Virtual reality in dental eduction

Mission and purpose

- Exchange of information and ideas.
- Update on new developments.
- Update on research in the field of VR in Dental education

Special Interest Group ADEE

Virtual Reality in Dental Education
Thursday August 28, 15.00-17.00 hrs.
Chairs: Marjoke Vervoorn & Paul Wesselink

Program
15.00 *Learning metrics using dental simulation.* **Laura Darnell,** D.D.S. John Hopkins University, USA .

15.20 *Motor learning in dentistry-Vision of the future.* **Susan Bridges,**PhD, The University of Hong Kong, HK
.
15.40 *Strategies to evaluate virtual systems in dental education: How reliable is the evidence*. **Margaret Cox**,
King's College London Dental Institute, UK .

16.00 Tea

16.10 *Relative contribution of haptic technology in implantology.* **David Joseph,** School of Surgery Nancy-Lorraine, University of Lorraine, France.

16.30 *Virtual patients in dental education.* **Paul Wesselink,** Academic Centre for dentistry Amsterdam (ACTA),
The Netherlands.

16.50 *SIG Virtual reality in dental education: Quo Vadis?*

17.00 Closing remarks

Learning Metrics using Dental Simulation

Dr. Laura Darnell
Johns Hopkins University

Study Design

- 50 predental students
  - 25 students used traditional methods
  - 25 students used advanced simulation

- Students were instructed how to prepare a class I mandibular preparation on tooth 36 and how to operate equipment.
- Each student was given 5 teeth to prepare.

Overall Scores on Preparations

- **Students using DentSim improved their scores on average from 78.26 to 90.47 between their first and fifth attempts.**
- **Students not using DentSim saw approximately a 2 point average increase in their score between their first and fifth attempts at their preparation.**

Average Scores
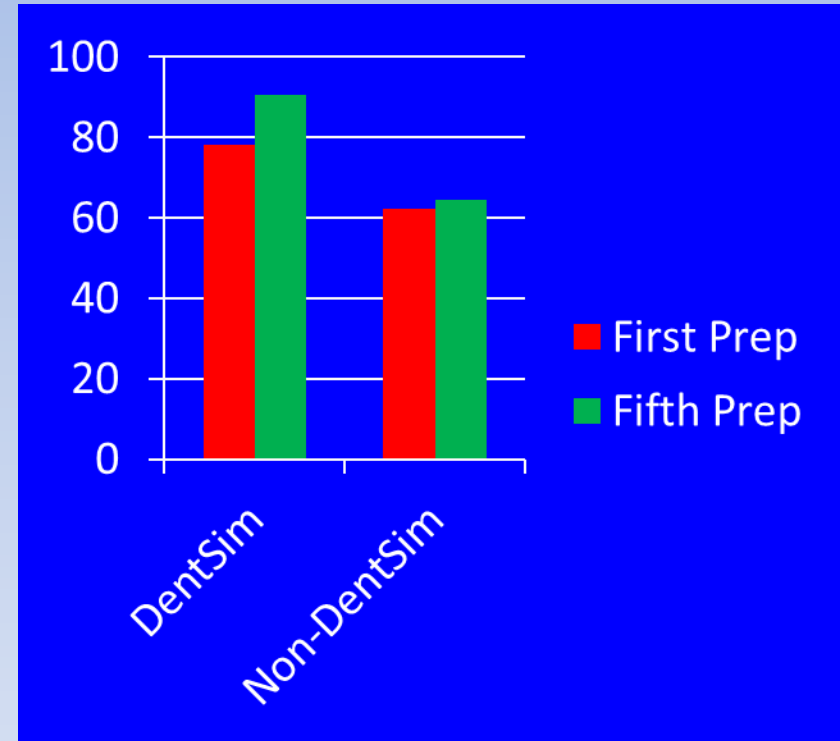
Conclusions

- Students improved their learning using simulation.

- Students with access to unlimited feedback use this whenever they need to and are therefore able to reduce the amount of clinically unacceptable errors and improve their overall score.

- Provide the students constructive, objective feedback.

Motor learning in dentistry
Susan Bridges

- Using a haptic dental trainer simple and complex procedures were performed and by encephalographics brain activity registred.

- At complex procedures language centre and motor centre communicate more resulting in less motor skills. During simple procedures this comunication does not occur and motor skills are better.

Relative Contribution of Haptic technology in implantology

David JOSEPH, Nguyen TRAN, Pascal AMBROSINI

Faculty of dentistry, department of periodontology &School of surgery, Nancy , France.

