UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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Faculty of
Veterinary Science

Fakulteit Veeartsenykunde
Lefapha la Diseanse tša Bongakadiruiwa

InVeST Proceedings

10–12 April 2017

InVeST 2017

The 5th International Veterinary Simulation in Teaching Conference


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Welcome to InVeST 2017

It is a great pleasure to welcome delegates from all over the world to the 5th International Veterinary Simulation in Teaching (InVeST) Conference. Held on African soil for the first time, we hope that the Intundla Conference Venue will ensure that the meeting is enjoyed in the spirit of “umoya”, a Zulu word meaning team spirit. We are looking forward to a few days of sharing innovations and best practice in the exciting and rapidly developing field of veterinary simulation in teaching.

We therefore invite you to engage with an extensive network of experts, to form new partnerships and share knowledge with likeminded colleagues in a relaxing environment, while experiencing the rolling African bushveld.

We would like to thank our keynote speakers Sarah Baillie, Rikke Langebæk, Harold Bok and Dean Hendrickson for joining us. Furthermore, we would like to thank all workshop facilitators as well as all other delegates for their contribution to the InVeST 2017 conference.

InVeST Advisory Board
Dean Hendrickson
Sarah Baillie
Marc Dilly
Emma Read
Robin Farrell

Local Organizing Committee
Annett Annandale (Chairperson)

Elrien Scheepers

With special thanks to:
Susanna Fick for secretarial support
Matthew Wagner from Online Interactive Computing (Pty) Ltd for website design and -support

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Information for interactive poster/oral presenters

Posters will be displayed in Eland.

Each poster has been assigned a number which you will receive upon registration, from the Registration Desk. Assistants will be available to help you with placing your poster on the allocated poster board. Please remove your poster at the end of the conference. All posters will be removed by 15h00 on the 12th of April.

In the interactive poster sessions/ oral presentations, you will have five minutes to outline the key points of your abstract/ poster, followed by two minutes of questions from the audience. Please ensure that you do not exceed seven minutes, as strictly no additional time will be allowed. Please sit near an isle if you are presenting in a session, as handover time between presenters will be short and disruption to the audience must please be minimal.

Information on workshops

Workshops will run in parallel sessions of 90 minutes. There will be sign-up sheets available from Monday morning the 10th, on the notice board in Eland, which will indicate how many places are available per workshop. Places will be assigned on a first come, first served basis. Please sign up for one workshop per parallel session.

Workshop presenters must please not hesitate to contact any of the InVeST organizing committee members or assistants at the Registration Desk, should they require any help.

Information on model and simulator display area

The model and simulator display area is open to all delegates for the duration of InVeST 2017 in Eland. Delegates are welcome to display models. Please ask any InVeST organizing committee member for assistance to set up.

An open access demonstration on the use of technology to create simulations, including 3-D printing, will also be in the model and simulator display area. Staff from the University of Pretoria's Makerspace will gladly demonstrate the 3-D printer and answer your questions.

Left luggage and vacation of rooms

Left luggage facilities will be available at the Intundla Reception Office. Please note that all delegates must vacate their rooms by 10h00 on the 12th, and leave luggage in the office until the conclusion of the conference, unless extended accommodation has been arranged.

Internet access

You can access wireless internet on your own laptops, tablets and smartphones. The connection speed is 25mb/second on average.

At Intundla Conference Venue the Wi-Fi will be Eland, Zebra, or Giraffe. The password is intundla44.

At the Faculty of Veterinary Science, University of Pretoria, there are two Wi-Fi options:

1. Eduroam: You have to be activated for Eduroam at your home institution. Please use your usual username and login details.
2. TUKS-guest: create and register an account to log in.

Accompanying persons

Accompanying persons are welcome to join the full conference program, teatimes and lunches (and of course the social evening events booked). Spa visits (a pricelist will be provided from Intundla Reception upon request) and game drives (at R150 per person) can be booked directly with Intundla Reception and also online at www.intundla.co.za. Other free activities include canoeing, bird watching, hiking and swimming (please use your own swimming towels).

Old conference bags for the Onderstepoort outreach project

You are welcome to hand in old unused delegate/conference bags or backpacks that you want to donate to the children of the Onderstepoort Primary School at the Registration Desk.

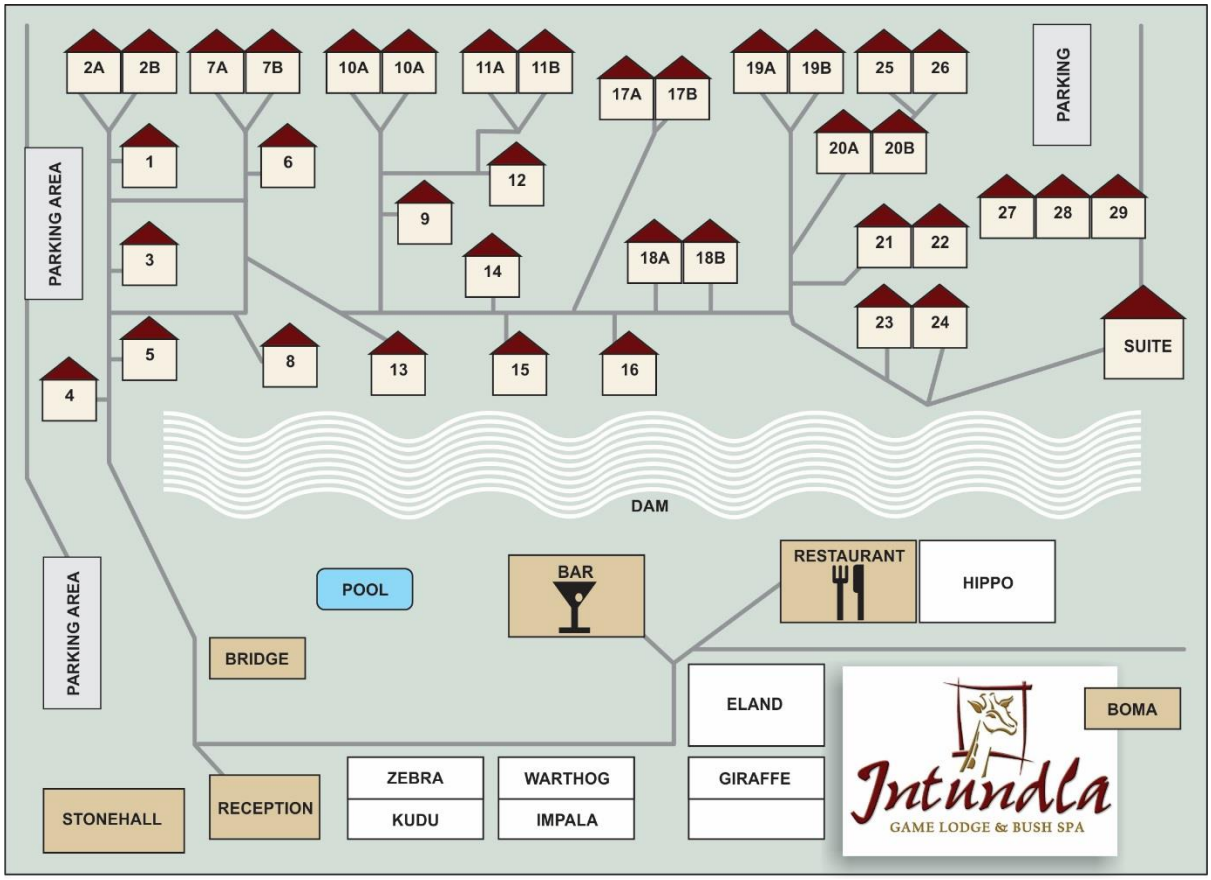
Transport to (and from) the Faculty of Veterinary Science on 11 April

Delegates will be transported by bus. Please note that the departure time is strictly at 7h50. Please be at the parking area close to the dam by 7h40.

Onderstepoort Skills Laboratory and Onderstepoort Veterinary Academic Hospital tours

These tours will take place on 11 April. Information on group meeting points and times will be given on the day. Note that the bus will depart at 17h15 to Intundla Conference Venue after the visit to the Faculty of Veterinary Science.

Conference Venue site map



Keynote Speakers and Addresses

Sarah Baillie

Sarah has had a varied career; she was in clinical practice for many years, then undertook a PhD in computer science and most recently has lead a major curriculum review at Bristol Veterinary School. She has a diverse portfolio of educational research including assessment, peer assisted learning, curriculum development, professionalism and business skills and is particularly passionate about clinical skills and simulation. She set up the online discussion group 'Veterinary Clinical Skills & Simulation' in NOVICE to support the community's sharing of innovation and ideas worldwide and has been involved in developing many clinical skills models (high-tech and low-tech). She also often demonstrates veterinary simulators to the public including at the Science Museum in London and as part of the BBC Christmas Lectures.

