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Beyond the Tick and Flick: An Approach to Identifying the Realised Value of Simulation Exercises in Educating for the Future

Dr. Amanda Davies
Email: ADavies@csu.edu.au

Abstract **– Globally, there is a focus by technology companies and educators to collaborate and leverage on the affordances of simulation technology to provide innovative, world leading learning environments. This focus is both commendable and strategic. However, in such a race is optimising educational outcomes being overshadowed by organisational agendas which require participation as the key outcome and high fidelity as the conduit? Is it necessary to have the highest level of fidelity available in order to provide realistic contextualised learning environments? Conducting comprehensive evaluations of participation in a simulation based learning exercise has the potential to reveal a plethora of information which informs the technology design community, the wider education community and importantly, the adequacy of the specific simulation exercise. This paper presents a case study of an evaluation undertaken on two different technology assisted simulation based learning exercises and environments, the common denominator being the development of decision making skills for high risk high stakes policing situations. The evaluation project has contributed to understanding the influence of simulation based learning exercises far beyond the immediacy of participation and surface competencies. Evaluative research which captures the experiences of the participants in simulation exercises offers valuable insights which contribute to the financial, pedagogical and technology considerations for the future of simulation based learning.**

Keywords **– Simulation, Evaluation Model, Policing.**

I. INTRODUCTION

Comprehensive evaluation studies of simulation based learning exercises is pivotal to guiding future endeavours by technologists and educators in providing learning environments which aid the transfer of learning from the classroom (simulation environment) to the field of operation (see [3]; [4]; [5]; [16]). Appreciatively, there is a place in the education of professionals where participation in a role specific simulation exercise which identifies a participant's cognitive capability/ies as a minimum learning outcome – the 'tick and flick' is deemed sufficient. The reality is for these exercises, the evaluation or feedback design and subsequent process required by participants is less insightful than can be garnered by a comprehensive evaluative study offering a rich pool of participant perspectives. The reliance on Harvard 3 minute [15] style feedback, for example, whilst having a place in feedback exercises, dismisses the opportunity to more widely and comprehensively inform.

The literature indicates that as emerging technologies compete for a place in the education and training arena there has been a parallel emergence acknowledging the importance of research which evaluates the impact of technology-enhanced simulation learning environments across a wide spectrum of professions. This is demonstrated by the evolving published literature as evidenced by the work of [6];[9];[7];[8];[10];[11];[12]; and [13]. The complexities which surround intellectual property and commercialization are widely acknowledged as impacting on the publication of evaluative research into the application of simulation based learning exercises in the education and training arena.

A study undertaken to develop an understanding of the influence of simulation based learning exercises on the development of decision making skills for police officers completed in 2013 offers a contribution to the deliberations of educators, technology designers and field basedpractitioners as they seek to refine the adoption of simulation technology for education and training. The two case studies included in the research are described in the following section.

II. CASE ONE AND TWO

2.1 Case one

The pivotal focus of CaseOne was understand the impact on police recruits of participation in a judgmental use of force simulation exercise. Of specific interest was the influence on a police recruit's decision making and professional identity as they transition from the police academy to operational field based duties. Case One followed the experience of 372 academy student police recruits as they participated in a VirTra™ use-of-force simulation.

The VirTra™ environment comprises five 300°surround screen immersive platform. High definition video footage is played onto the screens and dependent on the participant's actions the response of the characters in the video may be altered by an instructor at the computer control panel. Transducers and audio facilities simulate sound and movement [14]. In this study the participant is able to use a gas fired Glock pistol and Oleoresin Capsicum spray. The system does not provide for the use of batons or physical restraint. The system does have a threat-fire capacity, this was not utilised in the case study.

The participants were provided with a safety briefing and a brief (1-2minute) individual exercise debrief. They did not participate in a practice session in any full or part format nor had they viewed a demonstration of the simulation exercise or environment.

