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Perceptions of Safety Knowledge and Skills in Vocational Training

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Abstract

This research aims at investigating the perceptions towards safety knowledge and skills and perceived efficacies among flight attendants onboard. Many studies have reported deficiencies in vocational training among flight attendants to handle specific onboard emergencies, but these findings are not surprising as knowledge and skills that are not put into active use have been shown to deteriorate or decay significantly even over very short intervals. To further understand the issue, an In-flight Safety Assurance Model is presented and data were collected and analyzed following this model. The findings revealed low perception and efficacy levels which highlight the need to establish Continuous Professional Development programs through making use of educational technology and multimedia.

Keywords: safety knowledge and skills, vocational training, educational technology, ISA model

1. Introduction

Technological advancements and high safety standards have made air travel much safer and millions around the world fly every day without much ado. Making each flight efficient are flight attendants who are put on board the airplanes to provide hospitality services, to maintain order and decorum, and also to execute the appropriate safety and first aid procedures should the needs arise. Their ability to perform the safety and first aid procedures is continuously checked and is under constant scrutiny due to the unpredictable occurrences of onboard emergencies and accidents. Their roles become apparent in real emergency situations as in the case of the emergency landing of the US Airways Flight 1549 on the Hudson River in New York. The captain did not evacuate but cabin crews did and this was why all the passengers were evacuated successfully. Leocha (2009) stated that:

> *"Even though the Captain "Sully" Sullenberger masterfully landed the crippled plane in the Hudson to give the passengers a chance to be rescued, the actions of the flight attendants in the cabin were the key factor in the successful evacuation of the floating plane."*

Praises for flight attendants are aplenty, but so are criticisms and concerns. Mahony, Griffiths, Larsen, and Powell (2008) conducted a study on retention of safety knowledge and skills in first aid and resuscitation by airline cabin crew. The results of this study indicate that cabin crew may not have adequate training to manage a cardiac arrest properly. The study recommends that the current procedures of cabin crew training require investigation and modification. This study claims that the decline in CPR and AED skills is associated with the types of instructional techniques employed that do not make use of educational technology, variations in program delivery and the time interval between training and re-assessment and lapses in knowledge and skill retention. Erricson (2009) too reports that decay of knowledge and skills are not only experienced by military pilots but also by technicians and anti-submarine sonar operators and can occur within three months. This study brings to light the lack of preparedness and the decay of expertise among flight attendants and recommends that frequent brief skill reviews be used through educational technologies to improve retention of skills and this can be done before pre-flight briefing and the frequency of refresher course should be less than 12 calendar months.

Earlier, Dunbar, Chute, and Jordan (1997) conducted a study exploring the flight attendants' technical knowledge and flight attendants' and pilots' expectations of flight attendants. The results of the study revealed that the flight attendants, despite being certified after having undergone basic safety training, refresher training and continuous pre-flight briefings, did not receive adequate training according to the pilots and flight attendants expectations. Moreover, flight attendants were not trained on efficient exchange of safety information. Rosenkrans (2006)

found out that flight attendants did not always follow emergency procedures, had difficulty locating and operating emergency equipment and sometimes failed to perform their safety duties in accordance with established criteria. He mentioned that flight attendants failed to apply the proper emergency procedure when fire is detected onboard. Flight Safety Foundation (2003) also reported that the accidents were sometimes further complicated by the lack of coordination and communication among flight attendants in case of emergency.

Mahony, Griffiths, Larsen, and Powell (2008) pointed out that airlines were not adequately training flight attendants to handle emergencies such as evacuation and CPR and recommended more intensive and frequent training and refresher courses using educational technologies and multimedia. From the previously mentioned study we conclude the context of flight attendants is in urgent need of attention and research because of lack of studies. The remarks by Rhoden, Raltson, and Ineson (2007, p. 538) support this contention. They claim that:

> *"Ironically, the safety role of cabin crew (Flight attendants) receives no attention in the academic literature. Given that cabin crew takes responsibility for millions of passengers annually, it is argued that the quality of the training delivered to enable them to undertake their safety role effectively is an important consideration for all air transport passengers and airline personnel."*