Look how far we have come - what's changed in veterinary simulation over the last 10 years?

As little as 10 years ago veterinary simulation and clinical skills labs were the exception rather than the rule. It is therefore timely to reflect upon the huge amount of progress the veterinary education community has made worldwide in supporting student learning of clinical and practical skills through the development of many innovative simulators and the opening of new clinical skills labs. The keynote address will chart the journey and include examples of educational innovation as well as posing questions about future opportunities and possible challenges.

Rikke Langebæk

Rikke is an associate professor at University of Copenhagen. Her PhD was in veterinary pedagogy and focused on the emotional impact of training surgery in a skills lab. Her research has continued in this direction – investigating learning and teaching methods with a special focus on surgical training. She has developed, implemented and is now head of The Veterinary Skills Lab at the University of Copenhagen. All the models in the skills lab are created by Rikke, and are used in the basic surgical courses that she is in charge of.

Creativity in veterinary education

Does creativity have a valid place in veterinary education or should the concept be reserved for studies in design, fine arts, music and architecture? In this presentation I will talk about creativity and argue why creativity in my opinion is the essence of learning in higher education, including veterinary education. Creativity is present throughout veterinary education, whether we acknowledge it or not. I will illustrate the different shapes and forms by which creativity presents itself, and discuss how we can improve teaching and learning by bringing creativity forward and out of the shadows.

Harold Bok

Harold graduated from the Faculty of Veterinary Medicine, Utrecht University in 2005. He is an assistant professor at the centre for Quality Improvement in Veterinary Education, Faculty of Veterinary Medicine, Utrecht University, the Netherlands. He is the chairman of the Quality Assessment Committee at the Faculty of Veterinary Medicine, as well as project leader in several educational projects on workplace-based assessment and faculty development. In 2014 he defended his PhD-thesis entitled Competency-based Veterinary Education: An integrative approach to learning and assessment in the clinical workplace. His research interests are workplace-based learning and assessment, programmatic assessment and competency-based education.

E-portfolios and its role in veterinary education

Are electronic portfolios worth the effort in veterinary education? In this keynote address I will talk about why we could use portfolios, how they could contribute to student learning, illustrate different portfolio types and discuss their usability in veterinary education. Especially in outcome-based educational programs where decisions are based on longitudinally gathered assessment and learning information, e-portfolios with learning analytics are crucial means. An e-portfolio is an aggregated collection of information from several instruments that represent a learner's ideas, reflections, and evidence for learning. Based on scholarly evidence and my own experiences I will discuss the pitfalls and promises of using an e-portfolio in health care education.

Dean Hendrickson

Dean received his DVM from Colorado State University in 1988, and completed an Equine Surgery and Medicine Internship at the University of Sydney, Australia and Large Animal Surgery Residency at Cornell University in 1992. He was on faculty at the University of Wisconsin-Madison for 2 ½ years and joined the Department of Clinical Sciences at Colorado State University in December 1994. His primary clinical interests are in Equine Wound Care and Minimally Invasive Surgery. He is very interested in surgical skills training and has developed models for surgical training. He has started developing eBooks for student notes.

Developing an e-book – the pitfalls I fell into

Our students live in the digital age. They have expectations that their class notes will be interactive and can serve as a resource when they complete their program. On-line publishing is becoming easier and there are many different options for development of "eBooks". In this keynote address I will describe concepts in eBook development, including some "pit falls" that I fell into when developing my first eBook. I will discuss some of the various platforms for eBook development and deployment.

Workshops

1) Building an e-book: how do you start? by Dean Hendrickson

This workshop will go over the resources necessary to develop an eBook to use in teaching. Bring your ideas and your computer! By the end of the workshop you should have the first chapter fleshed out.

Dean Hendrickson received his DVM from Colorado State University in 1988, and completed an Equine Surgery and Medicine Internship at the University of Sydney, Australia and Large Animal Surgery Residency at Cornell University in 1992. He was on faculty at the University of Wisconsin-Madison for 2 ½ years and joined the Department of Clinical Sciences at Colorado State University in December 1994. His primary clinical interests are in Equine Wound Care and Minimally Invasive Surgery. He is very interested in surgical skills training and has developed models for surgical training. He has started developing eBooks for student notes.

2) Challenges and promises: the use of an e-portfolio in workplace-based learning and assessment by Harold Bok and Herman Jonker

During this workshop experiences with e-portfolios from educational practice and evidence from educational research will be briefly presented. In small groups the participants will then gain experience in the different features of an e-portfolio, and discuss its pros and cons. Examples of best practices will be shared. The workshop will be highly interactive, requiring participants to use the evidence and translate it to their educational practices.

Harold Bok graduated from the Faculty of Veterinary Medicine, Utrecht University in 2005. He is an assistant professor at the centre for Quality Improvement in Veterinary Education, Faculty of Veterinary Medicine, Utrecht University, the Netherlands. He is the chairman of the Quality Assessment Committee at the Faculty of Veterinary Medicine, as well as project leader in several educational projects on workplace-based assessment and faculty development. In 2014 he defended his PhD-thesis entitled Competency-based Veterinary Education: An integrative approach to learning

and assessment in the clinical workplace. His research interests are workplace-based learning and assessment, programmatic assessment and competency-based education.

Herman Jonker graduated from Utrecht University Faculty of Veterinary Medicine, the Netherlands in 1981. In 1982 he started as an intern at the former Department of General and Large Animal Surgery of Utrecht University. In 1983 he switched to the Department of Obstetrics, Gynaecology and AI, now the Department of Farm Animal Health. In 1993 he got his PhD with the thesis entitled "Cardiotocographic Monitoring of the Bovine Fetus". In 2000 he became a Diplomate of the ECAR (European College of Animal Reproduction). His main clinical and research interests are obstetrics, perinatology and reproductive surgery. In the recent years he has become more and more involved in the examination of students and since mid-2014 he is chairman of the evaluation committee of the postgraduate veterinary e-portfolio's.

3) Insomnia and the potential horrific impact on mental health among veterinarians by Hermann Liebenberg

This interactive workshop will deal with causal as well as ameliorating aspects regarding sleep deprivation due to insomnia with specific focus on veterinarians. The long-term impact of the various causal factors of insomnia will be highlighted and practical interventions (psychological self-care and preventative actions) will be discussed in order to improve mental health. Participation during the workshop is voluntarily and no attendee will be asked to share any personal information / be in interaction with the presenter if not comfortable.

Hermann Liebenberg started his career 29 years ago in the South African Defense Force (SANDF) as a psychometrist. While at the Military Psychological Institute he was involved in the selection and support of Special Forces, pilot selection, bomb disposal teams, being part of the SANDF hostage negotiation team, specialist hostage negotiation trainer; as well as various other Special Forces selections and training. Hermann was involved in various trauma debriefings and interventions related to post-traumatic stress situations. He completed his Master's degree in Counselling Psychology (University Johannesburg) with a dissertation on "The Post-Concussion Syndrome. He completed his Doctorate degree with a thesis in the combined fields of Complex trauma, Obesity and Bariatric surgery. Hermann holds a wide repertoire as a guest or keynote speaker at national and international congresses, frequent commercial publications in popular magazines, newspapers, and radio and television broadcasts. He also presented extensively on the effects of torture, complex trauma, PTSD and hostage negotiations. About nine years ago he engaged in various psychological interventions related to the veterinary and related professions. He got involved in the debriefing of National and International Animal Rescue Operations. During 2012 and 2013 he acted as a part-time lecturer in Veterinarian Professional Life at the Onderstepoort Veterinary Faculty. Hermann has a special interest in the mental health of veterinarians and para-veterinarians.

4) Mould making, mould casting and silicone model development by Liezl Kok

In this workshop, participants will gain basic moulding and casting techniques and knowledge and experience in the technical aspects of silicone and two-part component rubbers. Silicones are used for making moulds that are poured, brushed or sprayed on the model and have specific performance characteristics. Participants will be given the necessary materials (consisting of an original model, clamps, scale, modelling clay, mixing containers, stirring sticks, sealing agent, release agent and molding rubbers) to make a mould. The basic elements of mould making will be demonstrated and taught using step by step instructions.