Fig.I. VirTra™ training environment

2.2 Case Two

The second case study included in the evaluation research centred on a Hydra/Minerva simulation exercise. The key focus of the exercise is to provide opportunity for senior officers to apply their decision making knowledge and skills to the management to a policing response. The Hydra/Minerva environment was designed by Professor Jonathan Crego and comprises:

- a plenary/lecture room which acts as both a briefing and debriefing room
- three or four syndicate rooms containing a computer, video screen, telephone, each of which is networked to the control room, conference table and whiteboards; the rooms are outfitted with the equipment the participants would need in a real life event
- a fixed command support/control room from which each syndicate room is monitored via closed-circuit television and boundary microphones. The technology network enables the feed of information to the participants; it may consist of intelligence briefings, police radio traffic, newscasts, or telephone calls. Officials control the exercise and feed of information to the trainees. The control room houses the subject matter experts, program training staff, and replicated police radio communications.

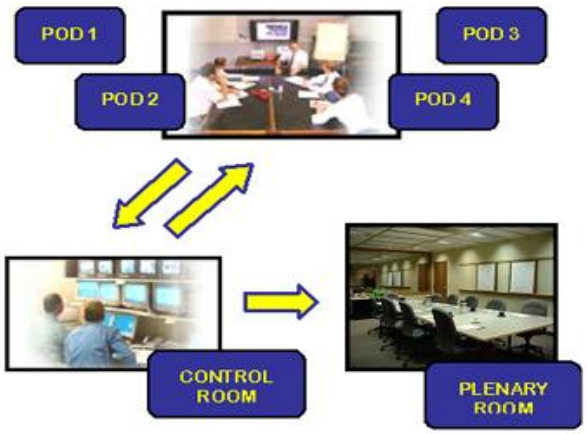

Fig.II. Hydra/Minerva simulation environment

The simulation exercise is conducted in real time and requires a policing response to an emerging neighbourhood public order incident. The participants (approximately 16 per simulation exercise) are divided into teams which are assigned to the syndicate rooms. The senior officers are rotated through the syndicate rooms so as to assume command roles at varying stages throughout the exercise. An exercise briefing and debriefing is included in the full day exercise. Two groups of participants were included in Case two comprising a total of 33 participants.

III. DATA COLLECTION

3.1 Data Collection

The data collection methodology chosen to provide a comprehensive evaluation is pivotal to the potential extent, richness, rigour and quality of the data. In this research a mixed method data collection approach was employed. The rationale for this approach was premised on the work of Erzberger and Kelle [2] which suggests that a fuller and more complete picture of the phenomenon under study may be captured through applying different investigative methods. Importantly, as advocated by Bergman[1] the application of qualitative and quantitative data collection methods has the potential to be complementary and illuminate specific aspects of the data. The qualitative approach in this project allowed for participants to give voice to their experiences beyond that which was captured in the quantitative data.

The data collection process for the case studies included a pre-simulation survey. This survey included Likert scale and short answer questions designed to capture the commencing experience of the participants, in relation to the learning on which the simulation was centred. A further focus was to understand the participants'' perception of the factors which had the potential to influence their decision making in the simulation. A post-simulation survey with Likert scale and sort answer questions was completed by participants in Case One and Two. The focus of this survey was to develop an understanding of the influencing factors from the simulation experience on their decision making skills, the factors which contributed to the realism, immersion and presence experienced by the participants. A time period of approximately 3 – 4 months following participation in the simulation exercise interviews were conducted with Case One and Two participants from their operational field base. The interviews were designed to reveal the participants' reflection on the simulation experience. The influence of the simulation participation on the participants' current approach to field based decision making (the transfer of learning) was an important focus of data collection at this stage.

The value in developing a continuum of the learning journey from commencing knowledge to field based application, via participation in the simulation based learning exercise is the key to developing an understanding of the influence of simulation based learning exercises, irrespective of the learning focus e.g. practical/physical demonstration of a skill or as in Case One and Two decision making skills.