SIG, ADEE, Riga August 28th

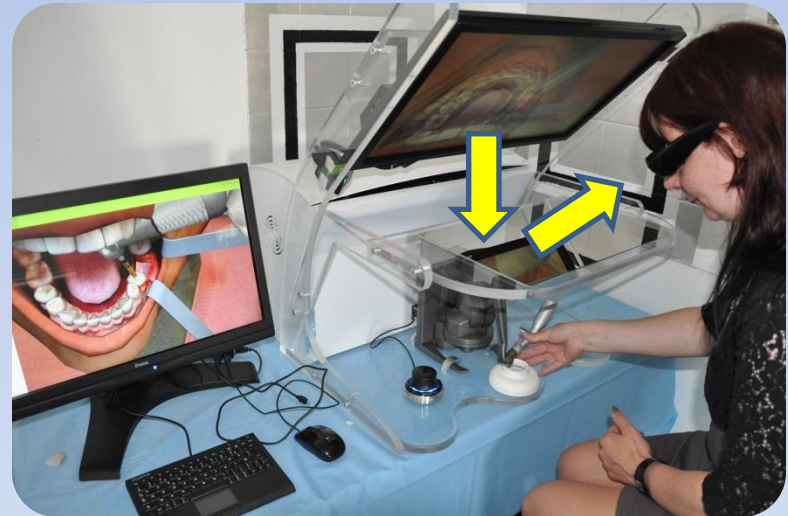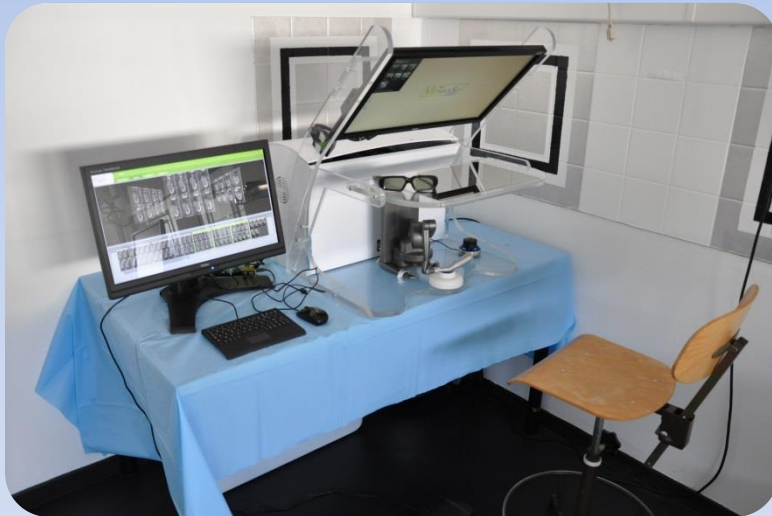Master 2R BIMC/ ISSM, Nancy le mardi 25 juin 2013

Haptic device

Haptic force feedback arm
Phantom®, dummy contra anguled

Haptic simulator, workstation

Worksation and use of Simulator

Aim of the study

Check the impact of Virteasy® as a teaching tool and progression in implantology

3 parts:

1) Impact of simulation training on the skills of the operator

2) Comparative study of three groups of operators: evaluation of drilling parameters on the model from the scanner cuts simulator

3) Subjective assessment of the simulator through a

Materials and methods: study population

«Novice » group (N=20, 10 ♀,10 ♂, average age 21,15 years)

- Students enrolled in DFGSO3 (3rd year dental) that received a theoretical course using a Powerpoint® presentation.

«Simulator» group (N=20, 10 ♀,10 ♂, average age 21,5 years)

- Students enrolled DFGSO3 (3rd year dental) that performed a 8 sessions course on the simulator Virteasy® in addition to the theoretical presentation.

«Expert » group (N=20, 11 ♀,9 ♂, average age 39,25 years)

- Licensed practitioners having already raised at least 15 implants, which receive a theoretical course using a Powerpoint® presentation.

