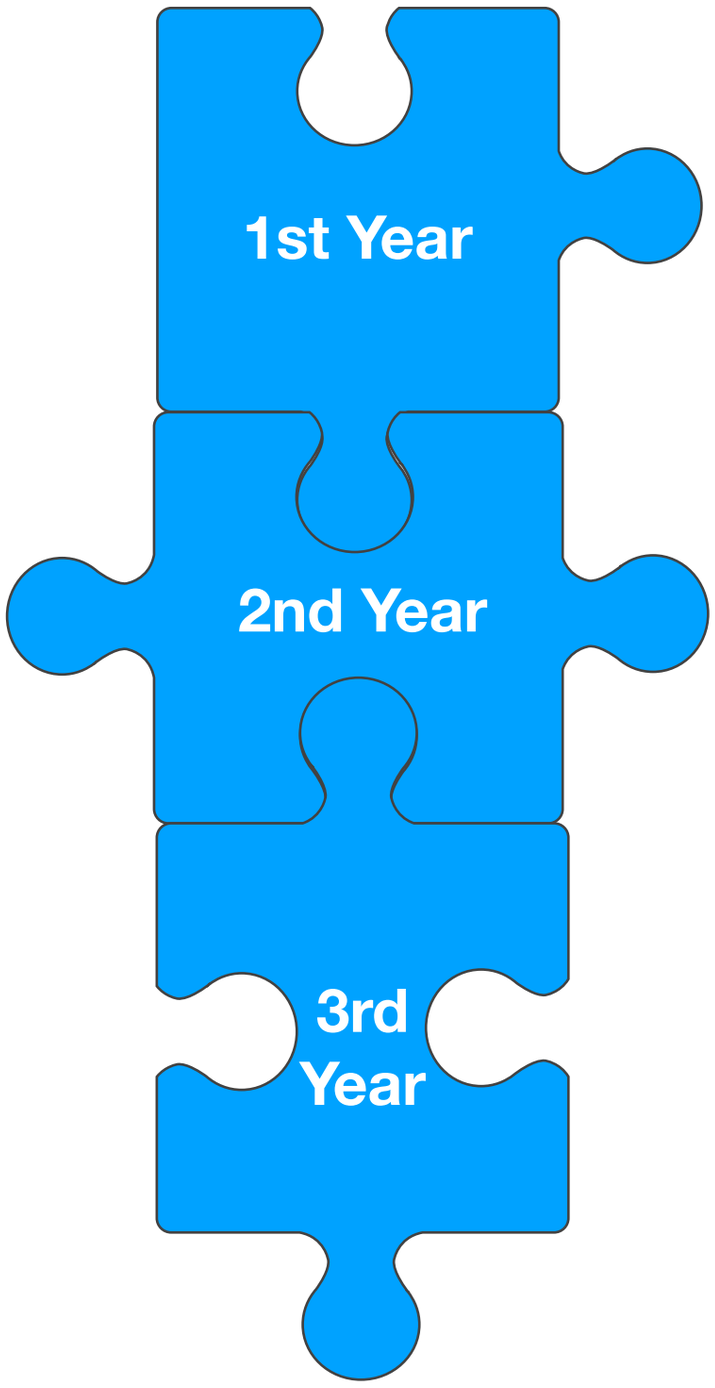
Mr Jonathan Dixon
Clinical Researcher

Alumni



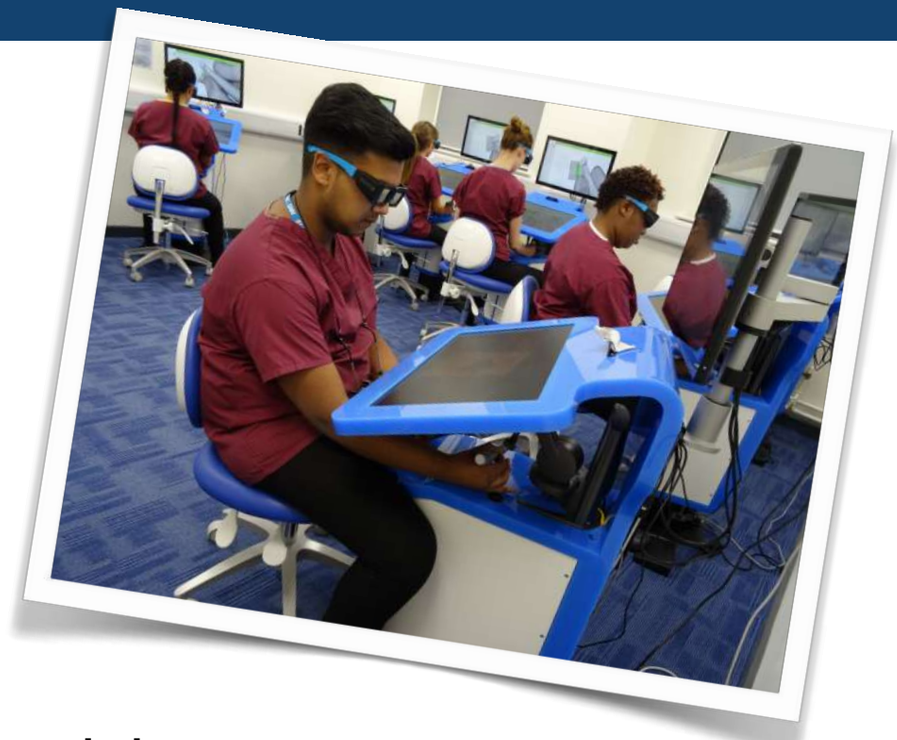
Dr James Field
Senior Clinical Researcher
(Now at Cardiff University)

Curriculum Integration



Curriculum Integration

The University Of Sheffield.