This is the moment when evaluation of the influence of simulation based learning exercises moves beyond the tick and flick or the Harvard 3 minute evaluation [15] to the more meaningful, comprehensive and extensive insight into the learners' experience. The following examples illustrate the value of capturing both quantitative and qualitative data and the relationship which extends

understanding the learner's perspective. Table 1 presents the quantitative response to Question 8 of the post-simulation survey for Case Two.

Table 1: Expectation of transfer of decision-making skills to operational policing

Question 8: "The simulation exercise provided an opportunity for me to apply decision-making skills which I expect to transfer to my future policing practice". *N* = 21	
Very Strongly Agree	5
Strongly Agree	13
Agree	2
Undecided	0
Disagree	1

Responses to interview questions posed 3-4 months postsimulation participation provided depth of explanation and examples underpinning the quantitative data in Table 1. For example, Participant 11 commented:

"… I think I still do things the same way, but now with more recent knowledge, for example, one I did recently was a high risk search warrant, I make sure I have covered off on everything…some things in the simulation were not covered off properly and these you remember and transfer to the field"

The previous example of the complementary nature of quantitative and qualitative data also demonstrates the valuable insights which can be gained by extending evaluation of simulation based learning. The point of note here is that the evaluation of the simulation based learning in this project provided not only opportunity to (1) determine the demonstrated level of learner knowledge and skill application it also provided (2) insight into the influence of the simulation exercise in learning transfer from classroom to the field.

IV. Areas of Influence

Evaluation studies of simulation based learning exercises have the potential to inform on a breadth of pedagogical and simulation design criteria. The research design discussed here has informed on the pedagogical approach to simulation based learning exercise in police education and more broadly in the simulation exercise design arena, i.e:

- The level of psychological and physiological fidelity required by experienced and novice learners to experience immersion and presence;
- The role of realism as a conduit for transfer of learning from theory to practice;
- The influence of simulation exercise participation on the professional confidence and competence of participants;
- Identifying previously unvoiced advantages and disadvantages of simulation based learning exercises for developing professional practice;
- The role of simulation exercise briefing and debriefing on participants' learning uptake;
- The level of transfer of learning influenced by simulation based learning;
- The financial implications and potential return on investment realised by application of simulation based learning in educational programs; and
- Implications for educational designers and technologists in creating profession specific simulation learning environments.

V. Conclusion

The contribution to the design, financial, technological and educational considerations which can be realised from conducting comprehensive evaluative research on the design, application and learning outcomes of simulation based learning exercises cannot be underestimated. The approach to evaluating simulation based learning exercises as discussed here is applicable across the wider professional domain where simulation exercises are designed and conducted for education and training.

The advantages that can be realised through systematic evaluation of simulation based learning initiatives are not restricted by profession or discipline. The evaluation process/model discussed in this paper is replicable irrespective of the size of the simulation exercise in terms of participants per exercise infrastructure, levels of fidelity and longevity.

As education providers are increasingly exposed to technology advances which have the potential to take the ordinary and make it extraordinary in the simulation space, it is the strategic, evaluative approach which can determine 'the best fit for purpose'.

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AUTHOR'S PROFILE

Dr. Amanda Davies
Doctor of Philosophy, Charles Sturt University, Wagga Wagga, Australia;
Master of Education (Information Technology)with distinction; Charles Sturt University, Wagga Wagga, Australia.

Current position: Course Director, Associate Degree in Policing Practice, Charles Sturt University at the New South Wales Police Academy Australia.
2002-2012 Lecturer for the Associate Degree in Policing Practice, Charles Sturt University at the New South Wales Police Academy, Australia.
Publications listed at:
http://www.csu.edu.au/faculty/arts/policing/staff/profiles/adpp-course-director/amanda_davies
Dr. Davies has received a Vice Chancellors Excellence in Teaching Award (2009); Australian Learning and Teaching Council Citation (2009).