Basic SiM – Train The Trainer: A resuscitation training module for cabin crew in Malaysia

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<td>Fariduddin, Muhamad; Universiti Teknologi Mara - Kampus Puncak Alam, Health Education; Universiti Kebangsaan Malaysia Fakulti Sains Kesihatan, Health Education Hum, Wee; Universiti Kebangsaan Malaysia Fakulti Sains Kesihatan Halim, Lilia; Universiti Kebangsaan Malaysia Fakulti Pendidikan Jaafar, Mohd; Universiti Kebangsaan Malaysia Fakulti Perubatan</td>
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Basic SiM – Train The Trainer: A resuscitation training module for cabin crew in Malaysia

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Abstract

Background: We tested the Basic SiM - Train-the-Trainer simulation-based resuscitation training module among airline instructors to train the cabin crew in Malaysia.

Methods: Selected airline instructors were asked to attend a Train-The-Trainer course and then use the knowledge to test their airline cabin crews who were divided into 2 different groups (n = 65) by using different debriefing methods (customary vs DIAMOND) at both the baseline and 6-week period on resuscitation knowledge, technical and non-technical skills through MCQ test, TSTC and CETAM.

Results & Discussion: There was no significant difference in terms of the usage of different debriefing methods on the improvement of all variables except for technical skills in both groups, $F (3,123) = .540, p = .656$, and partial $\eta^2 = .013$ despite retention for all variables.

Conclusion: This module is an effective approach to develop trainers for simulated resuscitation training and has proven to be effective in improving the knowledge and skills of cabin crew in Malaysia.

Keywords: cabin crew, debriefing method, resuscitation training, simulation learning, Train-the-Trainer
1. Introduction

The development of the Malaysian aviation industry occurs rapidly and directly encourages more people in Malaysia to choose to travel by commercial flights as shown in the increase of passengers to 2 million people per year compared to the much smaller numbers posted years ago. Statistics on airlines’ activities around the world indicate that the increased travel by commercial flights in addition to the aging population contribute to an increase in in-flight medical emergency cases (http://www.transtats.bts.gov). In-flight emergency medical cases are a new phenomenon that still lacks attention (Amit & Shauna, 2013). Aside from the compact and small cabins with minimum space available to provide medical care, the low possibility of getting help from a medical doctor, nurse or medical assistant indirectly impacts and causes a variety of complications to passengers (Amit & Shauna, 2013).

The above issues can be overcome by having the airline crew trained in first aid in order to ensure that proper treatment is given timely and accurately. Every crew member on duty must undergo intensive training in order to be certified as a first aider. In the past, almost 3-quarters of in-flight emergency cases were handled by airline crew who were competent in carrying out their duties as a first aider (Dowdall, 2013). However, a study by Mahony (2008) which tested on airline crew’s CPR (Cardiopulmonary Resuscitation) and AED (Automated External Defibrillator) knowledge and performance through a recurrent examination to renew the crew’s safety and emergency licenses showed unsatisfactory results. The crew tested had failed on techniques such as proper hand positioning whilst performing CPR, usage of AED, as well as having low level of knowledge and self-confidence. Low mastery of technical skills and knowledge retention in first aid amongst crew members have also been documented in several previous studies. These problems were
attributed to several key factors including ineffective teaching and learning techniques, modular teaching, the usage of different learning methods according to each airline academy, and insufficient training duration (Mahony, 2008).

In addition to knowledge and technical skills, non-technical skills also play an important role in improving patient safety (Sevdalis, Hull, & Birnbach, 2012). In medical and health sciences education, professional training conducted by faculty is more focused on technical knowledge and skills and not geared specifically to non-technical skills, such as communication, teamwork and leadership. However, in the present medical world, non-technical skills are the skills that should be mastered in full view as this skill is most important to be practiced in everyday work (Rasmussen et al., 2012).

In developing quality crew to provide medical care to patients, teaching and learning methods need to be extended and not centred on technical knowledge and skills alone due to crew’s lack of exposure to non-technical skills, in particular those that contribute significantly to errors in giving emergency treatment to passengers (Pronovost, 2013). Similarly, the lack of exposure to emergencies, insufficient training duration, and time constraints to engage with facilitators are additional factors leading to ineffective training which consequently, have an impact on the crews’ quality and performance when imparting emergency treatment to patients (Dreifuerst, 2009).