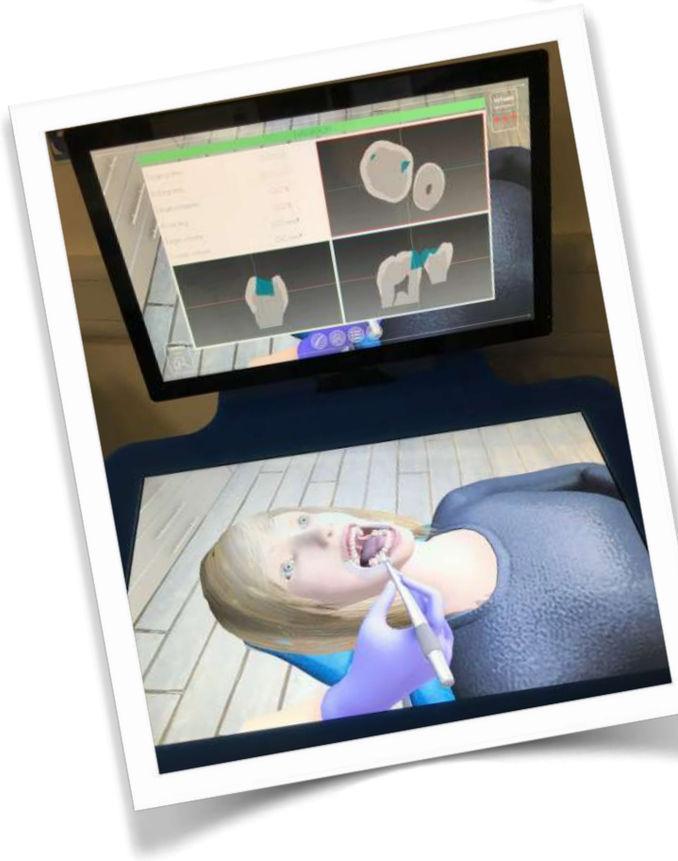
Guiding Principles

Tutor Led Sessions

Complimentary to Phantom Head teaching

But… offering something different

Reflective practice



Curriculum Integration

The University Of Sheffield.

Introduction

- Posture
- Finger Rest
- Handpiece Control
- Shape-cutting exercises

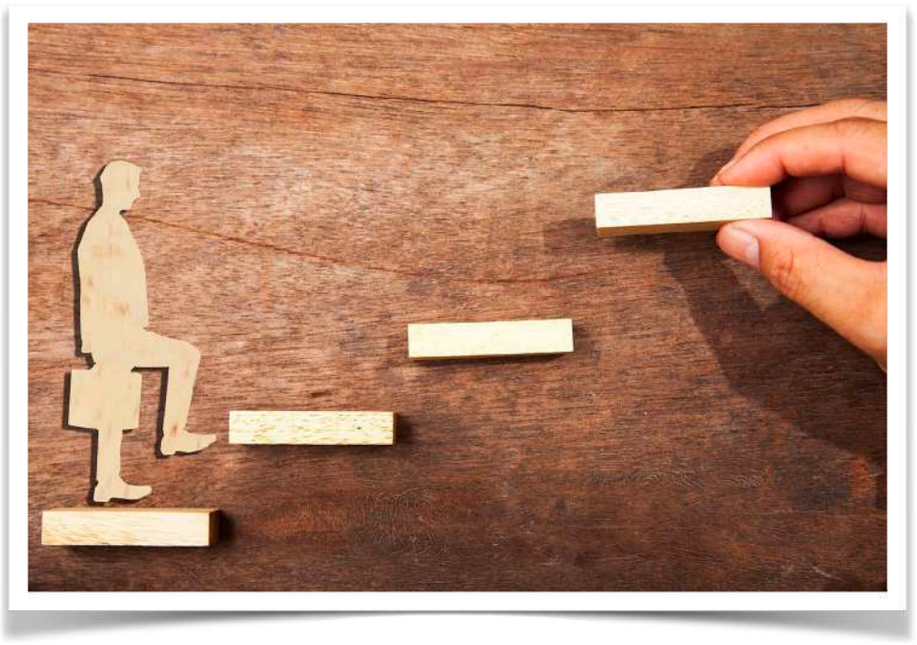
Core Clinical Skills

- Re-enforce Phantom Head Teaching
- Case studies
- Small-group discussion
- Focussed tuition

Consolidation

- Explore complex concepts
- Case studies/Simulated Patient Cases
- Small-group discussion
- Focussed tuition

A Focus on Core Skills



Core Skills

The University Of Sheffield.

Develop and Reinforce Fundamental Skills:

Operating Posture

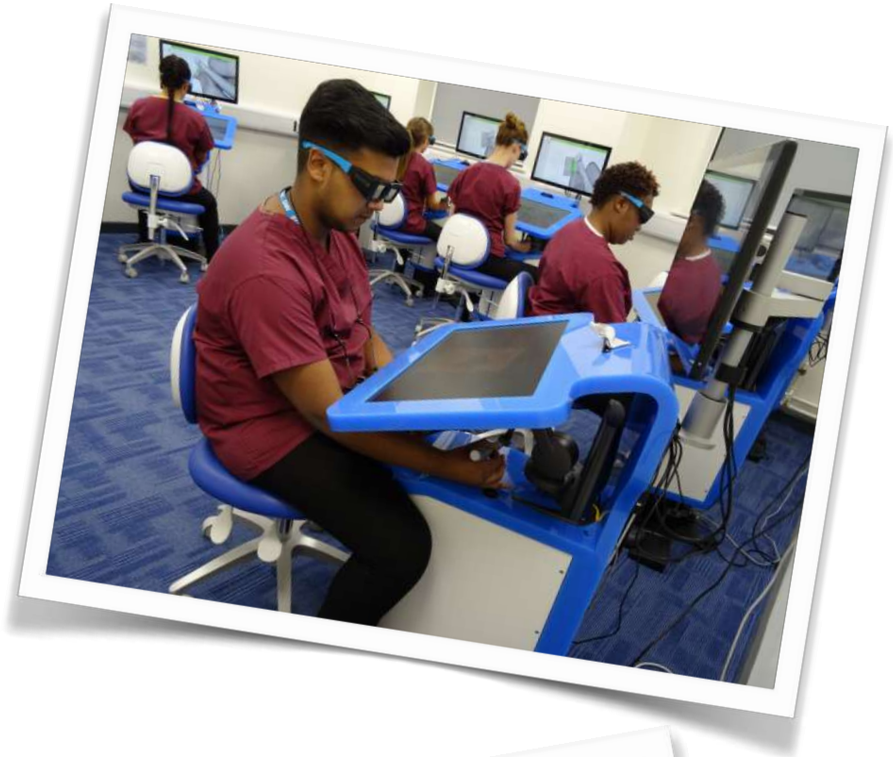
Instrument Selection

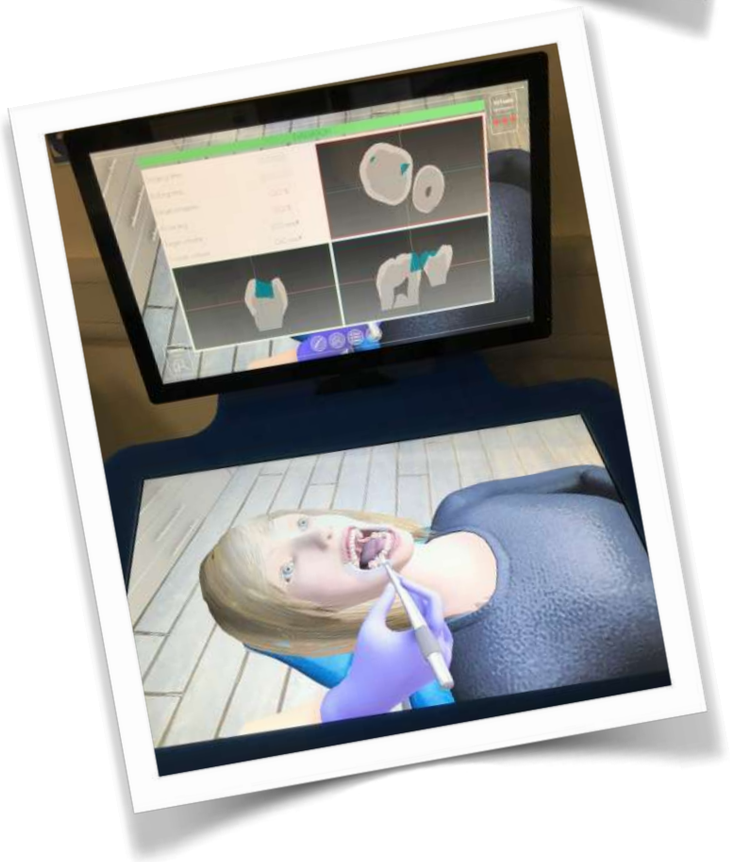
Establishing a Finger Rest

Indirect Vision/Working in a Mirror

Growth as a Self-directed Learner

Reflective Practice





The University Of Sheffield.

Educational Initiatives

Educational Initiatives

The University Of Sheffield.

Multi-Modal Simulation of Complex Operative Procedures with Patient-Specific Models

Senior students undertaking clinical patient care

“Gap” between pre-clinical simulation and clinical practice

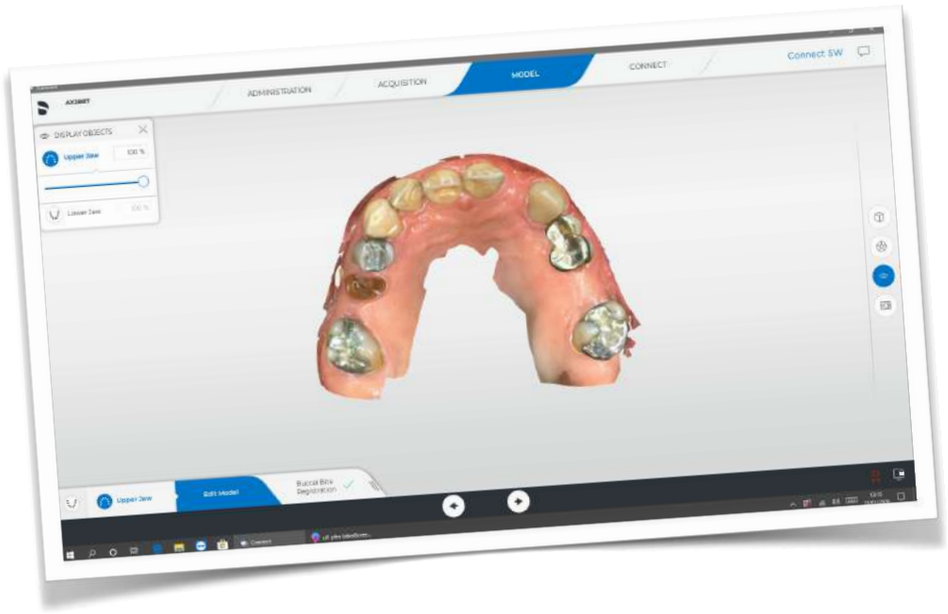
Stress, low confidence

Can students practice their real patient case before performing the treatment?

Educational Initiatives

The University Of Sheffield.

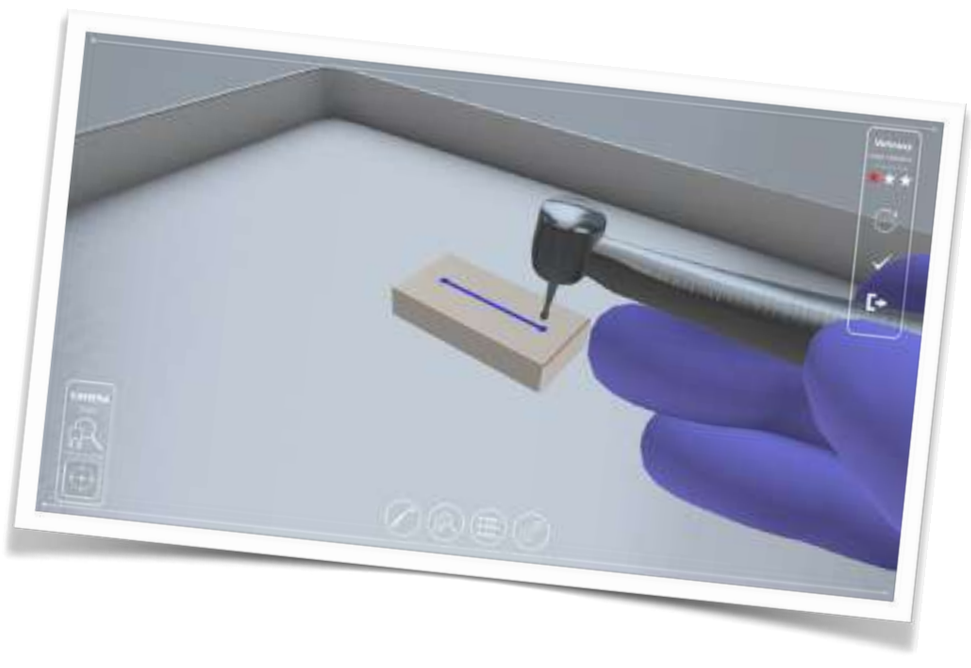
Multi-Modal Simulation of Complex Operative Procedures with Patient-Specific Models



The University Of Sheffield.

Educationally-focused Core Operative Skills Exercises with Clinically-relevant Assessment and Feedback

Current assessment methods by dental VR simulators are quantitative



“Your preparation is 63% accurate, you still have 11% of the target material to remove”

Is this useful?

This does not mirror the feedback we give students on clinics…

The University Of Sheffield.

The Impact of the COVID-19 Pandemic

Simulation after COVID-19

Dental students are seeing less patients and are carrying out fewer clinical procedures

Quality over quantity, improving the quality of each educational experience

More simulation-based operative skills training

Ability to tailor the exercise to fulfil specific educational goals

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Redefining simulation, with meaningful clinical feedback

Continuing to Bridge the Clinical Gap - 4th November 2020

Dr James Field Cardiff University
Mr Jonathan Dixon The University of Sheffield
Mr Ashley Towers The University of Sheffield
Mr James Markey Virteasy Dental
Mr Pierre-Jean Petitprez Virteasy Dental

The University Of Sheffield.