Liezl Kok completed her National Diploma in graphic design at the Technicon Witwatersrand in 2000. Thereafter she freelanced in graphic design with award winning results, for the next two years. She then joined the corporate sector, becoming an Art Director. She then left to join the non-governmental organization sector, as she believes in giving back to the community through skills transfer and product development in various mediums that include painting techniques, fabric printing, glass work, beading, moulding and casting, papermaking, crochet and embroidery. Her work has integrated communities and their produce into the corporate market. She trained local community members in the art of moulding and casting, business skills, marketing and

communications as part of a casting project initiated by the Gauteng provincial government and Witwatersrand University Evolutionary

studies Institute. Liezl has become involved in the Onderstepoort Skills Laboratory in 2015 and has been part of the team ever since. She assists in developing and manufacturing veterinary training models.

5) Simulated client training: addressing character and skills development, script write- up and the importance of feedback by Elpida Artemiou and Beth Dronson

Clinical communication is a Day One competency. A successful method of learning communication skills is active engagement and practice. Critical to this method are trained and experienced simulated clients. This workshop will focus on the training of simulated clients including selection, skills training, development of scripts, and delivering feedback. In small groups, participants will practice simulated client development through vignettes and live simulations, as well as engage in discussions on how best to support and strengthen simulated client training. This workshop will enhance any stage of communications program and will be of interest and value to novice as well as experts in communication skills development.

Elpida Artemiou is an Assistant Professor of Clinical Communication at Ross University School of Veterinary Medicine. Elpida began her professional career in counseling at Ross University School of Veterinary Medicine and continued to complete a PhD in Medical Education with an emphasis on Clinical Communication. Through her teaching Elpida follows a process skills approach while encouraging students' individuality and innovation. She views research as an integral component of enhancing teaching and is interested in novel teaching methodologies and outcome assessments. Elpida is interested in computer-assisted-programs to teach clinical communication skills and explored possibilities of incorporating blended learning in the classroom. Furthermore, Elpida has developed and implemented outcome assessments to measure students' communication competence and explored the role of Simulated Clients (SCs) as examiners as well as developed SC assessment training

programs. Elpida is passionate about the importance of the human-animal-bond and providing compassionate care while promoting diversity and embracing the One health approach.

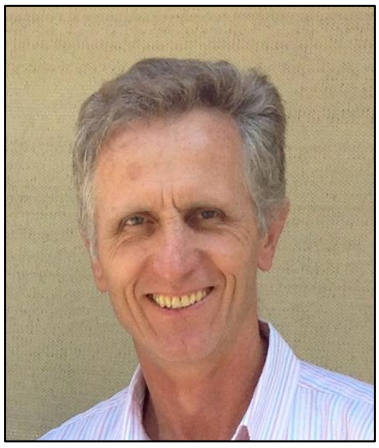
Beth Dronson is a former Academic Liaison from Zoetis- Pfizer Animal Health. She helped develop and currently teaches in the communication program at University of Pennsylvania, along with deliverying workshops nationally and internationally. Beth is a 1987 graduate of University of Pennsylvania School of Veterinary Medicine. She has continually practiced in the small animal realm since then- first full time and now part time. After a background in small animal practice, feline practice, teaching and consulting, she worked at Zoetis full time from 2005 to 2015. Originally in Technical Services and Regulatory Affairs, the opportunity to serve as Academic Liaison to the Caribbean Vet Schools emerged in 2010 and expanded to include the Northeast and Mid-Atlantic schools, which allowed her to serve the Deans and their leadership teams and the students. Education, Communication and Wellness are continuing passions.

6) Skills centres and the curriculum by Pete Irons

The relationship between the skills centre and the curriculum is the focus of this workshop, with good integration being essential to maximise the return on investment in the centre. Discussion will cover the importance of good alignment and an approach to and experiences with some tools to achieve this. A model with the origin and development of the centre embedded in curriculum development is outlined, working through the definition of program outcomes and the component skills, assignment of each to organisational units, involvement of academic staff in the development of materials, inclusion in the teaching

and assessment and the allocation of time to learning the skill. The use of curriculum mapping and skills recording tools will be discussed. Participants are encouraged to share their experiences in this regard.

Pete Irons graduated as a veterinarian in South Africa and has worked there, in the United Kingdom and in the USA, both in practice and academia. He is a reproduction specialist with over 20 years' experience as a specialist and consultant, particularly in bovine and canine reproduction. He has focused increasingly on veterinary education since taking up a full-time leadership role at the University of Pretoria in 2009, where he played a prominent role in curriculum development and expansion of the teaching and learning facilities. His current role is that of Veterinary Program Director and Associate Professor at Murdoch University's College of Veterinary Medicine, with responsibilities in curriculum development and oversight in addition to other academic duties. His research interests include veterinary education, canine, domestic ruminant and wildlife reproduction and assisted reproduction technologies.



7) The Internet of Things and artificial intelligence delivering solutions for veterinary science through mobile applications by Harry Pretorius

As part of the fast moving pace of technology, as well as the change in student generations and expectations from a learning interaction, it is critical that partnering with fast moving companies enables teaching institutions to produce learning experiences that support the learning behaviours of students, as well as delivering advanced techniques that cannot always be delivered in a one-on-one basis. This workshop will cover the agile life cycle of application development, as well as the opportunities currently being explored from virtual reality and augmented reality to supplement applications. The workshop will also address the closely inter-related Internet of Things sensor capabilities and artificial intelligence components to enhance the delivery of educational and monitoring experiences. Participants will be taken on a journey demonstrating what is possible to be converted into an electronic interaction and guided through the steps and thought processes of initiating your own application.

Harry Pretorius is a global artificial intelligence and Internet of Things inventor-developer, a big data innovator and Director of the Mind the Gap Group.

8) Using creativity as an educational method in veterinary surgery by Rikke Langebæk

The aim of this workshop is to experiment with an active, inductive and creative educational method and together investigate and discuss if such teaching methods can encourage deep learning and foster reflection, creativity and self-efficacy in students, thereby improving students' ability to handle surgical situations that diverge from the textbook 'recipe'. In the workshop, participants will meet a creative challenge and work in groups to come up with a solution. The solutions will be presented and an example of a similar process, conducted with surgical students at University of Copenhagen, will be described. We will then discuss our thoughts and experiences regarding creativity as an educational tool – or maybe even goal - in surgical training.

Rikke Langebæk is an associate professor at University of Copenhagen. Her PhD was in veterinary pedagogy and focused on the emotional impact of training surgery in a skills lab. Her research has continued in this direction – investigating learning and teaching methods – with a special focus on surgical training. She has developed, implemented and is now head of The Veterinary Skills Laboratory at University of Copenhagen. All the models in the skills lab are created by Rikke, and are used in the basic surgical courses that she is in charge of.

InVeST 2017 Program – Monday 10th April 2017 @ Intundla Conference Venue

7h00 – 9h00	**Breakfast / Registration**	
9h00 - 9h15	**Welcome to InVeST 2017**	
9h20 – 10h05	**Keynote Address: Sarah Baillie** Look how far we have come – what's changed in veterinary simulation over the last 10 years?	
10h10 – 11h00	Viewing of posters and model /simulation display	
11h05 – 11h25	**Tea**	
11h30 – 12h30	**Oral Presentations Session 1**	**Skills and Simulation / Assessment**
		Christopher, Rachel: Introducing a series of primary care focused clinical skills practicals to prepare students for rotations and work-placements
		Baillie, Sarah: Reflections on some initiatives used to optimise the impact of a clinical skills laboratory in promoting learning
		Williamson, Julie: The impact of model fidelity on acquisition of three-layer abdominal incision closure skills in novice veterinary students
		Cerfogli, Frank: Objective Structured Clinical Examination by means of an anaesthesia simulation
		Michel, Anita: Development of a diagnostic intradermal tuberculin test model for bovine tuberculosis
		Holm, Dietmar: Objective assessment of practical skills in final year veterinary students
		Mostert, El-Marie: The effect of Bloom's taxonomy level and other factors on the performance of final year veterinary students in theoretical assessment
12h30 – 13h25	**Lunch**	
		Challenges and promises: The use of an e-portfolio in workplace-based learning and assessment by Harold Bok and Herman Jonker
		Insomnia and the potential horrific impact on mental health among veterinarians by Hermann Liebenberg
		Using creativity as an educational method in veterinary surgery by Rikke Langebæk
15h00 – 15h15	**Tea**	
15h20 – 16h05	**Keynote Address : Rikke Langebæk** Creativity in veterinary education	
16h15 – 17h45	**Workshops Session 2**	**Insomnia and the potential horrific impact on mental health among veterinarians** by Hermann Liebenberg
		Building an e-book: how do you start? by Dean Hendrickson
		The Internet of Things and artificial intelligence delivering solutions for veterinary science through mobile applications by Harry Pretorius
		Skills centres and the curriculum by Pete Irons
19h30– 24h00	**Boma Braai**	