The train-the-trainer (TTT) module integrated with simulation-based learning is an instructional method that has been used successfully in both health sciences and medical education and has shown benefits in terms of development of clinical skills, knowledge on patients, and health management (Riley, Grauze, Chonnery, Horely, & Trehwella, 2003). The Institute of Medicine (http://www.nas.edu) claimed that this learning method is an innovation aimed to strengthen the learning process in the health sciences clusters through improvements to students’ skills which will thereby reduce the risk of error to patients. The nursing field is
also concerned about the importance of this learning method; therefore, trainers in this field should use this method as a teaching and learning methodology to generate specific clinical skills (Grantt & Webb, 2010).

As such, we have sought a potentially sustainable solution to overcome the boundaries to education and training for airline academies through the introduction of the TTT module of resuscitation incorporated with basic simulation which uses first aid airline instructors as trainers to teach basic life support (BLS) to cabin crew. The effectiveness of this module was assessed as statistically significant in the numerous components of resuscitation knowledge, skills and non-technical skills amongst cabin crew.

2. Materials & Methods

This project was developed by a team of health educationists from Universiti Kebangsaan Malaysia (UKM) in collaboration with an airline company in Malaysia. Ethics approval was obtained from the Faculty of Health Sciences, Universiti Kebangsaan Malaysia (UKM) Research Committee (NN-2017-105) on Ethical Research in humans. As per protocol, the research team described the details of the study and acquired written consent prior to the commencement of the intervention. This study was conducted at the Airline Academy of the respective company between August and December 2017. Our study population consisted of trainers who were participants in the Basic-SiM workshop and the cabin crew who attended the pre- and post- training assessment.

Phase 1 – Training the trainers
The first section of the study involved the training of trainers which consisted of 3 certified first aid trainers from the department of safety and emergency of the airline academy who each possess different healthcare backgrounds (registered nurse & medical doctors). Each prospective trainer underwent a 1-day training session held from 0830 – 1600.

The aim of the workshop is to ensure that each trainer is fully equipped with the knowledge and skills needed to conduct a basic simulation learning through role-plays with case scenarios together with structured debriefing following a simulation. The two instructors responsible for the training session are simulation instructors certified by the Simulation Skill Lab of UKM Medical Centre.

The Basic-SiM – Train of Trainer for Airline Instructor handbook used as the manual for this workshop is largely based upon the modified content of the Structure & Support Debriefing Instructor Training (American Heart Association) & SimPle Teach (Simulation Practice for Teaching & Learning) endorsed by the A & E Department of UKM Medical Centre.

The workshop began with a general introduction on the application of simulation learning in the healthcare industry, followed by specific content on the element of non-technical skills. The session continued with the identification of simulators and design of case scenario, followed by an introduction to the different models of debriefing and their application in different domains. The session was concluded with a practice workshop on how to conduct effective debriefing techniques based on the selected models given following a simulation learning session. The manual included a supplementary document on a relevant adult education theory which outlined the teaching goals that might aid in the delivery of course content. The adult education theory and trainer training module within the manual were taken from the “Medical Education Theory & Practice”.
Simulation based-first aid learning for cabin crew (Phase 2 & 3 of Intervention)

The second and third phases required the “trained trainers” to conduct a simulation-based first aid learning on a sample of cabin crew for a 10 week duration. In this section, only two trainers were involved in delivering the simulation learning to 10-15 cabin crew members in line with the requirement of the session of keeping a minimal ratio of 1 instructor to 10 individuals in all sessions. The participants comprised of experienced cabin crew from the respective airline company. The purpose of this session was to apply the simulation learning associated with BLS knowledge and skills on cabin crew who were assumed to have no prior knowledge and experience in simulation learning. The point of interest of this learning was on the BLS knowledge, practical skills and non-technical skills that can be required and practiced by these cabin crews in their working environment. The skills taught encompass 3 approaches which are to maintain patients’ airway and breathing, provide effective CPR, and utilise the AED associated with non-technical skills including effective communication, teamwork amongst crew members, decision making and situational awareness.

The trainers carried out the simulation learning with the aid of training mannequins and other supporting safety equipment on board the aircraft as well as learning materials, such as power point presentations and a wall chart to indicate the elements of technical and non-technical skills. Prior to the session, all participants’ baseline data were collected together with their consent form. The learning session was divided into two different groups which are the control and experimental groups. Each session was held from 0800 hrs to 1600 hrs and included general briefing, assessment, simulation via role-play, and debriefing sessions. The intervention started with a general briefing, followed by a pre-assessment on the cabin crew’s knowledge on BLS using a 30-multiple choice questions test which lasted for approximately an hour. Next, the participants were grouped into teams of 5 members for a flight simulation using the case scenario method. They were oriented to the role-play based
on the case scenario given which covers the expected learning objective and skills (technical & non-technical) to be acquired based on the elements written on the wall chart.