All airlines must include flight attendants in CRM training (RJ flight attendant in-flight safety manual, 2014). The current practice in all major airlines dictates that flight attendants must attend initial training to start their flight duties onboard and at the end of the year they should pass a recurrent training to be certified again to uphold their safety duties for the upcoming year. Flight attendant training includes safety training, security training and crew resource management (CRM) training both in basic training and the refresher training. CRM is defined as

> *"The use and co-ordination of all the skills and resources, available to the crew, to achieve the established goals of a safe, efficient and comfortable flight."*

CRM is a comprehensive system directed towards the entire crew including cockpit crew and other related staff and it aims at enhancing crew performance and it concentrates on crew attitudes, behaviors and the effect on safety. CRM addresses five major issues: the first one is communication where by all the crew must establish effective communication when the need arise. The second one is situational awareness which refers to the ability to develop a mental model of the current situation in addition to the ability to identify the place and what you need and finally the ability to take action therewith. The third issue related to CRM is leadership which is identified as the process of influencing the group to achieve the objective satisfactorily. The fourth issue is teamwork whereby a group of people work together in harmony to achieve the desired objective. The fifth issue is decision making and problem solving (RJ flight attendant in-flight safety manual, 2014).

Liang and Hsieh (2005) conducted a study that aimed at investigating whether an individual's perception of career development influences job burnout among flight attendants in Taiwan. Career development dimension was divided into career choice satisfaction, career satisfaction, and confidence of career future. The dependent variable of job burnout included exhaustion, cynicism, and professional efficacy. A questionnaire was used to collect data whereby 358 Taiwan flight attendants responded. The results of the study indicated that career choice satisfaction and confidence of career future were significant in predicting job burnout while career satisfaction revealed insignificance on professional efficacy. The researcher emphasized that flight attendants job should be treated as professional and he recommended enhancing self-study among flight attendants, which could motivate them to appreciate their job. The researcher also recommended further research.

To better understand the whole issue of flight safety duties, the researchers developed In-flight Safety Assurance (ISA) model (Figure 1) which gives a holistic view of various stages that the flight attendants pass through from the basic safety training (BST) to the annual refresher training (RT). The factors of the ISA model represent the actual practice of the flight attendants in all major commercial airlines and lead to the development of Expert Flight Safety Schema. The ISA model explains the full practice undergone by a flight attendant. As a safety practitioner he/she is expected to read and review the safety manual continuously (RJ, 2014) and rehearse the safety procedures in their minds endlessly and individually without any additional assistance or learning support except for the refresher training after 12 months of flying.

A full discussion of this model is given in Bani-Salameh et al. (2010).