InVeST Program – Tuesday 11th April 2017 @ Faculty of Veterinary Science

7h00 – 7h35	**Breakfast / Registration**	
7h50 - 9h00	**Travel to Onderstepoort**	
09h10 - 9h20	**Welcome to Onderstepoort**	
9h25 – 10h10	**Oral Presentations Session 2**	**E-learning**
		Jonker, Herman: Implementation of an E-learning teaching module supports active learning and improves understanding of the regulation of oestrous cycles of domestic species
		Malinowski, Robert: Virtual, mixed and augmented reality in veterinary education
		Reichel, Michael: Panoramic video telepresence provides immersive virtual reality to enhance and extend student learning experience
		Vermot Des Roches, Marine: Self-evaluation and monitoring of clinical skills laboratory visitation using "VetSims'App", a dedicated web-app based on QR code technology
10h10 – 10h25	**Tea**	
10h25 – 11h10	**Keynote Address: Harold Bok** E-portfolios and its role in veterinary education	
11h20 – 12h50	**Workshops Session 3**	**Simulated client training: addressing character and skills development, script write-up and the importance of feedback** by Elpida Artemiou and Beth Dronson
		Building an e-book: how do you start? by Dean Hendrickson
		Mould making, mould casting and silicone model development by Liezl Kok
12h50-13h50	**Lunch**	
14h00 – 14h40	**Oral Presentations Session 3**	**Skills and Simulation**
		Trace, Chris: Virtual canine lameness: the development of a training tool
		Klit, Karel Johan : Virtual farrowing unit – increase piglet survival rate in a game-based setting
		Knecht, Chris: Construction of a pig model for training students in taking blood samples
		Whitehead, Ashley: Tips and tricks for equine emergency scenario simulation in pre-clinical veterinary student training
		Wager, Catherine: The rehearsal of clinical skills in sequence, through case-based scenarios
14h45 – 15h00	**Tea**	
15h05 – 17h05		**OP Skills Lab Tour**
		Hospital Tour
		Free time to visit Skills Lab
17h15– 18h30	**Travel to Intundla**	
19h45 – 24h00	**Conference Dinner**	

InVeST Program – Wednesday 12th April 2017 @ Intundla Conference Venue

7h00 - 8h30	**Breakfast/Registration**	
08h30 – 9h20	**Oral Presentations Session 4**	**Teaching Methods / Communication**
		Decloedt, Annalies: Flipping the classroom: does it work for the skills laboratory?
		Meier, Jack: The development of e-learning and clinical skills resources to improve the teaching of small animal wound management
		Hendrickson, Dean: Strengths, weaknesses, gaps and redundancies in the Colorado State University equine curriculum
		Engelskirchen, Simon: Influence of skills laboratory training on students' perceived self-efficacy
		Whitehead, Ashley: Simulated clients in final year dental rotations
		Gaida, Silke: Communication skills in veterinary industry – a qualitative approach
9h20-9h40	**20 min break**	
9h40 -10h15		**Skills and Simulation**
		Wager, Catherine: Beyond the physical skills station: student usage of clinical skills demonstration videos in veterinary clinical skills teaching
		Fletcher, Daniel: An Open Source hardware and software platform for veterinary immersive simulation training
		Shettko, Donna: Using simulation models to teach surgical skills in developing countries
		Shettko, Donna: Participation in a surgical simulation review program improves performance in the live animal surgery laboratory
10h20 – 11h05	**Keynote Address : Dean Hendrickson** Developing an e-book – the pitfalls I fell into	
11h05 – 11h25	**Tea**	
11h30 – 13h00	**Workshops Session 4**	**Simulated client training**: **addressing character and skills development, script write-up and the importance of feedback** by Elpida Artemiou and Beth Dronson
		Skills centres and the curriculum by Pete Irons
		The Internet of Things and artificial intelligence delivering solutions for veterinary science through mobile applications by Harry Pretorius
		Using creativity as an educational method in veterinary surgery by Rikke Langebæk
13h10 – 13h20	**Closing remarks**	
13h25 – 14h25	**Lunch**	

Oral Presentations Session 1 - Skills and Simulation / Assessment

1) Introducing a series of primary care focused clinical skills practicals to prepare students for rotations and work-placements

Christopher R[1], Lindsey S[1], Muguet-Chanoit A[1], Williams J[1], Catterall A[1], Baillie S[1]
[1]University of Bristol

A set of new primary care focused practicals were introduced for 4th year students in the Clinical Skills Laboratory. The aims were to focus on procedures that students will routinely undertake during work-placements and clinical rotations and to build upon the core skills taught in the preceding year.

The procedures were selected from suggestions made by employers, graduates and students and included:

- Otoscopic examination
- Ophthalmic examination including direct ophthalmoscopy, Schirmer tear test and application of eye drops
- Dermatology: skin scrape, tape strip and Diff Quick stain of slides
- Dentistry: ultrasonic scaling, dental charts and making a basic dental model
- Intermediate level suturing techniques: cruciate, intradermal and Aberdeen knot

A range of models and instruction booklets were developed. This included an ocular model from Bristol Medical Pro Limited and an ear made from Tubigrip and plastic piping. Fruit was also utilized e.g. an eyelid cut into a lime, that simulated tear flow. The dental scaling model was based on Lumbis et al.[1] with input from the School of Oral and Dental Sciences, University of Bristol.

In each practical, groups of 30 students visited stations during a 90 minute period. Feedback was gathered using Post-it® notes. Student comments were overwhelmingly positive with the sessions being considered 'enjoyable' and 'helpful'. The value of using models prior to exposure to live animals was highlighted, while spending time making the basic dental model was seen as 'therapeutic'. Some students requested more time, particularly for suturing. Future development of the clinical skills practicals will include modifying the set-up of some practicals to maximize the time available for teaching.

[1] Lumbis, R; Gregory, S; Baillie, S. Evaluation of a dental model for training veterinary students. Journal of Veterinary Medical Education, Vol. 39, No. 2, *2012*, p. 128-135.

2) Reflections on some initiatives used to optimize the impact of a clinical skills laboratory in promoting learning

Baillie S[1], Catterall A[1], Christopher R[1], Lindsey S[1]
[1]University of Bristol

As part of a recent major curriculum review the need for improved clinical skills training was highlighted by students, recent graduates and employers. Therefore, a new Clinical Skills Laboratory (CSL) was opened in 2012, which is now used for teaching throughout the five year curriculum. It is run by a dedicated team who have developed a wide range of innovative models and supporting learning resources.

Our reflections on initiatives that promote learning include:

1. Embed formal teaching in the timetable to ensure all students have opportunities to develop practical and clinical skills at the most advantageous times e.g. prior to work-placements and rotations. However, there can be challenges for staffing and schedules.

2. Operate an open-access policy to give students multiple opportunities to practise and at times that best support their learning needs. A set of CSL 'House Rules' helps ensure students sign up to safe working practices e.g. no lone-working.

3. Involve recent graduates in development of learning resources; they know what students really need to support their learning and for the transition into practice.

4. Develop instruction booklets to enable students to learn skills, step-by-step. Including 'how to reset the station' is invaluable as it means the CSL remains tidy and all stations are always ready for the next learner.

5. Tips from colleagues in the online forum 'Veterinary Clinical Skills' (www.noviceproject.eu) are invaluable.

6. Ultimately, assessment drives learning - so Objective Structured Clinical Examinations are a must.

3) The impact of model fidelity on acquisition of three-layer abdominal incision closure skills in novice veterinary students

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[1]Lincoln Memorial University
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[3] Ross University School of Veterinary Medicine

Veterinary surgical simulation can be used to increase student competency prior to live animal surgery. Abdominal surgeries are common, so the ability to perform a three-layer abdominal incision closure is critical.

This study compared one lower-fidelity (LF) model made of foam and fabric, and one higher-fidelity (HF) model made of poured silicone, for teaching novice veterinary students this task. Veterinarians (n=10) evaluated both models. Students (n=38) were randomly assigned to LF and HF groups. They participated in four three-hour teaching sessions using their model and completed a model evaluation survey. Students were recorded performing three-layer closure on a canine cadaver before and after their training. Blinded raters scored the recordings, using a task-specific rubric.