The afternoon session included the role-play session which lasted for 10-15 minutes. In this session, the trainer assisted the teams by providing instructions and prompts on the specific expected actions to be taken. Following this session, the trainer conducted a 30-45 minutes debriefing session to reflect on the participants’ actions. The feedback consisted both positive feedback and constructive criticism (Figure 1). The only difference applied between these 2 groups was the type of debriefing models used to conduct the debriefing session. A customary debriefing was conducted by the trainer who handled the control group, while the experiment group was debriefed using the DIAMOND structured model. Since the knowledge and skills of each participant were assessed before and after they went through the intervention, thus each role-play session was recorded for evaluation purposes by selected expert raters. At 6 weeks, all participants had to go through an identical assessment as follow-up (Figure 2).

Outcomes

The primary outcome is measured by the effectiveness of this simulation-based learning module in enhancing the cabin crew’s BLS knowledge and skills taught via the ‘trained trainers’. This assessment was completed immediately pre- and 6 weeks post-training following international guidelines which advocate the use of repeat assessments to ensure adequate retention of knowledge and skills following training (Nolan et al., 2010). The secondary endpoint of this study is the comparison between the structured and unstructured
debriefing techniques used by each ‘trained trainer’ and its effectiveness following the simulation learning on the acquisition of non-technical skills and retention of knowledge and skills via simulated case scenarios applied on the cabin crew.

**Knowledge assessment : MCQ test**

The MCQ test used was a modified version of the American Heart Association’s (AHA) basic life support (BLS) test validated by selected professionals. One mark was awarded for each question answered correctly, and no penalty was given for neglected or incorrect answers. The participants were not informed about their test scores nor were they given remarks on their answers.

**Skills assessment : Technical & Non-Technical**

A “simulated cabin interior” was established in the first aid room and the simulated passenger was a male mannequin lying in the middle of the aircraft seat. Since the participants were given the scenario script during the morning session together with their respective roles, they were thus asked to locate their working positions in the actual cabin. Throughout the scenario, they were given prompts by the ‘trained trainer’ such as :

“Passenger is unconscious and not breathing, start CPR on this victim please” (technical skill)

“Incoming calls from the captain inquiring for the victim’s status, please answer immediately” (non-technical skill)

Video assessment of simulated scenarios is an established methodology in measuring the effectiveness of resuscitation training (Brennan, Braslow, Batcheller, & Kaye, 1996; Whitfield, Newcombe, & Woollard, 2003). The recorded simulated scenarios were marked by 2 different expert raters selected by the researcher. The observational checklist was
adapted and modified from the *Technical Skills Testing Checklist* (Mahony, 2008) tool for the technical skills assessment component and the *Crew Emergency Teamwork Assessment Measure* (Guise et al., 2008; Cooper et al., 2010) tool for non-technical skills component. Each checklist was consistent with the *Safety and Emergency Procedure Manual for Cabin Crew* guidelines of the respective airline company. The participants’ respective videos were shown to each rater to be marked independently, and these videos were not labelled (pre- or post-). Technical skills were analysed as binary outcomes (YES/NO), whereas non-technical skills were scored on a 1-10 Likert scale which indicated poor to excellent performance.

**Statistical analysis**

The researcher estimated that a total of 128 participants were needed to provide greater than 80% power to detect any statistically significant difference between groups at a significance level of 0.05 with a medium effect size using the $G$ power software version 3.12. A final total of 150 participants which encompass an additional of 10-15% dropout rate were recruited to allow for attrition. The mean MCQ test, technical and non-technical skills scores were compared using a MANCOVA analysis. All pre-scores were used as a covariate to look for a change between the 2 groups (control and experimental) during the post assessment. The statistical analysis was performed using IBM SPSS Version 22.

**3. Results & Discussions**

A convenience purposive sample of 130 cabin crew members were chosen by the airline company’s Human Resource Department to enrol in this study following an internal review based on the inclusion and exclusion criteria, and were equally assigned to either the control or experimental groups by the hosting facility; thus, each group consisted of $n = 65$
individuals. The researcher obtained a 100% response rate from the participating eligible cabin crew. The demographics of each participant were collected for both the control and experimental groups.