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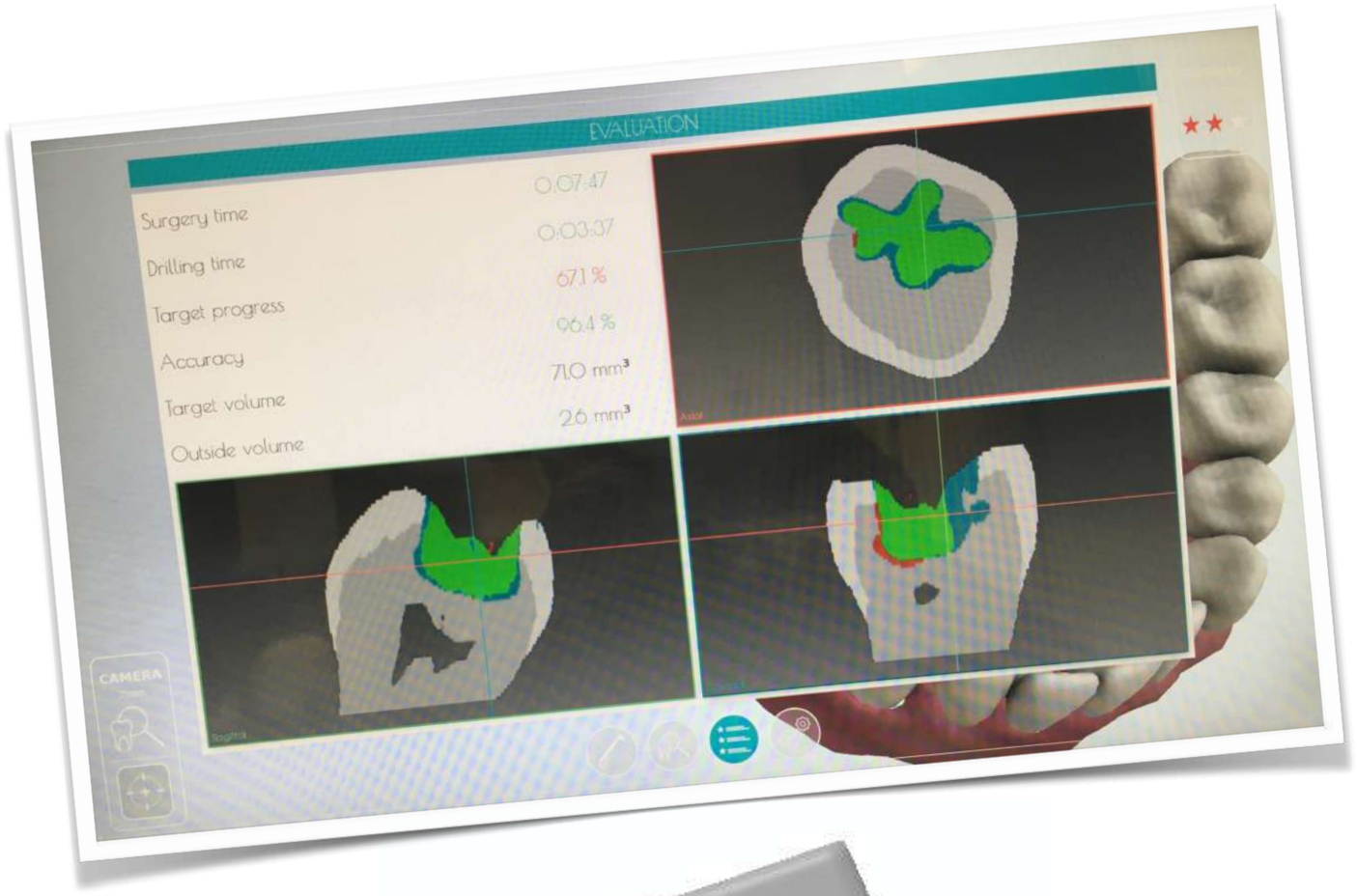
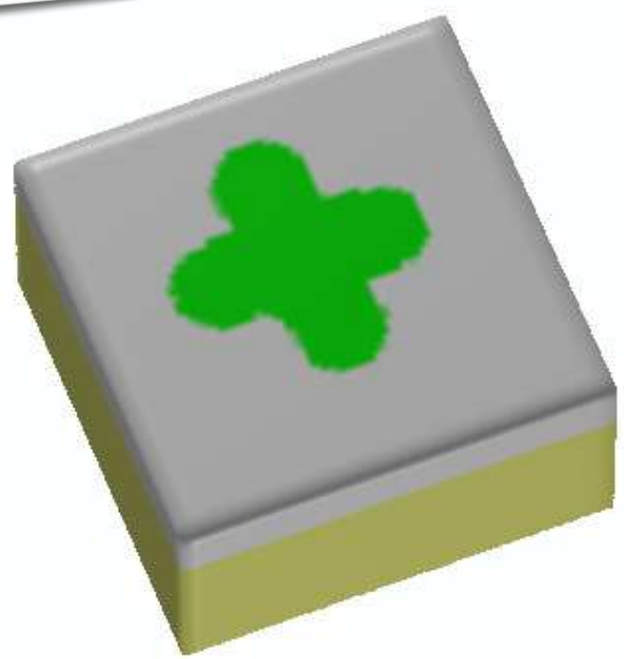
Importance of Feedback

Target Based Feedback





- Most common approach in the literature
- Progress calculated from percentage or mm^3 removed
- Iatrogenic damage measured
- Accuracy Score

Target Based Feedback

Limitations

- Doesn’t provide insight in to the “why”

Target Based Feedback

Limitations

- Doesn’t measure the “why”
- Different to tutor provided feedback

Target Based Feedback

Limitations

- Doesn’t measure the “why”
- Different to tutor provided feedback
- Can “punish” desirable behaviour

