A quasi-experiment to evaluate the effects of a blended approach of simulation learning and podcasting on caring behaviours

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Background: The need for quality nursing personnel in clinical practice expected nurse teachers to be able to impart instrumental and expressive aspects of caring behaviours to nursing students. Operating in a resource-limited higher educational context, nurse teachers are required to do so in a cost effective way. This study as part of a larger study evaluated the effects of a blended approach to learning of caring behaviours based on 'modified' medium-fidelity simulation scenarios and podcasting to repeat debriefs.
Methods: This study employed a quasi-experimental, two group pre-test-post-test design. The study included 146 second year nursing students. Participants were divided into 'intervention' and 'control' groups and were asked to complete a caring behaviour inventory scale at various stages of the research study.
Results: Students in the intervention group scored statistically higher, post receiving medium-fidelity simulation learning and higher post podcasting. The exposure to high fidelity simulation learning has resulted in the lower scoring in control group.
Conclusions: This study highlights the value of a blended approach based on medium-fidelity simulation learning and podcasting. Successful learning of caring behaviours lies in the heart of a care-oriented teaching approach rather than the use of sophisticated technologies. This study has implications for a better practice in nursing education for developing student caring behaviours, it also has a wider implication for all vocational and non-nursing healthcare education.

Keywords- Blended learning; caring behaviours; clinical skills; high fidelity simulation learning; medium fidelity simulation learning; nursing education; podcasting;

I. INTRODUCTION

Simulation activities to impart technical clinical skills to students have always been a common practice in nursing schools [1]. When pressure to nurture caring attributes of nursing students increased, high fidelity simulation scenarios (HFSS) employed in medical and other vocational education increasingly predominated the simulation activities in many nursing programmes [2]. There are high regards for HFSS to facilitate learning of non-technical clinical nursing skills and this resulted in an upsurge utilisation of the technology in nursing education. However, the larger nursing student enrolment with scarce faculty resources might interfere with optimising nursing faculties' ability to use the advanced but costly technology. Consequently, low fidelity simulation (LFS) and medium fidelity simulation scenarios (MFSS) remained a common educational teaching strategy, which was often justified by the need for teaching nursing fundamentals in undergraduate programmes. Operating in the current resource-limited higher educational context, pedagogic practices are further driven by a free open access education movement [3]. Digital technologies such as podcasting were far becoming a popular teaching strategy.

II. LITERATURE REVIEW

Technical clinical skills known as instrumental caring behaviours [4] had always been taught in clinical skills labs using various types of simulation activities ranging from LFS to MFSS learning strategies. In recent years, HFSS were increasingly used based on the assumptions that it not only has the potential for perfecting technical clinical skills but also the capacity for improving students' critical and analytical thinking skills, thus, facilitating student learning of interpersonal communication skills and team working spirit [5]. In this light, non-technical clinical skills as the expressive caring behaviours [4] were believed to be nurtured and developed using HFSS [6, 7]. However, as reported in several studies [8, 9], it was the repeated demonstrations in HFSS that improved knowledge and performance of individuals with the newly acquired clinical nursing skills. This finding was consistent with Abe et al.'s [10] study in which nurses' technical and non-technical skills were enhanced based on repeated scenarios simulation. Haskvitz and Koop [11] had similar findings, particularly when the repeated scenarios were developed around student learning needs. Apparently, repetition of simulation was believed to have reduced any anxiety and at the same time, increased confidence level to have raised student learning ability [12].

While repetition of simulation activities were responsible for influencing the level of anxiety and confidence and affected learning, greater level of knowledge gained was amongst the observers compared with the participants in HFSS [1, 13]. These findings were in contrast to Kaplan et al.'s [14] study of 92 junior nurses; the roles in HFFS were not found to be responsible for the difference to knowledge gained. As explained in a study by Loke et al. [2] the significantly higher level of decision making skills of the observers were attributed more to 'debrief' following HFSS. Supporting this observation was a study by Fey et al. [15] in which the reflective debrief was identified as key to successful

Innovations in Student Learning Scheme 2015 by Learning Enhancement & Academic Practice at the University of Hull.