69 flight stewards (53.1%) and 61 flight stewardesses (46.9%) were enrolled in this study. Other demographic characteristics, such as age distribution, education level, citizenship, working experience, experience in handling medical emergencies, and participation in simulation learning and debriefing sessions are presented in Table I below.

**INSERT TABLE I HERE**

**Knowledge, Technical and Nontechnical Skills Assessment**

The results for knowledge and non-technical skills showed improvements following the intervention. However, a reduction in technical skills was shown for both groups (Table II). The mean MCQ scores for the knowledge assessment increased from 22.78 to 24.18 (control) and 21.89 to 24.37 (experimental), with better retention in the experimental group. A similar trend was recorded for the non-technical skills assessment with increases of mean scores from 8.45 to 8.54 (control) and 8.59 to 8.66 (experimental). However, both groups showed a decrease in the mean scores for technical skills from 11.85 to 10.75 (control) and 11.05 to 11.10 (experimental). To determine the presence of any significant change, a one-way MANCOVA analysis was performed to further examine the effectiveness of the training programme.

**INSERT TABLE II HERE**

The mean MCQ, technical & non-technical total scores (post-intervention) were analysed using the MANCOVA analysis to assess the differences between both groups (DIAMOND debriefing vs. customary debriefing technique). Before carrying out the
MANCOVA analysis, the data were tested using SPSS statistics to make sure that all of the underlying assumptions were met. Univariate normality was assessed using the Shapiro-Wilk test and boxplots, and can be assumed. Moreover, no multivariate outliers were discovered within the data, thus supporting the assumption of multivariate normality. Correlations between the dependent variables were not excessive, indicating that multicollinearity is not a problem. Moreover, the relations that exist among the dependent variables are more or less linear. Subsequently, box’s M was not significant at $\alpha = .001$, indicating the homogeneity of the variance-covariance matrices. As all of the underlying assumptions were supported by the data, a MANCOVA analysis was then performed. Findings confirmed that there is no significant effect from the use of different debriefing methods (DIAMOND debriefing vs. customary debriefing) on the combined dependent variables, $F (3,123) = 0.540, p = 0.656$, partial $\eta = 0.013$ (Table III).

**INSERT TABLE III HERE**

Despite the lack of significant effect on the usage of different types of debriefing methods, there were several noted improvements, though no significant differences were observed for any variable. The most prominent improvements were in terms of level of knowledge where both groups had shown improvement after the training intervention, followed by non-technical skills. However, a decrease of mean scores was observed for both groups following the intervention with the control group showing the most decrease in technical skills (Table IV).

**INSERT TABLE IV HERE**
Discussions

Simulation-based learning has emerged as a well-known innovative teaching method which promotes active participation and offers experience by applying realistic skills in addition to the development of cognitive skills. With such a platform, the opportunity for individuals to function more independently can be accomplished with minimum risk of harm or mistakes. Aside from that, debriefing has been identified as the key element to an effective simulation experience as it reinforces the teachable moments which had happened during the simulation scenario. Whilst there are different researches that measure the advantage of various educational interventions in enhancing the BLS outcomes in medical settings, the key difference of this study is its focus on the use of the Train-the-Trainer (TTT) module on the effectiveness of the simulation and the employment of the non-medical community together with non-expert medical professionals in a confined resource setting. Aside from that, the researcher had additionally tested the objective and validated endpoints of the resuscitation knowledge and skills directly, following the training intervention. The study’s evidence suggested that participants (cabin crew) were capable of acquiring and effectively retaining cognitive and psychomotor skills following the simulation learning as shown in their better scores compared to their baseline scores, except in terms of technical skills. Improvements in most of the domains and data taken from each group were discovered, and the improvements seen in those metrics were similar to reports on comparable endpoints from training interventions delivered in highly-resourced clinical environments (Mpotos et al., 2011; Perkins et al., 2006, 2007).
The effectiveness of different debriefing models on promoting the retention of skills and knowledge at 6 weeks was a secondary endpoint in this study, and the results have shown that the mean scores (post) for knowledge and non-technical skills were elevated in comparison to the baseline (co-variate) scores. However, no improvement was sustained at 6 weeks in terms of technical skills, with a higher rate of deterioration by the control group. This means that the debriefing session carried out following the simulation learning did not impose any effects on maintaining the participants’ skills beyond the intervention assessment. The fact that both knowledge and non-technical skills showed an improvement, following the intervention made the researchers anticipate identical trends for technical skills. Nonetheless, the rate of decay of technical skills accelerated quicker compared to the other variables, thus leading to the search for a doable clarification on several possibilities which purpose is discussed in the next section.