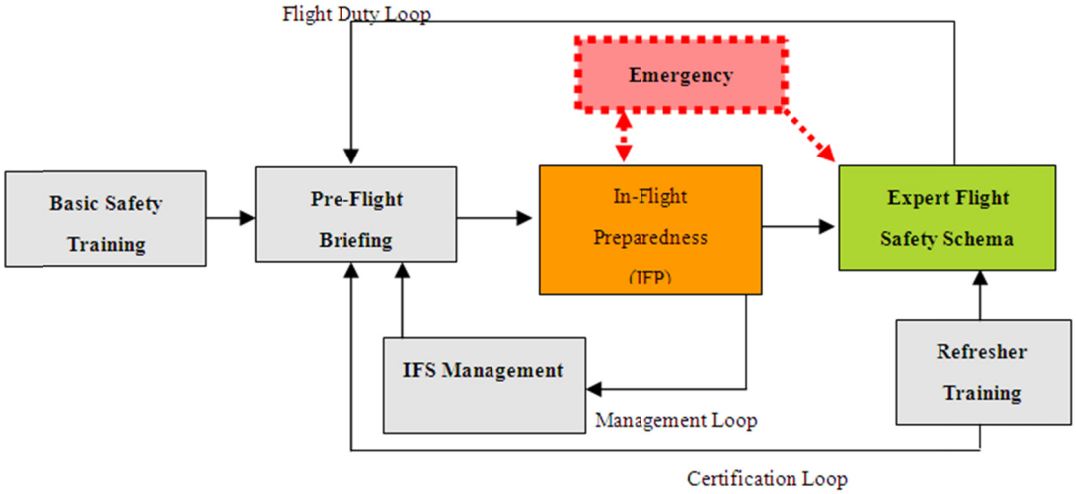

Figure 1. The In-Flight Safety Assurance (ISA) model

1.1 Problem Statement

Despite commendations for outstanding efforts in many emergency situations (Leocha, 2009), Mahony et al. (2008), Rosenkrans (2006), and Flight Safety Foundation (2003) have reported deficiencies in the flight attendants' abilities to execute safety and first aid procedures during IFP. This is in addition to the failure to develop Expertise as presented in ISA model. Therefore, the researchers are quick to call for the strengthening of flight attendants' training programs through educational technologies. Better training in each of the deficiencies through using educational technologies with multimedia appears to be the logical solution to the problems or deficiencies identified by the research reviewed. However, specific, isolated or uncoordinated paper training packages are not the answer.

The ISA model gives a holistic view of the flight attendants' duties and responsibilities and takes a systematic approach in identifying and executing the requirements and outcomes of training. The above mentioned studies have identified shortcomings in terms of specific tasks particularly IFP and Expertise development as shown in ISA model but no studies have investigated the perceptions and levels of confidence of the flight attendants towards their regular duties, tasks and responsibilities in a systematic way or along factors defined by the ISA model. To accommodate for the lack of studies in the context of flight attendants training (Rhoden et al, 2007) and to prepare for better and systematic educational technology training programs, there is a need to know the perceptions of the flight attendants and supervisors towards the factors of the ISA model regarding onboard safety assurance systems and procedures and the quality of training that they have undergone in ensuring in-flight preparedness and ability to handle onboard emergencies. Also needed to be identified are the differences in perceptions by job, gender, age, work experience and level of education and the effects of onboard emergency experience on expertise, which might draw particular conclusions that might significantly shape the methods through which training programs should be designed. On the other hand, the factors of the ISA model are discrete and are hypothesized to affect each other. Thus, correlation values between the factors of the model would further reveal their relationships within the model. Interconnectedness of the findings of this study would thus identify the variables that could assist in enhancing the design of new training packages and the stages or factors that are in urgent need of attention.

1.2 Research Questions

Thus, this study investigated the following questions:

Question 1: What are the perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training?

Question 2: Are there significant differences in perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training by a) Job, b) Education, c) Gender, d) Work Experience, and e) Onboard Emergency Experience?

Question3: Are there significant correlations between Basic Safety Training, Pre-Flight Briefing, In-Flight

Preparedness, Own Expertise, and Refresher Training?

2. Methodology

A questionnaire (Appendix A) comprising 53 items was developed following the dimensions of the ISA model. The content of the dimensions of the questionnaire is based on the flight attendants safety manual (Libyan Flight attendant In-flight Safety Manual, 2014 & Royal Jordanian Flight attendant In-flight Safety Manual, 2014). The first dimension of BST included items such as "The lessons in the basic safety training (BST) make use of multimedia meaningful sentences and simple language" and "I have difficulty remembering all the safety knowledge and skills (SKS) after the basic safety training (BST). The second dimension of PFB included items such as "The safety knowledge and skills (SKS) discussions during pre-flight briefing (PFB) focus on remembering" and "The safety knowledge and skills (SKS) discussions during pre-flight briefing (PFB) focus on problem solving." The third dimension of IFP included items such as "I can competently deal with first aid situations onboard" and "I have experienced emergency situations onboard." The fourth dimension of Expertise included items such as "I can recall the necessary safety knowledge and skills (SKS) when I need to use them in real situations onboard" and "Reviewing the safety knowledge and skills (SKS) from the safety manual enhances my memory." And the fifth dimension of RT included items such as "The refresher training (RT) provides thorough multimedia safety knowledge and skills (SKS)" and "The refresher training compensates for the forgetting of the safety knowledge and skills (SKS) that I experienced over the last twelve months." A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was employed for all the items.