DOI: 10.5176/2345-718X_3.2.112

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learning. Expanding on these findings, Reed et al. [16] found 'debriefs' to be useful when they were used alongside video clips which showed the simulations. This was useful information as video clips can be presented in the form of podcasting for effective learning. In fact, the effectiveness of podcasting as a learning tool has long been established [17, 18]. However, its use in nursing education is generally limited to delivering theoretical components of the nursing curriculum [17, 18]. Its effectiveness for imparting caring behaviours in clinical teaching was yet to be established

In essence, previous studies about simulation learning to determine if repeated simulation scenarios improved the students' performance and knowledge comprised mixed findings. In addition, studies which evaluated the effectiveness of debriefs for nurturing caring behaviours were limited. Certainly, no study was conducted to evaluate the use of podcasts alongside MFSS on nursing caring behaviours. In view of these observations, a study as part of a larger research was conducted to evaluate the effects of a blended approach to learning of caring behaviours based on MFSS and repeated debriefs using podcasting.

III. METHODS

A. Design

This study employed a quasi-experimental, two group pre-test-post-test design.

B. Participants

All 207 students from the second year adult nursing programme at a university in North England were eligible for the study. These students met the inclusion criteria as direct intake for a 3-year full time adult nursing programme, and also, they were scheduled to receive a two-week simulation learning of specific sets of fundamental clinical skills using LFS and HFSS (Table I). These students had experienced LFL but not MFSS nor HFSS learning in the current nursing programme. At the time of this study, the university was strategising ways to optimise use of digital technologies and simulation activities to enhance learning.

C. Measures

There were 3 aspects of data collection: 1) demographic data which consisted of age, gender, educational preparation prior to university enrolment and previous caring job experiences, 2) the caring attributes based on Caring Behaviour Inventory by Wolf et al [4] and 3) the qualitative description of students' caring attribute and their motivation for pursuing a nursing programme.

The CBI by Wolf et al. [4] was developed based on Watson's transpersonal caring theory, in which caring was conceptualised as an 'interactive and inter-subjective process that occurs during moments of vulnerability between nurse and patient and that, this is both – and other – directed' (Wolf et al 1994, pp107-111). The CBI comprised 42-items, based on 5 correlated subscales: respectful deference to others (12 items), assurance of human presence (12 items), positive connectedness (9 items), competent professional knowledge and skills (5 items) and attentiveness to the other's experience (4 items). In the current study, these items aimed at measuring the expressive, as well as the instrumental aspects of caring through a forced-choice 4-point Likert scale. Scores on CBI are based on the sum of each item to produce the total scale score ranged from 42 to 168. High internal consistency reliability coefficients of Cronbach's alpha of 0.98 and 0.95 were reported in two separate studies by Wolf et al. [19, 20]. A high Cronbach's alpha has also been reported elsewhere; $\alpha = 0.98$ in a study on patient perceived nursing care [21; $\alpha = 0.96$ and a test-retest reliability r= 0.82 on 42 nurses [22]. This tool uses consistent language and easy-to-understand instructions. It takes approximately 12.38 minutes to complete [23] and had been used for determining students caring attributes by first and final year nursing students in the UK [24] and replicated in Singapore with a Cronbach's alpha of 0.922 [6]. The current study has a Cronbach's alpha of 0.969.

TABLE I. CINICAL SKILLS TAUGHT IN THE 2 WEEK SIMULATION

Simulation week			
Clinical Skill being taught		*Specific skills to be acquired*	*Teaching strategies*
Wk 1	Hand hygiene	Decontamination and Universal precaution principles	**LFS**
	Intravenous drug & control drug calculation	Numeracy skills	
	Manual Handling	Carrying and lifting technique(explore the use of hoist and Patslide)	
Wk 2	Female Urinary Catheterisation	Aseptic technique	
	Administering oral medicine	The 5 rights of drugs administration	
	Communication workshop	Effective communication technique	
	Intermediate life support	The algorithm of reversing a cardiac arrest, CPR skills, defibrillation skills, team working skills.	**HFSS**

Students' motivation: Students were asked to respond to four open questions directed at providing us with some understanding of the following: 1) student motivation to be a nurse, 2) the influences on their decision to wanting to be a nurse 3) self-perception of caring behaviour and 4) student perception of the benefit they anticipate from being a nurse.