Target Based Feedback

Limitations

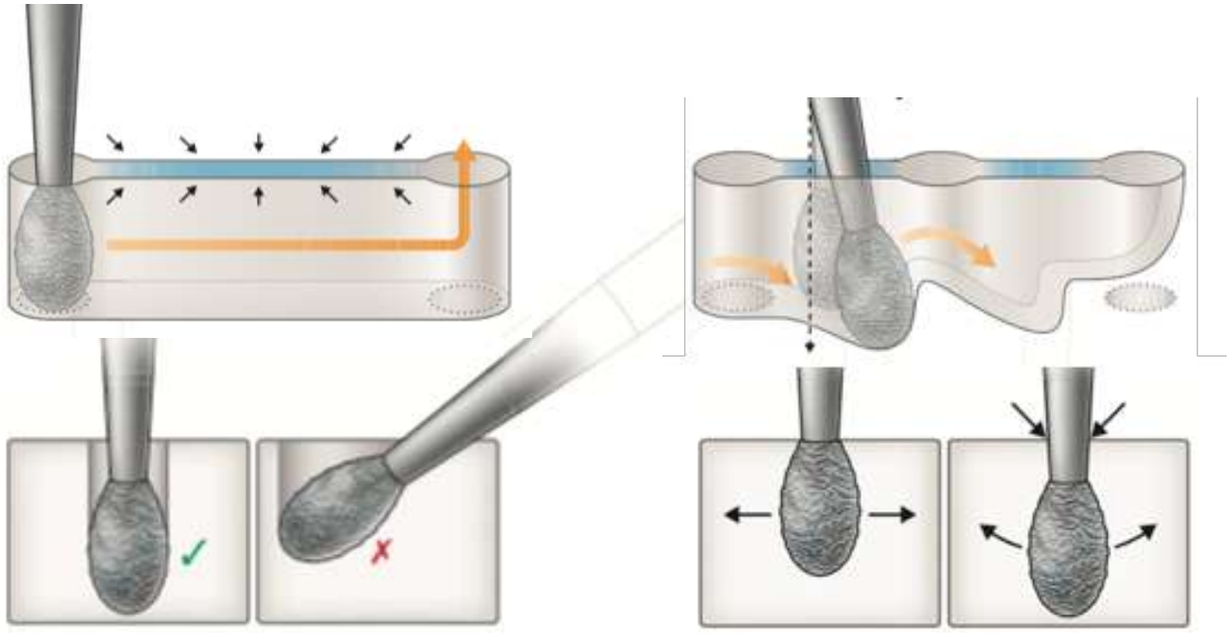
- Doesn’t measure the “why”
- Different to tutor provided feedback
- Can “punish” desirable behaviour
- Doesn’t provide advice on how to improve

Target Based Feedback

Limitations

- Doesn’t measure the “why”
- Different to tutor provided feedback
- Can “punish” desirable behaviour
- Doesn’t provide advice on how to improve
- Does it actually teach dentistry?

Design of the exercise



- Does the preparation follow the prescribed outline?
- Is the preparation an appropriate depth?
- Does the preparation have enough undercut?
- Is the floor of the preparation relatively flat?
- Is the preparation smooth enough?

Demo

VIRTEASY DENTAL

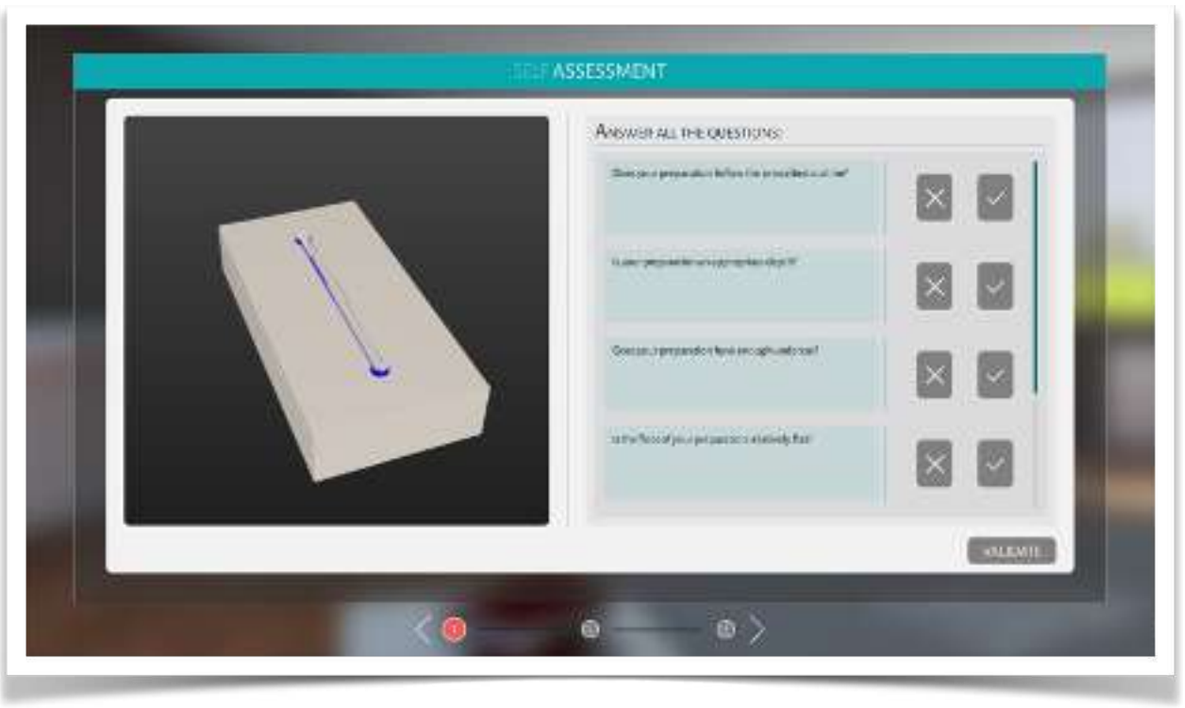
BY IRV

Validation Process

Measuring Concurrent Validity

Validity: *"The extent to which an assessment instrument measures what it was designed to measure"* (Van Nortwick *et al. 2010).*

Concurrent validity: comparing the assessment instrument to an externally validated measure of the same performance.



Measuring Concurrent Validity

A series of attempts of the exercise were carried out in order to demonstrate a range of good and bad performances based on the identified assessment criteria.

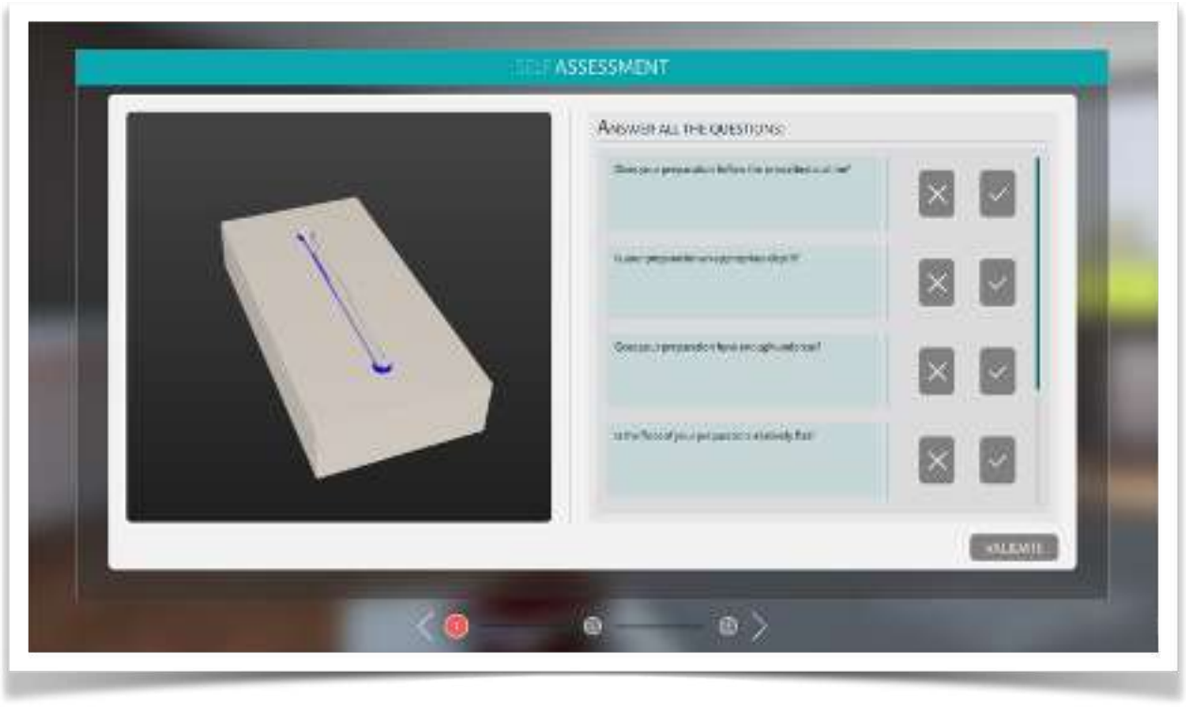
Does the preparation follow the prescribed outline?