Veterinarians believed both models were suitable for training and assessment (median 'agree', 5-point Likert scale, both models). Students reported that both models were not helpful for learning the task (median 'disagree', both models), but student improvement scores, calculated by subtracting each student's pre-test score from the post-test score, were positive values for 78% of LF and 95% of HF students (p=0.12). Improvement scores were statistically higher for the HF group (M=7.9) than for the LF group (M=4.1, p=0.04).

This suggests that even for novice students, an increase in model fidelity may improve learning outcomes for three-layer incision closure. Selecting the most appropriate model for teaching remains a multifactorial decision.

4) Objective Structured Clinical Examination by means of an anaesthesia simulation

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[1]Iowa State University College of Veterinary Medicine

At the Iowa State University College of Veterinary Medicine, second year veterinary students are taught anaesthesia by means of lectures and anaesthesia laboratories. One of these laboratories in particular teaches the assembly and operation of the anaesthetic machine and drug calculations for patients. The students assemble the machine, do all the operational checks and calculate drug rates. In order to improve the students' ability to identify components, assemble and operate the anaesthesia machine, an Objective Structured Clinical Examination (OSCE) was developed, that focused on thirteen critical aspects of the process.

The OSCE was carried out by means of a Dispomed® complete unused anaesthetic machine and a RescueCritters® intubation simulator. The thirteen areas were:

- identify anaesthetic machine components
- describe components functions
- identify breathing systems
- calculate reservoir bag size
- assemble rebreathing and non-rebreathing systems
- leak test a rebreathing and non-rebreathing system
- demonstrate gas supply knowledge

- calculate fresh gas flow rates
- list breathing system differences
- calculate breathing system time constants
- describe proper intubation protocols
- demonstrate proper tracheal intubation
- demonstrate proper endotracheal tube cuff inflation

All second-year students (n=120) were examined by means of the OSCE. They were graded on a scale from 5 (superior) to 1 (deficient). Students that scored grades of 1 and 2 were considered unsatisfactory. Students that scored 3, 4 or 5 passed the examination. Ninety-four percent (113/120) of students passed the OSCE. In conclusion, the highest scoring focus areas involved mathematical calculations. The lowest scoring focus areas involved assembly and functional operation of the machine.

5) Development of a diagnostic intradermal tuberculin test model for bovine tuberculosis

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Bovine tuberculosis caused by *Mycobacterium bovis*, is a chronic debilitating disease of mostly domestic cattle with infections reported in a wide range of domestic and wild animal species and also in humans. Due to its trade and public health implications, bovine tuberculosis is a controlled disease in many countries.

The prescribed diagnostic test is the intradermal tuberculin test (skin test) which involves the evaluation of the host's hypersensitivity reaction 72 hours after the intradermal injection of purified derivatives of mycobacterial proteins (bovine and avian tuberculin). Interpretation of skin test reactions is based on measuring the increase in skin thickness, as well as the subjective evaluation of any clinical signs observed such as edema and necrosis. The quality of the test outcome is highly dependent on the operator's skills and experience in performing this test. Practical training of veterinary students in the correct execution and interpretation of the skin test is therefore a critical Day 1 competency.

Live animal training for intradermal tuberculin testing is limited and no skin test models are commercially available. Therefore, bovine skin models made of dragon skin and platinum-cure silicon placed on aluminum clipper frames measuring 20x30cm and covered with artificial hair were developed. Each of the five models represents a different common test outcome: edema, diffuse or circumscribed swellings, necrosis and adhesion of the skin. The models are used to evaluate the different skin reactions by palpation, measuring skin thickness, and visual evaluation. A step-by-step manual is available to guide students through the procedure and interpretation of the skin reactions.

6) Objective assessment of practical skills in final year veterinary students

Holm D E[1], Mostert E[1]
[1]University of Pretoria

Objective Structured Clinical Examinations (OSCEs) were used to assess practical skills as part of the final examination of veterinary students at the University of Pretoria. A list of 40 practical skills to be assessed was set up by the examination committee in consultation with two external moderators. Examiner training on skills assessment was provided in workshops, following which rubrics for OSCEs were developed through a four-stage revision process. Ten OSCEs were assigned to each of four discipline-based panels, and made available to students two months before the examination.
Students were randomly allocated to an examination order in pairs, who then drew cards so that each student attended two panels: either Small Animals or Equines, and either Production Animals or Pathology and Veterinary Public Health. Students who failed one panel were offered an ancillary examination in that panel. Grades for the OSCEs were calculated as the proportion of correctly marked steps adjusted according to the subjective global rating score of the examiner and a critical error penalty. Theoretical knowledge was assessed separately, using Computer-Based Assessment.

A total of 276 panels were examined with 20 failures and a mean grade of 85.5% (95% CI 83.3% - 87.6%), independent of whether it was a student's first, second or ancillary panel ($P > 0.37$). Subjective examiner scores significantly decreased grades in all panels except Pathology and VPH where subjective scores were higher than in all other panels ($P < 0.01$), whereas objective scores were only higher than the Production Animal and Small Animal panels. Practical examination grades were not correlated with CBA grades (coefficient 0.08, $P = 0.38$).

It was concluded that a range of practical skills can be assessed accurately and independently of theoretical knowledge using only two OSCE panels per student.

7) The effect of Bloom's taxonomy level and other factors on the performance of final year veterinary students in theoretical assessment

Mostert E[1], Holm D E[1]
[1]University of Pretoria

Objective computer-based assessment was used for the final comprehensive theoretical day one competency examination of veterinary students at the University of Pretoria. This examination consisted of different question types in 11 veterinary disciplines across 6 domestic animal species.

Questions were scrutinised by an expert panel. The questions were also categorised according to the six levels of Bloom's revised taxonomy. Questions from all the cognitive levels were included in each discipline, to confirm that the students' competence was assessed with the emphasis on application of information and higher order thinking skills (levels 3-6). With retrospective quality assurance, difficulty score was determined as the mean score achieved by students for each question. Discrimination score was determined

(for single choice questions only) as the high-low discrimination ability of the question using Questionmark Perception.

In the examination of November 2016 (215 questions and completed by 125 students), Bloom's level 1 to 6 represented 11%, 27%, 29%, 23%, 7% and 3% respectively. Short answer-, single choice-, multiple response- and matching type questions represented 19%, 38%, 35% and 8% respectively of the maximum score for the examination. Data were entered into a statistical analysis programme (NCSS 2007, NCSS, Kaysville, UT, USA). Following descriptive statistics to determine univariable associations, multiple regression analysis was performed to establish the independent predictors ($P < 0.05$) of difficulty and discrimination score of questions.

The difficulty score (mean 0.61; SD 0.26) and discrimination score (mean 0.23; SD 0.16) of single choice questions were negatively correlated; however this association was not significant (P=0.18). Question type, Bloom's level and discipline, but neither species nor maximum score of the question, were independently associated with difficulty scores of all questions ($P<0.05$). It was concluded that balance between different disciplines and species represented in final year veterinary examinations can be improved by changing the weighting of different Bloom's levels or question types in species and/or discipline categories.

Oral Presentations Session 2 – E-learning

1) Implementation of an e-learning teaching module supports active learning and improves understanding of the regulation of estrous cycles of domestic species

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Veterinary students often struggle to understand reproductive physiology, due to the large variation between species regarding regulation of estrous cycles.

An interactive on-line module on the comparative biology of the estrous cycle of the cow, sow, mare, bitch and queen was developed for pre-graduate veterinary students. The aim of this e-learning module was to improve the students' knowledge by providing insight into hormonal changes during the estrous cycle in domestic animal species and differences in the regulation of the estrous cycle between species. The e-learning module was complementary to lectures and seminars.

The e-learning course consisted of three main sections. Each section included interactive modules, integrated video clips, clinical instruction movies, interactive graphics and quizzes with immediate feedback. The first section provided insight into general cross-species principles of hormones, the regulation of these hormones, their role in the estrous cycle and their effect on the reproductive organs. In the species-specific chapters of the first section, students had to actively simulate the hormonal changes during the cycle. Section two addressed physical examination of reproductive organs in relation to the estrous cycle.

Section three contained representative clinical case studies.

The e-learning course was evaluated in a survey. Of the responding students (n=193), 6% did spend < 3 hours, 27% 3 hours, and 67% >3 hours on the e-learning course. They indicated a significant effect in understanding the estrous cycles of the species. The majority of these students preferred the e-learning course above lectures or seminars, recommended its use to others and expected to use the module in the postgraduate program.