The questionnaire was sent to In-flight services of a major international airline for verification of item suitability and clarity of language. Changes to the questionnaire in the form of language and terminology were made according to the feedback received. A pilot study involving 36 flight attendants was then conducted. The flight attendants were chosen from a group of certified and experienced personnel who were on duty within the duration of the study. Each flight is dispatched with a flight supervisor and an average of 6 flight attendants. There are around 20 flights a day, giving an average of 140 in-flight supervisors and flight attendants on any given day. The questionnaire was sent to In-flight services of a major international airline for verification of items and clarity of language. Changes to the questionnaire in the form of language and terminology were made according to the feedback received. Then 50 copies of the questionnaire were given to the briefing supervisor to be distributed at random to the flight supervisors before PFB was conducted and 36 completed copies were returned to the briefing office upon arrival back to the briefing center. On the average, the flight attendants had 3 to 4 days to complete the questionnaire. Reliability analysis was conducted for each dimension of ISA model. A reliability index of "alpha=.780 for BST, .809 for PFB, .801 for IFP, .826 for Expertise and .750 for RT" was obtained. The questionnaire was then distributed to 500 flight attendants and supervisors in two major airlines following the procedures established in the pilot study and this number was consistent with the required sample size for the study. For this study the flight attendants were given up to ten days to complete the questionnaire. 249 completed questionnaires were returned. Then, an overall reliability index of alpha= .886 was obtained for the 249 respondents. This study employed quantitative data analysis involving one-way ANOVA and correlation analysis. The level of significance was set at $p = 0.05$.

The sample for the study was chosen using the simple random sampling method (Gay, 1996) as employed in the pilot study. The population of the study is 600 flight supervisor and flight attendants. The recommended sample size for 5% margin of error and 95% confidence level is 242 (Raosoft.com, 2007). The flight attendants males and females were aged 19-55 years old with high school diploma and/or bachelor degrees in various fields. All have passed the BST which is taken once only at the beginning of their career and they must also pass the annual Refresher safety training. Supervisors are flight attendants who are promoted based on high record of performance and a minimum of three years' experience. Some flight attendants have prior experience in other airlines and have undergone similar BST and ISA experience.

3. Findings and Discussion

Question 1: What are the perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training?

Table 1 reports the findings regarding the overall perceptions towards the factors of the ISA model by both the flight attendants and the supervisors. The means were then normalized to the scale of the responses of the questionnaire and graphically presented in Figure 2. Figure 2 showed that the flight attendants and the supervisors reported low perceptions towards the factors and the scores ranged from low Disagree for Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, and Refresher Training and Neutral for Expertise. These findings indicated that there appeared to be low levels of confidence among the respondents towards all

the factors of the ISA model. As suggested by earlier studies mentioned above this may be due to inadequate educational technology training or poor training received during BST and RT which lack the use of multimedia or educational technologies or insufficient preparation during PFB (Mahony et al. and Rosenkrans). These findings are also consistent with the findings by (Liang & Hsieh, 2005) who reported low perceptions among flight attendants that contributed significantly towards job burnout. But the overall low levels for all the factors of the ISA model strongly suggest the lack of good or proper continuous professional development and maintenance of the skills among the respondents using educational technologies. Aside from PFB sessions and the brief annual Refresher Training program, the flight attendants' professional development activities only involve the reading and rereading of the safety manual without any support of educational technologies. The low perception levels reported in this study warrant further investigation.

Table 1. Overall means by total score for the dimensions of the ISA model

	N	Mean	S.d.	Normalized Mean
BST	248	32.78	3.71	2.73
PFB	248	23.94	3.42	2.67
IFP	248	32.57	6.43	2.57
Expertise	248	26.62	3.61	3.00
RT	248	25.74	3.81	2.57

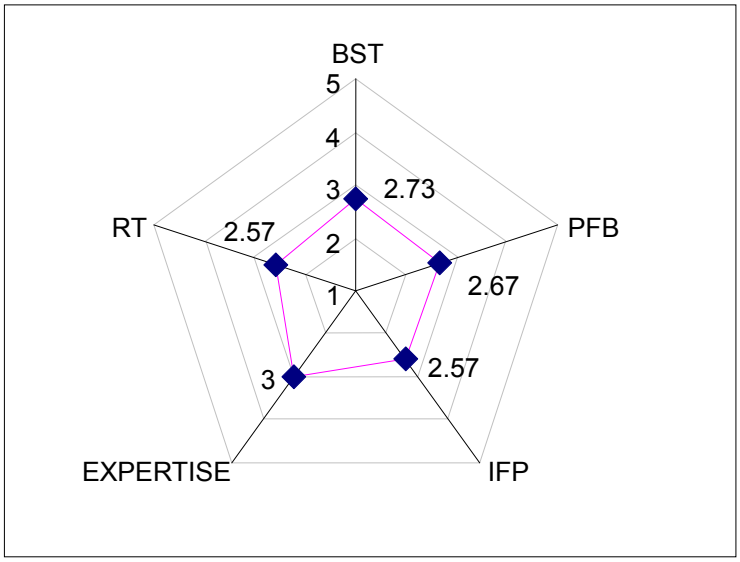

Figure 2. Overall perceptions towards the ISA factors by normalized means

Question 2a: Are there significant differences in perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training by Job of the Respondents?