Is the preparation an appropriate depth?

Does the preparation have sufficient undercut?

Is the floor of the preparation relatively flat?

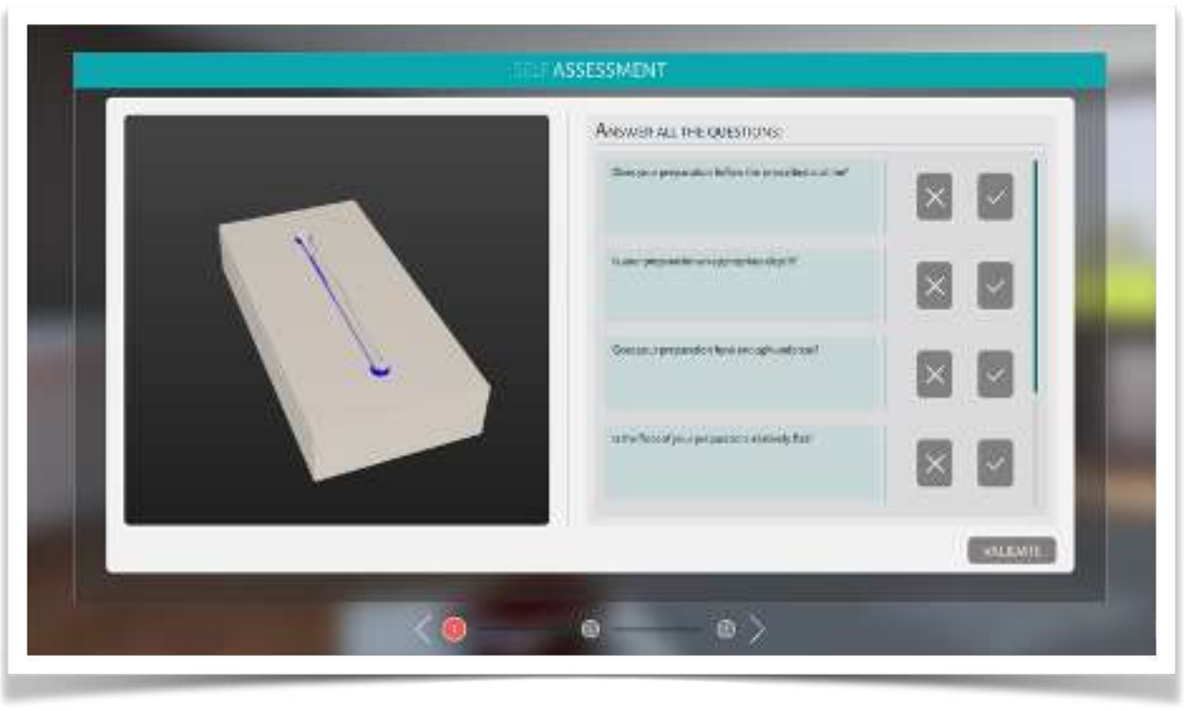
Is the preparation smooth enough?

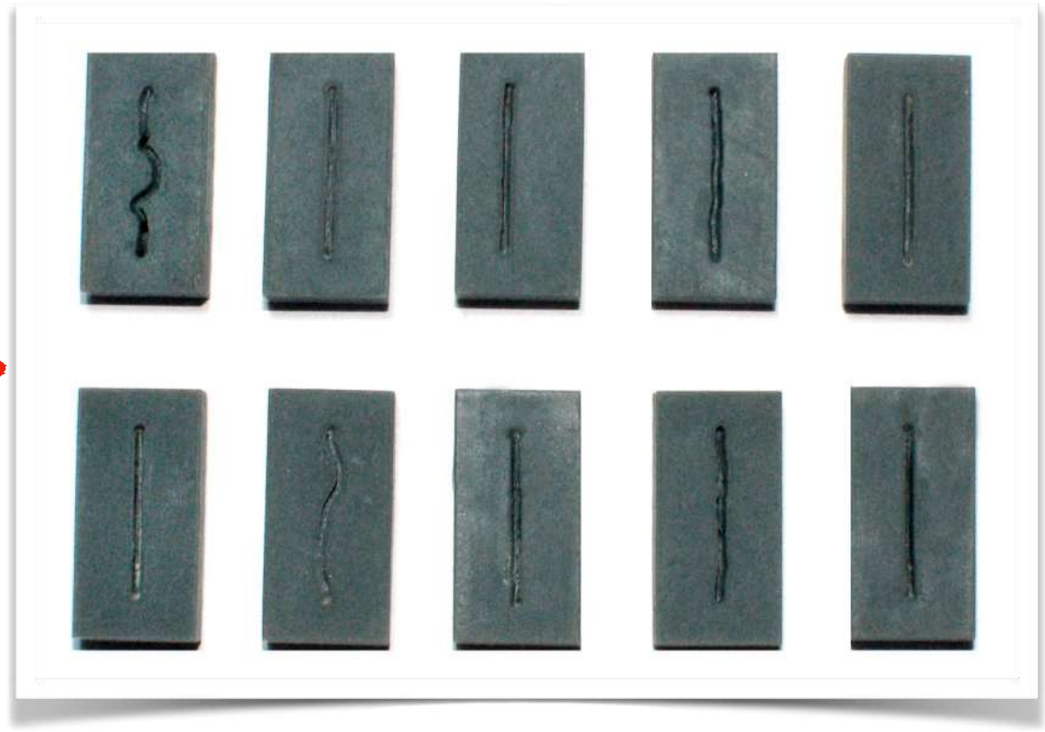


Measuring Concurrent Validity

The exercise attempts were saved, along with the simulator assessment responses.