2) Virtual, mixed and augmented reality in veterinary education

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Advanced visual simulation technologies have gone mainstream and are now available to consumers and educators alike. Rather than being physical simulators, these systems generate visualizations of three-dimensional objects and immersive environments that users can interact with using a variety of devices. The technologies have rapidly matured over the past two years and continue to quickly evolve.

Instead of being physically tethered to high-power computers, the next generation of devices will be stand-alone with integrated processors, or units that are capable of connecting to mobile phones to provide the computational might. This fundamental design change will further aid in promoting VR/AR/MR, allowing students to participate with devices they already own. This will reduce costs for educational institutions and re-define what a simulation laboratory is and how it is structured.

Several different approaches exist including virtual reality (VR), augmented reality (AR) and mixed reality (MR) from companies such as Samsung, Oculus and Microsoft. Virtual reality is currently the most prevalent and affordable. Products vary greatly in price and features. Google Cardboard and the Samsung Gear VR are a great place to start and cost under $100. Higher-end devices, such as the Oculus Rift and HTC Vive, offer greater capabilities but are also much more costly ($600-$700). VR fully immerses the user allowing for a completely novel perspective. Two practical uses of this technology include 360 degree video and virtual models. Cameras such as the Samsung Gear 360 and Ricoh Theta capture video in all directions, giving learners the ability to explore an experience as if they were physically present. Virtual models and simulations, created from scratch or from CT/MR data, can be viewed in an immersive, web-based environment such as Sketchfab. As these solutions continue to evolve, educators will be able to harness their potential to create high-fidelity simulation experiences for students.

3) Panoramic video telepresence provides immersive virtual reality to enhance and extend student learning experience

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[1]City University of Hong Kong
[2]UNSW Australia

City University of Hong Kong has established a veterinary school that strives to be a regional leader in quality veterinary education. Internationally accreditation requires the school to address all the major livestock species in its animal husbandry and clinical teaching. Providing that experience in the built-up urban area of a major Asian metropolis is challenging and virtual experiences will be drawn upon to extend and enhance students' experiences.

The advantage of virtual experiences is that they are predictable and repeatable, and can be sourced from all corners of the globe, allowing the students based in a major Asian city to experience farm life in Australia, New Zealand, Europe and the United States. Sheep and cattle, pig and poultry (as well as abattoirs) operations can be virtually experienced.

The School of Creative Media at City University of Hong Kong is a world leader in the innovation of cultural and educational applications of virtual and augmented reality. It has developed a 360-degrees projection environment which, when combined with a proprietary system for panoramic digital video recording, is able to create compelling real world scale immersive experiences. These techniques are eminently suited to high fidelity 360-degree recordings of farm life at different locations in the world, enabling students in Hong Kong to have a tele present sense of being there. The 10-meter diameter projection arena provides for our expected thirty students at a time to be completely immersed in these situations and have the most direct teaching and learning experience possible in virtual reality.

4) Self-evaluation and monitoring of clinical skills laboratory visitation using "VetSims'App", a dedicated web-app based on QR code technology

Vermot Des Roches M[1], Chateau H[1], Moissonnier P[1], Poma G[1], Gogny M[1]
[1]Université Paris-Est

Learning of specific technical procedures can be particularly challenging for veterinary students. Self-evaluation can be a very effective method to monitor progress and to improve learning and self-confidence in the context of the clinical skills laboratory (CSL). Monitoring of student attendance in the CSL is generally performed using a paper register. However, this does not give detailed information on each visited workstation and is time-consuming when data processing is needed. Since September 2016, a new method of self-evaluation by means of QR code technology has been used. This gave students autonomy for their own learning and allowed staff to better monitor skills laboratory visitations and students' progress.

The VetSims'App is based on QR codes scanned by students with their smartphones or with tablets available in the CSL. Each workstation instruction booklet provided a QR code.

Scanning the QR code also redirected the student to a specific web page with links to instructions and videos. Attendance rate and the duration of time spend at the station or in the clinical skills laboratory could therefore be recorded. At the end of the learning process, students had to provide a self-evaluation, stating if they did not acquire the skills/acquired the skills/acquired and mastered the skills. All the data were recorded and linked with the EnvA Learning Management System (http://eve.vet-alfort.fr/).

The use of this new app based on QR codes seems highly beneficial. Veterinary student expressed enthusiasm for the technology with subsequent increase in attendance rate throughout the three months of the study.

Oral Presentations Session 3 – Skills and Simulation

1) Virtual canine lameness: the development of a training tool

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[2]University of Birmingham

Lameness is commonly encountered in veterinary practice, however precise visual lameness detection requires experience. This skill is challenging to teach: exposure of students to many patients is needed to learn the necessary perceptual skills; however patients might not be readily available. Video recordings of patients can be useful, but depend on the quality of recording and variety of cases available. They are limited to two dimensional views which don't fully replicate a real-life three dimensional examination.

Following on the success of an equine lameness training tool (www.lamenesstrainer.com) developed at the Royal Veterinary College; a 3D virtual canine lameness tool is being developed to teach students to reliably recognize canine lameness.

We collected 3D motion capture data from 10 non-lame Labrador retrievers at walk and trot on a treadmill. Data were captured using eight Oqus7 cameras (Qualisys, Sweden). The movement of these dogs was recorded based on 32 reflective markers positioned over key anatomical locations. Marker positions for twenty steady strides for one dog were averaged to drive the skeleton movement of a matching 3D dog model in Autodesk MotionBuilder. The final clips were rendered to show a realistic-looking shaded wireframe of the dog model at normal walk and trot. Varying types and degrees of lameness were then introduced to this animation based on previous kinematic studies.

Next stages of work will involve the inclusion of this model in a tool to enable it to be used for veterinary education; once validated it will be released as an Open Educational Resource.

2) Virtual farrowing unit – increase piglet survival rate in a game-based setting

Klit KJ[1], Nielsen CK[1], Stege H[1]
[1]University of Copenhagen

Incorrect procedures performed by farm workers or veterinarians can be costly and may jeopardize animal welfare. In the education of both veterinary students and farm workers, practical training is sparse and hands-on clinical skills can be difficult to obtain. Game-based virtual training facilities are interactive and require participation as well as student decisions. Motivation is secured by use of points, different game scenarios and integration of gaming activities. The combination of interactive knowledge acquisition and motivational factors aim to exploit the learning potential of game based learning.

Animal welfare was the overall theme for the first of several game based modules. Piglet survival rate and compliance with Danish legislation were key elements in the first module: "Farrowing unit". Game design and content were described in cooperation between Danish agricultural colleges, University of Copenhagen, pig practitioners, veterinary officers, game developers and didactic specialists. To increase piglet survival, three key areas related to management were identified: correct farrowing assistance, identification and correct treatment of sows with MMA (Mastitis, Metritis, Agalactia) and insurance of an optimal environment in piglet nesting area. Video clips and photographs were collected in pig practice.

Game design uses a mix of animation and real photos/videos. Students engage in playing as the newly employed farm worker, responsible for the farrowing unit. Upon entrance into the farrowing unit, the manager of the farm introduces the player (student) to tasks related to the unit. The tasks include: farrowing assistance, allocation of nest building material, training of piglets to use nesting area hereby insuring an optimal piglet environment, castration, tail cutting. The point system is a dynamic piglet survival barometer where mistakes cause piglet survival rate to decrease.

The game provides a virtual farrowing unit where students can train clinical skills in a safe environment. By adding new tasks during the game and by the stress caused by the piglet survival rate barometer, players will stay motivated and challenged throughout the game.

3) Construction of a pig model for training students in taking blood samples

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[2]University of Veterinary Medicine Hannover, Foundation

Because of the stress response of pigs during restraint, time spend on blood sampling should be as short as possible. A realistic swine model which allowed students to practice methods such as blood sampling during the course of their clinical training, before collecting blood from live pigs, was therefore developed. The idea for this model originated from the University of Veterinary Medicine Vienna and was realized as a co-operational project with the Skills Laboratory of the University of Veterinary Medicine Hannover.

The first step was the production of a pig torso using a frozen pig as a basis, which was molded by plaster binds. In a second step this gypsum model was lined with fiberglass mats. This prototype was used to form a further model without the aperture of the thorax. To close this thoracic gap a life-size silicone insert was constructed. This resembled the anatomy of the pig, and consisted of a trachea, veins and arteries made of caoutchouc (natural rubber that has not been vulcanized) tubes. These tubes were filled with colored fluid to simulate successful blood sampling.

In addition, the pig model could also be used to further teach procedures in the skills laboratory, such as intramuscular injection in a silicone pad in the neck behind the ear and nose swab sampling of the nasal passages.