D. Ethical considerations and procedures

The study, as part of a larger study commenced in February 2016 after the approval was obtained from the Ethics Review Committee of the Health and Social Care Faculty at the institution where the study took place. Students were introduced to the study and the procedure explained to them before a written consent was obtained. Students were informed that their identities were kept anonymous and confidentiality was observed. Students were made aware that they could withdraw from the study at any time without any reason. All

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students who participated in the study were given a 5-pound gift voucher at the end of the study for their time and effort.

There were 146 students who consented to the study giving a response rate of 71%. Based on the existing 2-week simulation time table, all participants were assigned to intervention (n_1=69) and control (n_2=77) groups except 5 students. They had self-assigned to the control group to avoid being video-recorded during learning. All participants in the control group were joined by students who did not consent to the study (n_0 =60; 29%). All participants were exposed to LFS for clinical skills and HFSS using SimMan™ for intermediate cardiac life support care (Table I). Students in the intervention group were exposed to an extended session for 'female urinary catheterisation' which used a blended approach to learning based on MFSS by Nursing Anne™ and 'Teacher' podcasting (Table II). The 'physiological responses of Nursing Anne was not switched on, students were expected to voice over to provide the response. The 'Teacher' podcast was a video clip showing nursing care of Nursing Anne™ during catheterisation. Students were expected to return a demonstration post watching the 'Teacher' podcast. All student performance and the accompanying debriefs were video recorded to produce the 'Student' podcasts. These were then made available for repeated access by the intervention groups post MFSS till the end of simulation week.

TABLE II. SCENARIO USED IN 'TEACHER' PODCAST AND STUDENT DEMONSTRATION INICAL SKILLS TAUGHT IN THE 2 WEEK SIMULATION

Amy is a 23 year old student pursuing a law degree. She was admitted to your ward for acute urinary retention. The doctor has recommended a urinary catheter to be inserted to relive her pain prior to any further investigations. This admission being Amy's first hospitalisation, she is very anxious. Her anxiety is also raised due to the pain she is experiencing.

In groups of 3-4, organise yourselves into the various roles: 1) a staff nurse as Amy's primary carer and 2) a third year student nurse shadowing the staff nurse, 3) Amy (to voice over the full sized manikin) and 4) Amy's mum (optional).

Working as a team (and in partnership with the patient), demonstrate how you would carry out the procedure of a urinary catheterisation for Amy.

TABLE III. SIMULATION ACTIVITIES AND ADMINSTRATION OF CBI IN THE 2 WEEK SIMULATION

Simulation week											
wk	**0**	**1**					**2**				
dy	**M**	**M**	**T**	**W**	**T**	**F**	**M**	**T**	**W**	**T**	**F**
n_1	CBI pre-test 1	**L F S**					**MFS/Pod-casting** / CBI post-test 1		**H F S**	CBI post-test 2	**H F S**
n_2							**LFS**				

The two groups were asked to complete the CBI at various stages of the research process (Table III); one week before the simulation week, the pre-test CBI was answered alongside a questionnaire which established their demographic profile. Into the second week of the simulation, just before the intervention group accessed the 'Student' podcasts, they were asked to complete an additional CBI post MFSS (post-test 1). All 69 (n_{1a}) answered the CBI. Towards the end of the second week, all 146 participants were asked to submit another CBI (post-test 2); 56 students from intervention group (n_{1b}) and 39 from control group (n_{2b}) did so.

E. Data Analysis

Data were analysed using SPSS for Windows version 23. Descriptive analysis was applied to demographic data. Chi-square (χ^2) and *t*-tests were used to test the homogeneity of the groups as well as their pre-test CBI scores. The analysis continued with paired *t*-test to compare the differences between pre-and post-tests values, and two sample *t*-tests were used to evaluate the intervention efficacy by comparing the differences of the CBI scores between the two groups.