**Cognitive Load & Rate of Decay in Technical Skills**

In the context of this study, technical skills were reported to decay at a faster rate in both groups following the intervention. This can be explained by the level of exposure and participation in dealing with actual medical emergencies on a daily basis (Einspruch, Lynch, Aufderheide, Nichol, & Becker, 2007; Kaye et al., 1995; Reder, Cummings, & Quan, 2006). The research team had specifically designed resuscitation case scenarios based on actual emergencies that occur on-board which involved the management of airway and breathing, high quality of chest compression, and the usage of AED. All of these elements are linked to one another and simultaneously require participants’ excellent grasp of theoretical knowledge, technical & non-technical skills in order to solve emergencies accordingly. The use of simulation modalities which reproduce real-life situations in a simulated workplace environment to produce better transfer of learning is now debatable (Norman, Dore, &
Grierson, 2012). For instance, in this research, the participants who were also known as novices have limited exposure to medical emergencies. Thus, unfamiliar learning environments can potentially be distracting rather than add meaning to a learning task (Van Merrienboer & Sweller, 2010).

According to the Cognitive Load theory (CLT), learning is restricted via the finite capability of learners’ working memory which could preserve seven to nine newly-obtained items; however, the working memory only actively processes three of such items at any given time (Sweller, Van Merrienboer, & Paas, 1998; Van Merrienboer & Sweller, 2010; Young, Van Merrienboer, Durning, & Ten Cate, 2014). The demand on the working memory’s resources imposed through a learning task is known as cognitive load which can be divided into intrinsic, extraneous and germane. While intrinsic cognitive load is associated with the complexity of what is learned, extraneous cognitive load is commonly a result of bad instructional design and is considered counterproductive to learning. The germane cognitive load refers to the working memory resources committed to the development and storage of schemata into long term memory and for this reason is directly connected to learning (Kirschner, 2002; Sweller, 2010).

In this study, the researchers chose to study the element of interactivity which refers to the degree to which each element to be discovered requires reference to other elements which might be learned or additionally to be learned. This element is a key determinant of intrinsic cognitive load (Young et al., 2014). As such, the high-fidelity simulation of medical emergencies developed by the research team through the re-creation of information, skills and non-technical skills essential in real life offers a form of complicated learning with a very high element of interactivity (Van Merrionboer & Sweller, 2005). The researchers suspect that the cognitive load of medical emergency management used in the case scenarios probably surpasses the potential working memory of the participants, particularly the
individuals who had not acquired any knowledge and skills prior to the simulation as these components help in their overall performance by means of freeing up more working memory to cope with the imposed cognitive load (Riem, Boet, Bould, Tavares, & Naik, 2010).

It is also important to note that providers from different disciplines or specialties (medical vs non-medical community) may experience different rates of decay in their knowledge and skills due to differences in type and frequency of clinical exposure (Jensen et al., 2009). This is supported by the fact that cabin crew rarely have to confront medical emergencies in their workplace. Thus, the differences above explain the higher rate of decline even after 6 weeks of successful intervention. To amend this situation, the Department of Civil Aviation (DCA) has instructed airline companies to send their cabin crew for refresher courses once a year as a mandatory requirement prior to renewing their safety licenses. The long duration prior to the refresher course added with the lack of exposure in dealing with medical emergencies directly affects the decay rate among cabin crews compared to healthcare professionals (Jensen et al., 2009; Lewis, Kee, & Minick, 1993; Young & King, 2000).

**Study Limitations**

As this study was measured up to 6 weeks following the intervention, there is a potential limitation in understanding the rate of retention, particularly on all of the included variables. Secondly, it is plausible that independent learning could possibly occur following the intervention and prior to the post assessment. This may have affected the post-assessment performance in terms of knowledge and non-technical skills among the cabin crew. Thirdly, the usage of the same MCQ test and case scenario for the pre- and post-assessment imposed a potential limitation as it is possible that repeated testing may have contributed in part to the elevated overall performance. Additionally, the teaching techniques imposed by the selected
facilitators also limited the study. It is important to note that the effectiveness of intervention between groups which utilised different debriefing methods may be highly influenced by the teaching skills of the individual facilitators.