This newly developed pig model could improve student´s clinical training in swine in the skills lab of the University of Veterinary Medicine in Vienna.

4) Tips and tricks for equine emergency scenario simulation in pre-clinical veterinary student training

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[1]University of Calgary

Emergency and disaster management simulation is a frequently used teaching tool in human medical, volunteer and emergency responder training and is becoming more common in veterinary medicine. At the University of Calgary, an equine emergency scenario simulation has been a part of the second year curriculum since the inception of the school ten years ago. Students at this stage in their veterinary training have limited clinical and technical skills. The scenarios therefore encourage problem solving, leadership, teamwork and deliberate communication, without the need for significant clinical experience.

Scenarios are designed to simulate a common equine emergency such as a trailer accident, barbed-wire entrapment or a barn fire. The simulations have grown over time but remain fairly simple to set-up and deliver and are low cost after the initial horse model investment. Students are pre-briefed with basic information about the scene and the available resources.

During a simulation, students interact with a simulated horse owner, life-sized horse model, live horses, the “media”, and depending on availability, a local police or fire department community outreach officer. A simulated vet box with medical supplies, drugs, medication formulary and equipment is supplied, along with a faculty member who acts as a “phone a friend”, that can answer specific medical questions.

Throughout the simulation a smartphone is used to record the student activities, which are then discussed in detail during a debrief session using the acquired photographs. Topics discussed during debriefing also including triage basics, safety, incident command protocols, ethical considerations, legal implications and insurance and liability.

5) The rehearsal of clinical skills in sequence, through case-based scenarios

Brearley J C[1], Wager C J[1], Holdstock, N[1]
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First year clinical students in the Department of Veterinary Medicine of the University of Cambridge have timetabled sessions dedicated to task-based training using benchtop models in the Pauline Brown Clinical Skills Centre. Combined with self-directed skills rehearsal, this results in students well-practiced with the majority of available skills stations by the start of their second year of clinical studies. Rather than further rehearsal of isolated skills, these students require additional challenges. Additionally, whilst procedures taught out of context are a beneficial starting point for the inexperienced learner, continued practice in this way can misrepresent what is required in the clinical setting[1].

Case-based scenarios were devised, each necessitating a series of procedural skills to be performed in sequence, as required in the clinical context. The scenarios include canine ovariohysterectomy, feline urethral obstruction and equine wound management. Additional dimensions of the simulations include clinical decision making, use of local documentation and simulated client communication. Students complete the scenarios with the supervision and assistance of teaching staff.

Each scenario was run across one cohort of second year clinical students. Students were asked for open comments on their experience, via an anonymous online feedback mechanism. Ninety-seven % of the responses (n=148) were positive, with 22% of these comments specifically citing the sequencing of clinical skills into a case-based context. Opportunities for further development of this approach in this setting will therefore now be sought, with continuing reference to the established medical literature on contextualized simulation and procedural skills.

Oral Presentations Session 4 – Teaching Methods / Communication

1) Flipping the classroom: does it work for the skills laboratory?

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[1]Ghent University

Flipping the classroom is an instructional model in which students gain basic knowledge outside of class, followed by active learning in class. At Ghent University, teaching clinical skills on simulators was recently incorporated in the curriculum in a new compulsory course. Due to the large number of students, time for supervised skills laboratory practise is limited. Therefore, the flipped classroom model was used to maximize an active learning experience.

Online ‘learning paths’ and 1-2 hour practical sessions on surgical skills, injections, anesthesia and reproduction were developed for the fifth year students. Learning paths include text, pictures, videos of the skills, links to background information, a forum and a compulsory pre-class test, for which a minimum score of ≥75% was required.

All students (n=292) had followed the session on surgical preparation and asepsis. The learning path was viewed by 287/292 students prior to the practical, for 38±24 minutes (range 2-134 minutes). However, some students reported more time spent on preparation than recorded, using a printout of the text. The test score of ≥75% was attained by 290/292 students, with a median of 2 attempts (range 1-16).

Subjective instructor feedback indicated that students were well-prepared. Informal student feedback indicated the need for additional live demonstrations, especially for complex skills. Future improvements to the learning paths could be including slow step-by-step demonstration of the skill with narration as well as stimulating narration of the steps by the student, by including this into the test.

2) The development of e-learning and clinical skills resources to improve the teaching and learning of small animal wound management

Meier J T[1], Owen L[1], Wager C J[1]
[1]University of Cambridge

Teaching and learning of small animal wound management at the University of Cambridge is currently via the traditional lecture system. Recent graduates and current clinical students were surveyed in order to evaluate the current teaching method. Sixty-three percent of respondents felt that an insufficient amount of time was dedicated to the topic, with the majority of students stating that they would like an increased emphasis on decision making and practical skills.

In response to this, new resources were created to support the existing lecture. An integrated approach was chosen, involving e-learning modules and practical skills exercises to simulate clinical scenarios. E-learning has previously been well received as a teaching method in veterinary medicine[1]. In addition, practical skills exercises can be encouraged in the Pauline Brown Clinical Skills Centre, which is already well utilized by students in acquiring surgical skills[2].

Five different clinical scenarios were designed to reflect common wound presentations in first opinion practice, consisting of a burn wound, a shearing injury, a cat collar wound, a laceration and a chronic wound. The cases were presented in a quiz format, with key concepts and further supporting information given, where appropriate. The quizzes were comprised of multiple choice questions, which provided a particular focus on decision making, by testing appropriate methods of wound management at different stages of healing. A practical component was incorporated by encouraging students to practise the clinical skills encountered, including tie-over dressings, for which a complete instructions booklet was created.

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3) Strengths, weaknesses, gaps and redundancies in the Colorado State University equine curriculum

Hendrickson D A[1], Varnum A[1], West A[1]
[1]Colorado State University

A survey was sent to large animal track students of Colorado State University (CSU) that have graduated in the last five years. Questions centered on the American Association of Equine Practitioners Competencies, listed as the Business of veterinary medicine, Client education and Regulatory responsibilities, Anesthesia, Dentistry, Examination, Husbandry, Medical knowledge, Radiology, Reproduction and Surgery techniques. The students were allowed to give responses of free text. The response rate was 31%.

The first main question was: How well did the CSU equine veterinary curriculum address the following areas? Answer options were: too much, just right, not enough. There were 4 of the 11 categories where more than 30% of the respondents felt that there was not enough theoretical information in the curriculum to make them feel confident in practice. Those categories were: Business (49%), Dentistry (32%), Radiology (32%) and Surgery (41%). They felt most prepared in Anesthesia, Physical Examination, Reproduction and Basic Techniques.

The second main question was: How well did the CSU equine veterinary curriculum provide practical skills in the following areas? Answer options were: excellent preparation, good preparation, moderately unprepared, severely unprepared. When combining the unprepared categories, 4 categories gave greater than 40% unprepared students: Business (62%), Dentistry (43%), Radiology (41%) and Surgery (59%). They felt most prepared in Client interaction, Anesthesia, Husbandry and Basic Techniques.

Based on this, the equine curriculum is currently being evaluated. To improve the curriculum, a two-week clinical rotation, focusing on teaching these skills, was outlined, beginning May 2017. Basic laceration repair is now taught during the normal two-week equine lameness and surgery rotations.

4) Influence of skills laboratory training on students' perceived self-efficacy

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[2]University Witten/Herdecke

In 2005 the "practical year" was introduced at the University of Veterinary Medicine Hannover to involve students in clinician's daily work[1]. However, students reflecting on their practical competences, showed a lack of self-efficacy[2]. To improve this, a one-week skills-lab-training immediately before starting a ten week clinical rotation at the small animal clinic was introduced. During the last week of their rotations students have to pass a formative objective structured clinical examination (OSCE)[3].

Students were divided into two groups. Group A (n=64 students) did only clinical rotations; Group B (n=58 students) in addition underwent the one week skills lab training. A survey to evaluate student's self-efficacy before (pre-clinical survey) and after (post-clinical survey) clinical rotations was carried out. Each survey consists of 20 questions with a four Likert scale to evaluate students' resources and deficits as well. The survey was developed based on validated surveys[4,5]. In both groups, students got significantly higher scores ($p \leq 0{,}01$) for self-efficacy after their rotations. The post-clinical survey showed that students from Group B showed significant higher scores ($p \leq 0{,}001$) for self-efficacy compared to Group A. Group A has a post-mean of 2,58 for resources and 2,09 for deficits. Group B has a post-mean of 2,74 for resources and 1,90 for deficits. The comparison of the groups therefore demonstrates a significant impact on self-efficacy after skills-lab-training.