IV. RESULTS

The participants were predominantly female (Female= 133, Male = 13), and the majority were either young [114 (78%)] or middle aged adults [31 (21%] (Table IV). Only one participant was aged 55. All participants have at least two qualifications and the most common was 'Access to Higher Education' Diploma (n_1 = 26, n_2 = 20). The majority of participants (69%) were pursuing nursing as a second or third career (n_1 = 52, n_2 = 49) with half of the participants (n=73) reported to have previous caring job experiences (n_1 = 41, n_2 = 32). Participants were advanced in age and had previous job experiences, both characteristic features were less commonly found amongst students in other undergraduate programmes. Nevertheless, similar to other undergraduate programmes, the pursuit for a degree was a first attempt for the majority of participants (n=131).

Many have self-perceived to be a caring individual and wish to make a difference in others' life based on a satisfying and rewarding career (n_1=31, n_2=28). Some reported undertaking a nursing programme was under the influence of having cared for a family member, who was suffering from either a chronic or a terminal illness (n_1=11, n_2=14). Those with the experience as a healthcare assistant saw the pursuit as either a need (n_1=19, n_2=11) or a natural career progression (n_1=4, n_2=5). Only a small number (n_1 = 6, n_2 = 10) revealed their intention was to pursue a non-nursing career. A small population of the participants had experienced HFSS [n_1=8 (5%), n_2=7(4.8%)] and podcasting [n_1=9 (6%), n_2=10(6.8%)] prior to the current nursing programme. All 69 participants in intervention groups participated in the MFSS, and 46 of them had accessed the podcast post simulation (Table IV).

The age (n_1: 30.43 $\pm$ 8.5 versus n_2: 26.56, t= 2.91, p=0.04) and gender (χ^2=5.817, p=0.016) differences between the two groups were significant. Nevertheless, both age (r=1, *p=0.112)* and gender difference (t=1.565, p=0.120*)* were found to have no significant influence on the pre-test CBI

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scores. No significant group difference was also found for the overall pre-test CBI scores (n_1=3.6315, n_2=3.6385, t = 0.146; p= 0.884) and the pre-test CBI subscales (Table V). However, the post-test 2 CBI score of the intervention group (n_{1b} =3.7694) was significantly higher than the control group (n_{2b}= 3.6007; t = 3.076; p= 0.003) (Table V). Similar patterns were observed in post-test 2 for all four CBI subscales except for 'Assurance of human presence' (t = 2.094; p=0.390).

TABLE IV. DEMOGRAPHIC DATA BETWEEN THE TWO GROUPS

Variables	n_1	n_2	χ^2	p
Other qualifications			2.651	0.266
At least 2	42 (29%)	39 (27%)		
3 to 4	27 (18%)	36 (25%)		
5 or more	0 (0%)	2 (1%)		
Highest Qualification			5.423	0.608
BTEC	3 (2%)	3 (2%)		
Access to higher education	26 (18%)	20 (14%)		
A level (and/or Equivalent)	14 (9.5%)	26 (17.5%)		
University Certificate / Certificate in vocational training	14 (9.5%)	14 (9.5%)		
Diploma/Degree	12 (8.5%)	14 (9.5%)		
Nursing as a career			2.347	0.126
1st career pursuit	17 (12%)	28 (19%)		
2nd or 3rd career pursuit	52 (36%)	49 (33%)		
Motivation to complete a nursing degree			2.770	0.250
To practise as a nurse	63 (44.5%)	63 (44.5%)		
To practise as a nurse temporarily and move on to non-nursing career in the future	6 (4%)	7 (5%)		
To use it for pursuing a non-nursing degree/career	0(0%)	3 (2%)		
Held caring positions	41 (28%)	32 (22%)	5.839	0.211
Experienced high fidelity simulation learning	8 (5.5%)	7 (4.7%)	0.247	0.619
Experienced podcasting for learning	9 (6%)	10 (7%)	0.000	0.992

In terms of the scoring by the intervention group, there was significant increase of composite CBI scores between pre- and post-test 2 (t= -2.924, p=0.004) and pre- and post-test 1 (t =-2.126, p=0.035) (Table VI). There was also significant increase in CBI scores between pre-test and post-test 2 for all subscales. Similar findings were also seen between pre-test and post-test 1 in the following subscales: 'Assurance of human presence' (t= -2.186, p=0.031); Positive connectedness (t=-2.116, p=0.036). As for CBI scores between post-test 1 and post-test 2, the only significant increase was seen for 'Professional knowledge and skills' (t=-2.570, p=0.011).