Materials and Methods: Resin Model and Evaluation Criteria

Evaluation criteria
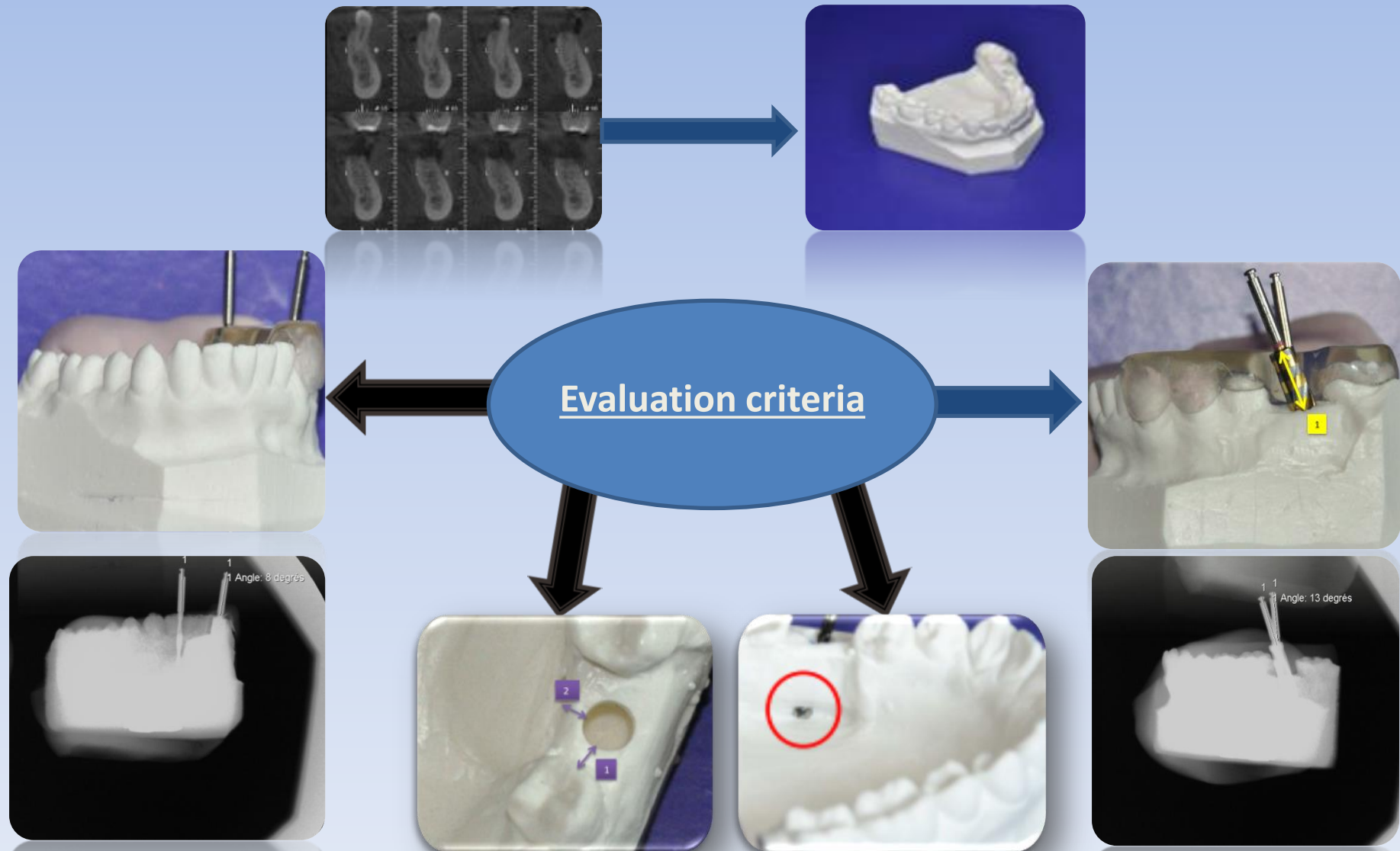
Discussion, conclusion

- **In their study they:**

  - **Distinguished the three populations with a basic exercise on resin model based on a simulator exercise.**

  - **Observed an increase performance in the "Simulator" group.**

  - **Identified some deficiencies and settings to improve the simulator.**

Strategies to Evaluate Virtual Systems in Dental Education: How Reliable is the Evidence?

**Margaret J. Cox; Barry F. A. Quinn,
Arash Shahriari-Rad, Jonathan P. San Diego and
Mark Woolford**

The Dental Institute and the Department for Educational Studies - King's College London

**40th Annual Conference of the Association
for Dental Education in Europe**

Limitations and confounders of previous studies (Quinn)

- Too short time span of using the innovation
- Innovation as a supplementary learning experience
- Unequal time spent on innovation compared with the traditional learning activity
- Using student volunteers instead of randomly assigned groups
- Different conceptual demands between innovation and traditional task
- Mismatch of method to potential of learning outcomes
- Not integrated into the curriculum
- Affordances of VR system different to the traditional system

hapTEL Workstation
(Curriculum Version)

3D Display Monitor

Shutter glasses

Camera

Audio speakers

Haptic handpiece

Pod

Haptic Device

Foot Controls

Lessons from the past

- **Disregard and ignorance of previous evidence, methods and theories has resulted in many repetitious and mediocre studies of little value to progressing research in VR dental in education.**

- Lack of understanding of VR technologies and their potential amongst educational researchers can result in inappropriate research designs, methods, analyses and consequent outcomes

- International comparative TEL/VR-assessments need to contribute to national policy analysis processes

- The dichotomy between researching VR in dental education within existing paradigms and the need to accommodate the changing nature of knowledge representation requires researchers to adopt new techniques and methods to capture new types of use and diverse ways of impact.

- **Critical Factors for effective research are – building on past evidence, reliability, consistency over time and validity**

Survey outcomes

- Aspects to be discussed

  Research data

  Experiences with education and implementation.

  Virtual patients

  Simulators in general.

Survey

Style of presentation

- **Lecture type**

- **Discussion**

- **Teleconference eg. via skype 50%**

Survey

- Should the SIG on virtual reality be continued?

100% yes

New mission?

- Develop guidelines for research in application of virtual reality in the dental learning environment as there may be a significant increase of the use of technology in learning