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5) Simulated clients in final year dental rotations

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Students at the University of Calgary's Faculty of Veterinary Medicine (UCVM) spend a significant amount of time in the first three years learning about clinical communication in simulated client experiences; however, there is no formal communications component in the final fourth year program. Standardized clients are routinely leveraged in simulated communication scenarios in many veterinary curricula, including at UCVM. The purpose of the study was to determine if the use of simulated clients in dental cases, where the owner is absent, enriched communication experiences in final year dental rotations.

Two UCVM dental rotations (small animal and equine) provided the opportunity for each student in the rotation to interact with simulated clients while diagnosing and treating two dental patients. For each of the cases, students anonymously scored and commented on their experience. Simulated clients also completed an evaluation of each student's communication performance.

In the small animal rotation, two thirds of the students felt that they would like to have more opportunity to work with simulated clients for admissions and discharges. Forty-four percent of students (equine and small animal combined) inadvertently self-identified as unconscious incompetents in clinical communication. Other observations included student challenges in obtaining informed consent, discussing financial costs and relating discharge instructions to simulated clients.

By utilizing simulated clients to enrich owner-absent clinical dental cases, some areas of communication weakness in the curriculum were identified. In addition, the unique combination of client simulation, real cases, and reflective surveys allowed instructors to identify the students' stage of communication competence and self-awareness of their skills.

6) Communication skills in veterinary industry – a qualitative approach

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Communication skills are very important in companion animal and food animal practice. In Germany nearly 68 % of the graduates are working as a veterinarian in private practice. More than 31 % of German vets are working in other fields, whereas almost 16 % are working in industry. So far, limited information is available about communications skills in veterinary industry.

To gain more knowledge about communication skills in veterinary industry we conducted semi-structured interviews as a qualitative research approach. All interviewees worked five or more than five years in industry. The interview focused on those communication skills needed in a daily work routine. Another focus was on meeting the expectations of new colleagues' in this field. The interviewees were also asked about predicted challenges in communication skills in the future. After a qualitative content analysis of the interviews the outcomes were compared to two established European learning outcomes catalogues, the German National Competence Based Catalogues of Learning Objectives for Undergraduate Medical Education, and the Swiss learning outcome catalogue of the Vetsuisse-Faculty.

The qualitative analysis demonstrated an overlapping of several required communication skills in veterinary industry with the skill set listed in both learning outcome catalogues. However, the interviewees mentioned a lack of communication skills in the field of professional skills. Particularly the personal development of the graduates represents a central aspect of the requirements in veterinary industry. Furthermore, basic skills in economics are required.

In the future more qualitative research will be necessary to derive more concrete learning outcomes. Moreover, the integration of specific learning and communication skills for veterinary industry into the curriculum could also prepare the students for better accomplishments in the formation of private practices.

7) Beyond the physical skills station: student usage of clinical skills demonstration videos in veterinary clinical skills teaching

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As part of a project to explore outcomes when students have access to a blended learning approach to clinical skills provision, the Pauline Brown Clinical Skills Centre at the Department of Veterinary Medicine, University of Cambridge, produced an online library of clinical skills demonstration videos. These videos complement the illustrated skill instruction booklets which accompany each physical skills station and can be accessed via Quick Response (QR) codes; they are also available remotely through the University virtual learning environment. This allows students off-site access, for example when completing Extra Mural Studies (EMS) rotations with veterinary practitioners.

Use of the videos by three academic years of students was evaluated through viewing statistics and an online survey, focusing on how, when and where the videos were accessed, and student attitudes to this aspect of clinical skills provision.

Students reported that they may watch the same video multiple times, as both an adjunct to practical teaching sessions and an aid during self-directed skills rehearsal. The videos were also valued as assisting with preparation for both practical assessments and EMS. Students viewed this method of learning clinical skills as an enjoyable and useful enhancement of their learning experience and would like the existing library to be expanded.

These findings therefore support continuing development of clinical skills demonstration videos within the Department of Veterinary Medicine and are also consistent with conclusions drawn from the existing medical and veterinary literature on the use of videos in clinical skills teaching[1, 2.]

1. Roshier, A. L., Foster, N. and Jones, M. A., 2011. Veterinary students' usage and perception of video teaching resources. *British Medical Education,* 2011, 11 (1).

2. Forbes, H., Oprescu, F. I., Downer, T., Phillips, N. M., McTier, L., Lord, B., Barr, N., Alla, K., Bright, P., Dayton, J., Simbag, V. and Visser, I., 2016. Use of videos to support teaching and learning of clinical skills in nursing education: A review. *Nurse Education Today,* 42, pp.53-56.

8) An Open Source hardware and software platform for veterinary immersive simulation training

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"Immersive" technology conveys the sense that participants are being immersed in a task or setting as they would if it were the real world. The benefits of immersive simulation are

well documented in human medicine, and a robust industry producing a range of high fidelity human patient simulators (HPS) has resulted. HPS can be programmed to progress through a series of states determined by learner interventions, providing a realistic clinical environment in which trainees can explore treatment options, receive direct feedback from the HPS, and learn from mistakes in a safe environment.

There are no comparable simulators on the veterinary market, and HPS are extremely expensive. To supply in this need a robust, expandable veterinary clinical simulation platform using Open Source software and off-the-shelf hardware was developed. This will be made available at no cost to the veterinary education community.

The current design is a canine simulator with palpable pulses, auscultable heart and lung sounds and chest movements to mimic spontaneous respiration and sensors to detect positive pressure breaths and chest compressions. A patient monitor (ECG and end-tidal CO2 waveforms, and pulse oximetry, blood pressure and temperature displays) is provided to the learner. The instructor interface is accessible on any computer or mobile device and allows on-the-fly alterations in patient state and management of pre-programmed clinical scenarios.

A companion web site will allow sharing of scenarios and extensions to the base functionality through an open source community, affording access to this powerful pedagogical approach to clinical training to a much broader audience than previously possible.

9) Using simulation models to teach surgical skills in developing countries

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In many developing countries the opportunity for learning or practicing surgical skills is limited. Simulation provides the opportunity for both veterinary students and veterinarians to learn and practice the required skills such as suturing, knot tying, instrument handling and tissue manipulation. A surgical skill curriculum has been developed around the use of suture models that provide texture, blood vessels that require hemostasis and tissues that mimic the holding strength of skin. To highlight the use of simulation models to teach surgical skills, a specially designed curriculum was conducted for the veterinarians of the Mountain Gorilla Veterinary Project.

To be able to coordinate a surgical skills curriculum in developing countries it was important to have a contact person on site, conduct a needs assessment to identify the surgical skill expertise of the veterinarians and to tailor the content to those specific needs. Realistic models that provide the opportunity for practicing the skills while in the course and continued practicing at home, optimized learning.

Assessments using a skills checklist and immediate feedback was crucial for the participants learning of the skills. An exit interview provided the information that participation in the program improved both the cognitive and technical surgical skill proficiency of the

participants. Success of the program included targeting the content to the needs of the participants, the ability for repetition of the surgical skills, hands on practice and the opportunity to take the surgical skills model home. It was therefore concluded that simulation models can be used to teach surgical skills in developing countries.

10) Participation in a surgical simulation review program improves performance in the live animal surgery lab

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Simulation provides the opportunity for the acquisition and continued practice of surgical skills. Veterinary students need to build a foundation of basic surgical skills before carrying out procedures on live animals. The goal of the study was to determine if participation in a surgical skills simulation program would improve the performance of third year veterinary student's surgical skills compared to traditional live animal surgery laboratory training.

Eighteen third year veterinary students were randomized to either the traditional training or the simulation program. The simulation program was conducted one week prior to the live animal surgery laboratory. The skills practiced included the procedural and technical skills of surgical incision, tissue/instrument handling, simple continuous suturing and knot tying. Each student performance was evaluated with a procedural checklist, global assessment and a combination of both evaluation tools.

The performance checklist, global assessment and the combination of both tools were assessed comparing the means with ANOVA and T test with significance of a p value of 0.05. For the procedural checklist statistical significance was found for incisional technique ($p<0.10$), use of the instruments ($p<0.049$), suturing procedure ($p<0.011$) and suture technique ($p<0.014$). The global assessment analysis found statistical significance for tissue handling ($p<0.001$), instrument handling ($p<0.009$), use of an assistant ($p<0.044$) and the combination of the global assessment and procedural checklist ($p<0.008$).

Participation in the simulation program improved the students' performance in the live surgery laboratory. The advantages included the opportunity for repetitive and deliberate practice, participatory learning and the immediate correction of errors.