V. DISCUSSION

The majority of the individuals enrolled for a nursing degree did not gain access to higher education based on traditional qualifications. Many had past caring experience either through the role of a healthcare assistant or informally, having cared for a family member or relative. Many claimed to have a strong caring nature and wished to make caring their career. The strong caring attribute of the intervention group as reflected in the high CBI score prior to the 'interventions' (pre-test=3.6315, SD=0.29503; post-test 2: n_{1a} =3.6315, SD=0.29503) was mirrored in the control group (n_{2a} =3.6385, SD=0.28915).

TABLE V. PRE- AND POST-TEST 2 CBI SCORES BETWEEN THE TWO GROUPS

	Pre-test Mean ± sd	**Post-test 2 Mean ± sd**	***t***	***p*-value**
Composite CBI				
Intervention Group	3.6315 (SD=0.29503)	3.7694 (SD=0.21947)	-2.924	0.004
Control Group	3.6385 (SD=0.28915)	3.6007 (SD=0.31834)	0.643	0.535
t	0.146	3.076		
***p*-value**	0.884	0.003		
Respectful deference to others				
Intervention Group	3.7693 (SD=0.27755)	3.8551 (SD=0.18464)	-1.997	0.048
Control Group	3.7792 (SD=0.25712)	3.7137 (SD=0.26338)	1.287	0.201
t	0.224	3.096		
***p*-value**	0.823	0.003		
Assurance of human presence				
Intervention Group	3.6461 (SD=0.34163)	3.7503 (SD=0.26894)	-1.872	0.064
Control Group	3.6656 (SD=0.34132)	3.6175 (SD=0.35185)	0.709	0.480
t	-0.344	2.094		
***p*-value**	0.732	0.390		
Positive connectedness				
Intervention Group	3.4654 (SD=0.32633)	3.6458 (SD=0.30868)	-3.165	0.002
Control Group	3.4580 (SD=0.35371)	3.4330 (SD=0.38303)	0.349	0.728
t	0.131	3.005		
***p*-value**	0.896	0.003		
Professional knowledge and skills				
Intervention Group	3.4986 (SD=0.50715)	3.7895 (SD=0.29862)	-3.817	0.000
Control Group	3.4987 (SD=0.44912)	3.5128 (SD=0.50429)	-0.153	0.878
t	0.002	3.371		
***p*-value**	0.998	0.001		
Attentiveness to the other's experience				
Intervention Group	3.7138 (SD=034105)	3.8246 (SD=0.24982)	-2.041	0.043
Control Group	3.7143 (SD=0.32625)	3.6987 (SD=0.34972)	0.237	0.813
t	0.009	2.057		
***p*-value**	0.993	0.042		

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Following a care-orientated MFSS session that was accompanied by podcasting in a blended approach to learning, the intervention group had a significant increase in CBI scores (n_{1a} =3.7694, t =-2.924, p =0.004). The use of MFSS without the manikin producing the physiological responses has not only allowed students to role play as qualified nursing personnel but also, as patients. In the position of a nurse, students learnt and acquired the necessary instrumental caring behaviours such as engaging with aseptic technique and universal precaution, choosing the appropriate catheter size/type and so on. This was evidenced in their significant higher CBI score than control group for 'Professional knowledge and skills' in post-test 2 (n_{1b} =3.7895; n_{2b}=3.5128 t =3.371, p =0.001) (Table V). As a 'patient', students were 'forced' to think about the type of care they wished to receive while undergoing a procedure as intimidating as urinary catheterisation. In this way, students were encouraged to consider ways in which the various types of expressive caring behaviours can be displayed as sensitiveness, kindness and respect to others. This resulted in the significant increased post-test 2 scoring for **'**Respectful deference to others' (n_{1b} = 3.8551, t = -1.997; p= 0.048), **'**Positive connectedness' (n_{1b} = 3.6458, t = -3.165; p= 0.002) and 'Attentiveness to the other's experience' (n_{1b} = 3.8246, t = -2.041; p= 0.043).