**Future Research Directions**

There are some aspects that can be improved when conducting the research in future. First, it is important to ensure an adequate sample size is successfully obtained to avoid any attrition during the study. Second, this research only investigated the effectiveness of the structured debriefing method compared to the customary debriefing method. In conducting the debriefing sessions, the researchers noticed that participants faced difficulties in reflecting on their actions which might have impaired the discussion, thus the usage of video during the debriefing session is highly suggested. Besides, there is still a wide knowledge gap in the usage of video assisted debriefing when coupled with several structured models of debriefing, which in this study was the *DIAMOND* debriefing model. Third, technical errors occurring in this study should be addressed accordingly. Since the method used to assess participants’ skills is recorded video analysis, hence the camera plays a role in developing high quality images which directly help raters to provide better ratings. The researchers also suggest that the devices and mannequins used for interventions to be upgraded or replaced to ensure that no technical difficulties will be encountered while simulations are conducted as these difficulties are known to affect participants’ performance. Finally, it is crucial to notice that debriefing effectiveness can be affected by the instructor’s debriefing skill. Due to the limited number of instructors available in the respective airline academy, only two instructors were involved in the study. The employment of fewer instructors may be more suitable in minimising the personal style variations employed in carrying out the intervention.
4. Conclusion

The research team discovered that the Train-the-Trainer module of resuscitation education incorporated with simulation learning as reported in this study was effective in improving and retaining the resuscitation knowledge and non-technical skills amongst the cabin crew in Malaysia. Moreover, both knowledge and non-technical skills showed improvements which were sustained for up to 6 weeks post-intervention. Regardless the decay of technical skills reported, further research investigating on the components of training course that may lead to improved knowledge and technical & non-technical skills and involving multiple opportunities for experience could be of benefit in developing effective resuscitation simulation programmes for all Malaysian cabin crew.

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References


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Figure 1 Flowchart showing the summary of a Phase 2 intervention

Figure 2 Flowchart showing the summary of Phase 3 Intervention
Table 1 Demographics and baseline characteristics of the study population

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</table>
Table II Mean scores for knowledge, technical & nontechnical skills assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Group</th>
<th>Pre (Mean &amp; S.D)</th>
<th>Post (Mean &amp; S.D)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>Control</td>
<td>22.78 (3.25)</td>
<td>24.18 (2.62)</td>
</tr>
<tr>
<td></td>
<td>Experiment</td>
<td>21.89 (3.69)</td>
<td>24.37 (2.71)</td>
</tr>
<tr>
<td>Technical Skills</td>
<td>Control</td>
<td>11.85 (3.2)</td>
<td>10.75 (2.86)</td>
</tr>
<tr>
<td></td>
<td>Experiment</td>
<td>11.05 (3.2)</td>
<td>11.10 (2.44)</td>
</tr>
<tr>
<td>Nontechnical Skills</td>
<td>Control</td>
<td>8.45 (.686)</td>
<td>8.54 (.564)</td>
</tr>
<tr>
<td></td>
<td>Experiment</td>
<td>8.59 (.681)</td>
<td>8.66 (.542)</td>
</tr>
</tbody>
</table>

Table III Multivariate test

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypotesis df</th>
<th>Error df</th>
<th>Sig</th>
<th>Partial Eta Squared</th>
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</thead>
<tbody>
<tr>
<td>Group</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Pillai’s Trace</td>
<td>.013</td>
<td>.540</td>
<td>3</td>
<td>123</td>
<td>.656</td>
<td>.013</td>
</tr>
<tr>
<td>Wilks’ Lambda</td>
<td>.987</td>
<td>.540</td>
<td>3</td>
<td>123</td>
<td>.656</td>
<td>.013</td>
</tr>
<tr>
<td>Hotelling’s Trace</td>
<td>.013</td>
<td>.540</td>
<td>3</td>
<td>123</td>
<td>.656</td>
<td>.013</td>
</tr>
<tr>
<td>Roy’s Largest Root</td>
<td>.013</td>
<td>.540</td>
<td>3</td>
<td>123</td>
<td>.656</td>
<td>.013</td>
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</table>

Table IV Estimated marginal means

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Mean (Co-variate)</th>
<th>Mean</th>
<th>S.E</th>
<th>95% Confidence Interval</th>
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<tbody>
<tr>
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<td>Lower Bound</td>
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<td>Knowledge</td>
<td>Control</td>
<td>22.34</td>
<td>24.13</td>
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<td>Control</td>
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<td>8.51</td>
<td>.073</td>
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<td>.073</td>
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