Each exercise was subsequently 3D printed in the same dimensions.

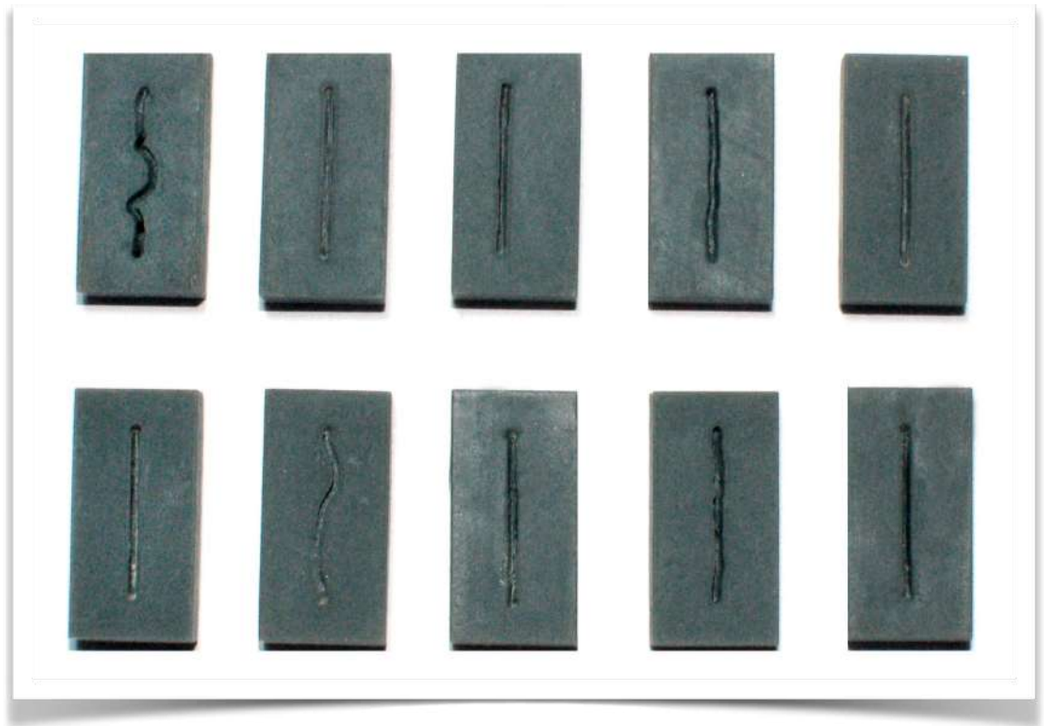




Measuring Concurrent Validity

Clinical teachers were asked to assess the preparations, using the same criteria as the VR simulator.

Clinical teachers were equipped with a straight probe and a transparent template to demonstrate the ideal preparation outline.



Does the preparation follow the prescribed outline?

Is the preparation an appropriate depth?

Does the preparation have sufficient undercut?

Is the floor of the preparation relatively flat?

Is the preparation smooth enough?

Measuring Concurrent Validity

Inter-rater reliability for assessment scores between clinical teachers was measured using the free-marginal multilateral kappa.

To validate the VR simulator assessment, both pooled and modal clinical teacher response were compared to the VR simulator assessment, percentage agreements were calculated.

Measuring Concurrent Validity

Exercise	Pooled clinical teacher agreements with simulator	Pooled teacher disagreements with simulator	% agreement with simulator
A	56	4	93.33
B	49	11	81.67
E	41	18	68.33
F	29	30	48.33
G	43	17	71.67
H	51	9	85.00
I	24	36	40.00
J	47	13	78.33
Average % agreement with simulator			70.83

Re-defining the VR Dental Simulator

Received: 22 April 2020 | Revised: 13 July 2020 | Accepted: 14 July 2020

DOI: 10.1111/eje.12581

ORIGINAL ARTICLE

WILEY

Re-defining the virtual reality dental simulator: Demonstrating concurrent validity of clinically relevant assessment and feedback

Jonathan Dixon[1] | Ashley Towers[1] | Nicolas Martin[1] | James Field[1,2]

[1]Academic Unit of Restorative Dentistry, School of Clinical Dentistry, The University of Sheffield, Sheffield, UK

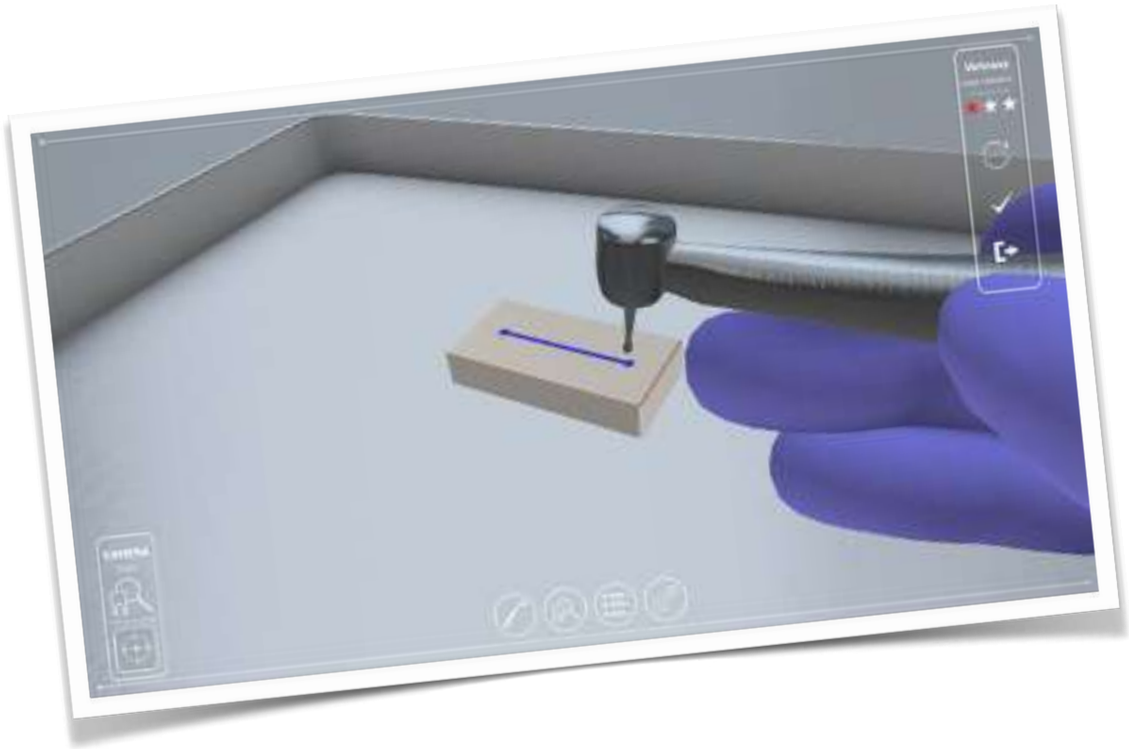
[2]School of Dentistry, Cardiff University, Cardiff, UK