TABLE VI. PRE- AND POST-TEST CBI SCORES FOR INTERVENTION GROUP

	Pre-test Mean ± sd	**Post-test 1 Mean ± sd**	**Post-test 2 Mean ± sd**	***t* (*p*-value)**
Composite CBI	3.6315 (SD=0.29503)	-	3.7694 (SD=0.21947)	-2.924 0.004
	3.6315 (SD=0.29503)	3.7271 (SD=0.22898)	-	-2.126 0.035
	-	3.7271 (SD=0.22898)	3.7694 (SD=0.21947)	-1.053 0.294
Respectful deference to others	3.7693 (SD=0.27755)	-	3.8551 (SD=0.18464)	-1.997 0.048
	3.7693 (SD=0.27755)	3.8261 (SD=0.16651)		-1.457 0.147
		3.8261 (SD=0.16651)	3.8551 (SD=0.18464)	-0.928 0.355
Assurance of human presence	3.6461 (SD=0.34163)	-	3.7503 (SD=0.26894)	-1.872 0.064
	3.6461 (SD=0.34163)	3.7957 (SD=0.26334)		-2.186 0.031
		3.7957 (SD=0.26334)	3.7503 (SD=0.26894)	0.197 0.844
Positive connected-ness	3.4654 (SD=0.32633)	-	3.6458 (SD=0.30868)	-3.165 0.002
	3.4654 (SD=0.32633)	3.5813 (SD=0.30017)		-2.116 0.036
		3.5813 (SD=0.30017)	3.6458 (SD=0.30868)	-1.184 0.238
Professional knowledge and skills	3.4986 (SD=0.50715)	-	3.7895 (SD=0.29862)	-3.817 0.000
	3.4986 (SD=0.50715)	3.6290 (SD=0.35843)		-1.701 0.091
		3.6290 (SD=0.35843)	3.7895 (SD=0.29862)	-2.570 0.011
Attentiveness to the other's experience	3.7138 (SD=034105)	-	3.8246 (SD=0.24982)	-2.041 0.043
	3.7138 (SD=034105)	3.7826 (SD=0.30891)		-1.243 0.216
		3.7826 (SD=0.30891)	3.8246 (SD=0.24982)	-0.826 0.410

The results could have differed if HFSS learning was employed using a manikin being programmed by nurse teachers to 'give' responses. As demonstrated in this study, there was a drop in the composite CBI score and all expressive subscale scores in the control group. Similarly, HFSS exposure had also resulted in a drop in CBI score for 'assurance of human presence' in the intervention group [3.7957 (SD=0.26334) to 3.7503 (SD=0.26894)]. This finding is not consistent with previous work which suggested that HFSS was useful for imparting non technical skills, just as it is for teaching technical skills [2, 10, 25]. Rather it echoed previous work in which learning to be a professional nurse in today's contemporary context could risk the expressive elements of care being subsumed [2, 24].

This study was conducted with the understanding that observers learnt better than performers in simulation [2, 13]. Hence teacher podcast based on a scenario was used with MFSS as part of the blended approach to help students identify and suggest any caring behaviours as needed before students returned demonstration. This resulted in findings consistent with Schere et al's. [1], in that observations followed by participations resulted in higher CBI scoring in post-test 1. Using similar concepts to previous work [1, 16] in which the same scenario was repeatedly used for students to acquire knowledge and skills, 'Student' podcast (of debrief and student performance) were created for student access. As in the study by Reed et al. [16] which found usefulness of video clips to video-record simulations, the use of podcast post simulation sessions had further raised the score of intervention group on caring behaviours [n_{1a}=3.7271(SD=0.22898); n_{1b} = 3.7694 (SD=0.21947)]. Nevertheless, the increase was not significant (t=-1.053, p=0.294). All subscale scoring from post-test 1 to post-test 2 in the intervention group followed the same trend, except for **'**Professional knowledge and skills' which was increased significantly. The overpowering effect of HFSS exposure over podcasting might explain this observation. This explanation was not far from wrong when there was a decrease in CBI scores by the control group who also had HFSS exposures but not podcasting. This observation highly suggested efficacy of podcasts and supported findings in previous work, which concluded that reflective debrief following simulation learning was key to successful learning [2, 15].