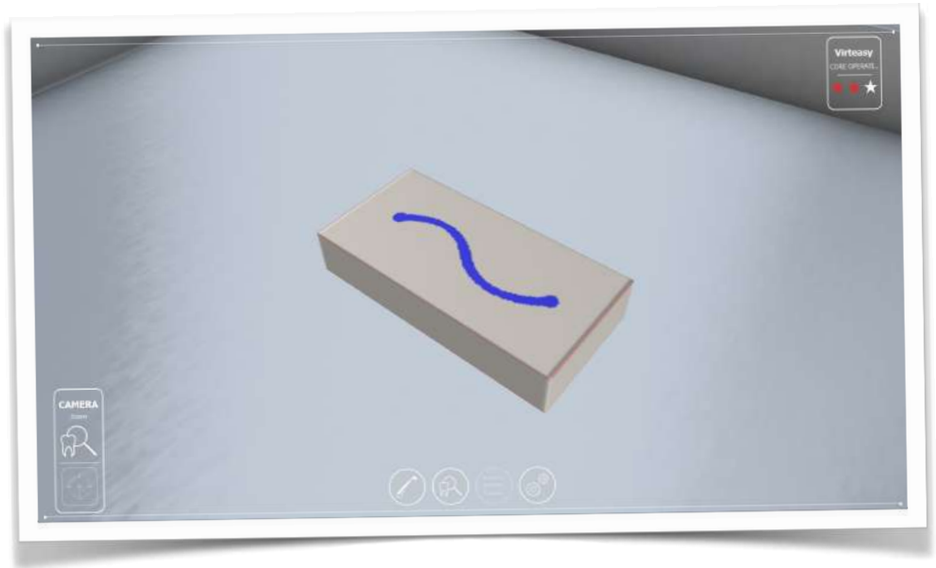
Abstract

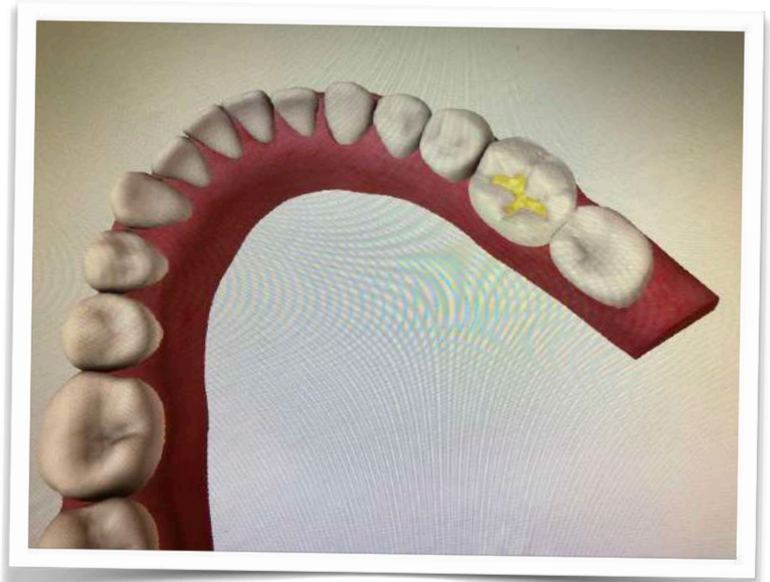
Introduction: Virtual reality (VR) dental simulators are gaining momentum as a useful tool to educate dental students. To date, no VR dental simulator exercise has been designed which is capable of reliably providing validated, meaningful clinical feed-

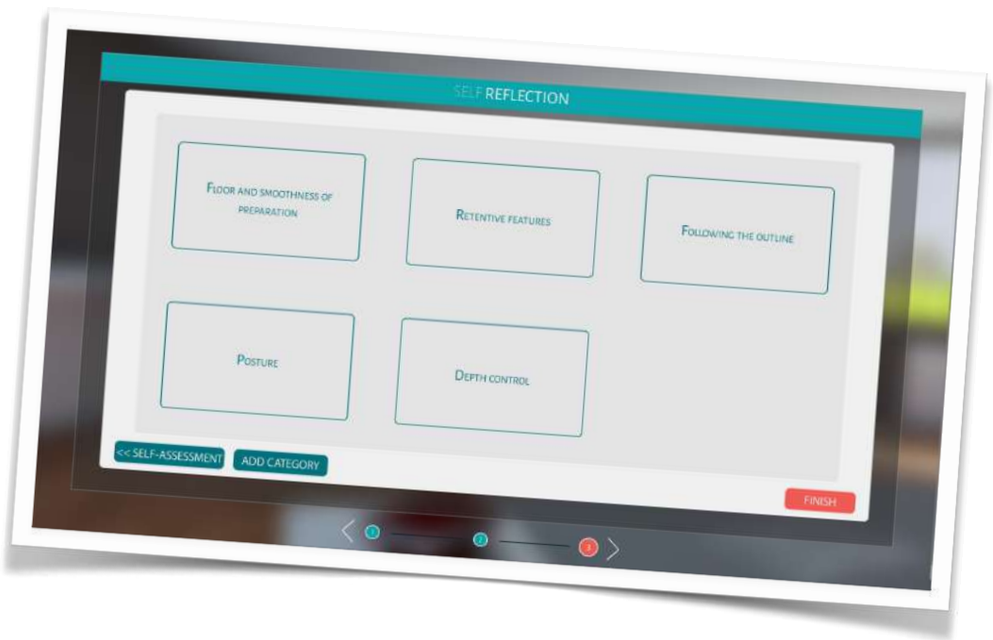
https://onlinelibrary.wiley.com/doi/full/10.1111/eje.12581

The Future




Virteasy
CAMERA




SELF REFLECTION
FLOOR AND SMOOTHNESS OF PREPARATION
RETENTIVE FEATURES
FOLLOWING THE OUTLINE
POSTURE
DEPTH CONTROL
<< SELF-ASSESSMENT
ADD CATEGORY
FINISH

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DigEdDent

Digital Education in Dentistry

DOMAIN ONE
Teaching

DOMAIN TWO
Assessment

DOMAIN THREE
Communication

DOMAIN FOUR
Support

DOMAIN FIVE
Data and portfolios

DigEdDent
Library

https://adee.org/projects/digeddent-digital-education-dentistry