The findings of this study have implications for a better practice in nursing education for developing student caring behaviours, they have also wider implications for all vocational and non-nursing healthcare education. While it is recognized that HFSS has important role in developing technical and critical thinking skills. Learning based on MFSS should be considered more often; and to do so with students themselves generating the responses rather than having 'teacher-led' physiological responses by the manikin. This pedagogic approach should also be introduced as part of a blended approach to learning with podcasting of teachers' performance during the simulation session to allow reflection and learning of the expected level of any complex and implicit skills, such as the expressive caring behaviours in nursing. Due to the fact that 'Student' podcasting exposure was tainted by HFSS exposure, whether there was benefit to use 'Student' podcast

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following a MFSS session required further investigations with study that allow a longer period of time for podcast exposures.

VI. Limitation

In this study, not only alternative explanations for the difference in caring behaviours before and after the simulation activities could not be ruled out, the testing effect from the pre-test CBI could not be erased. Besides, participants' changing CBI score based on maturation effect between the observations could not be addressed. Finally, the caring behaviours of students who did not complete the final CBI test, which, indicated a lack of caring attributes could not be established.

VII. Conclusion

A blended approach to learning comprised medium simulation scenario and podcasting were demonstrated to be useful for teaching and nurturing student caring behaviour. Acknowledging the few limitations, our study has provided evidence that high fidelity simulation learning was effective for developing professional knowledge and skills but had limited effect on facilitating the acquisition of expressive caring behaviors of nursing students. On the other hand, a medium simulation without the advanced technology was shown to have the capacity to effectively teach students both instrumental and expressive caring behaviors. However, success learning required a caring-orientated teaching strategy for use in conjunction with podcasting. Without a carefully crafted teaching strategy to help students reflect on the specific aspects of caring behaviours, a positive learning outcome would not have been achieved. Certainly, an opportunity to access podcasting which had the potentials to accommodate a variety of learning strategies which was used during and post simulation learning was responsible for the high CBI scores. The application of our study is particularly important to faculties who engaged in simulation teaching and learning practices. Nevertheless, future studies should involve larger sample sized groups and have better control of the extraneous variables.

Dr Jennifer Loke is committed to integrating research with pedagogic practices, in the hope of benefitting learners delivering nursing care and service users who receive the care. Her research interests include caring behaviours, critical theories, simulation learning and leadership and management in healthcare. Learn more about her at http://www.kwlee.karoo.net/ Dr Loke is the principal investigator of this study and will coordinate the handling of any other matters arising from this smaller published contribution by responding to readers' enquiries and requests for materials. Any correspondence and requests for materials should therefore be addressed to Dr Jennifer Loke at j.loke@hull.ac.uk.

Acknowledgment

The authors wish to thank the following individuals as 'participating investigators': Dr C Purcell for proof reading the final draft submitted for ethics approval and Dr C. Whitfield for proof reading the final draft submitted for funding applications and ethics review. The authors are also grateful for her time for acting out as a student nurse in the 'Teacher podcast' and also her effort in distributing some of the post-test 2 questionnaires. We also like to thank the following individuals: Associate Professor Y. Chen at the Southern Medical University (Quangzhou China) for sorting some of the pre-test raw data; Mrs M. Guest for directing students into the various clinical rooms for their simulation sessions and for assisting in managing student withdrawal from the research during 'interventions'; Mrs Gillian Wilson and Mrs Jan Hunter for their assistance in distributing the pre-test questionnaires. Finally we wish to thank all students who have participated in the study.

Author Contributions

Dr Jennifer Loke: established conception and design of the study, and was responsible for acquisition, analysis and interpretation of the data. Drafting the article and revising it for important intellectual content.

Bryant K Lee: made substantial contributions to the design of the study, data analysis and interpretation of the data. Provided the technical support for podcasting and participated in revising the article for important intellectual content.

Emma Bush**:** made substantial contributions to acquisition of data.

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