Table 2a gives the means and the results of ANOVA for perceptions of BST, PFB, IFP, EXPERTISE and RT between the flight attendants and their supervisors. The findings showed that there were significant differences in the perceptions of PFB and IFP between the air stewards and the supervisors with the supervisors reporting higher means in IFP and the flight attendants reported significantly higher scores for PFB. There were no significant differences for BST, Expertise, and RT.

The flight attendants reported significantly higher scores than supervisors for PFB. This is not surprising because PFB is a meeting conducted by the supervisor to establish the flight attendants preparedness for the flight and to plan for the special requirements of the flight. For the flight attendants PFB is a meeting where oral testing of safety knowledge and skills is conducted. If flight attendants fail this test, they will be offloaded. This is

consistent with the observation by Besco (1991) that supervisors are looked upon by the flight attendants as those who administer discipline and punishment for rule violations. The supervisor establishes the required level of competency and readiness of the flight attendants to execute the necessary actions during the flight if and when required. The PFB keeps the flight attendants on their toes and require them to refer to the safety manual continuously. This finding is consistent with Koreltz-Elliott (1989) who referred to PFB as intended to assure readiness by flight attendants for any emergency that might arise onboard. The supervisors, however, reflected more positively to the IFP due to the fact that the supervisors are expected to provide strong leadership onboard (Besco, 1991). Therefore they reported that they were more responsible for safety assurance during the flight than the flight attendants.

There are no significant differences on BST, Expertise and RT. This might be due to the fact that supervisors did not favor training which lacks educational technologies either in BST or RT while they believe that IFP, where they are expected to practice, makes significant difference in enhancing competency. This is consistent with the findings by Safety Net (2007) that referred to experienced supervisors who underestimate the importance of training or RT because they have been in the job since a long time and they do not need training. Cushman (1992) also pointed out that expertise does not develop without actual practice onboard because of disuse and lack of support of educational technologies, which highlight why RT is not appreciated. The findings show that flight attendants were more alert or concerned for PFB while the supervisors were more alert or concerned for IFP.

Table 2a. The means, standard deviations, and results of ANOVA for the dimensions of ISA by job

ISA Dimensions	Job	Mean	Std. Deviation	n	F	Sig.
BST	Air steward	30.12	4.25	234	.582	.446
	Supervisor	31.00	3.04	14		
PFB	Air steward	17.10	2.06	234	19.634	.000
	Supervisor	14.50	3.16	14		
IFP	Air steward	45.82	7.57	234	16.43	.000
	Supervisor	54.78	13.86	14		
Expertise	Air steward	19.41	2.71	234	2.997	.085
	Supervisor	20.71	3.00	14		
RT	Air steward	25.22	4.43	234	3.536	.061
	Supervisor	27.50	3.96	14		

Question 2b: Are there significant differences in perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training by respondents' Education?

Table 2b shows there are no significant differences in the perceptions of the dimensions of ISA model by Education. This finding is consistent with Joyner (2008) who stressed the idea that certain types of jobs need training through educational technologies but not education which conforms to the findings of this study that shows no significant differences between the flight attendants in terms of education because both the BA holders and the high school holders receive the same training.

Table 2b. The means, standard deviations, and results of ANOVA for the dimensions of ISA by education

ISA Dimensions	Education	Mean	Std. Deviation	N	F	Sig.
BST	High school	30.21	4.10799	197	.130	.719
	BA	29.98	4.52765	51		
PFB	High school	17.06	2.25893	197	2.393	.123
	BA	16.52	1.99352	51		
IFP	High school	46.05	8.46915	197	1.056	.305
	BA	47.39	7.48620	51		
Expert	High school	19.38	2.64641	197	1.333	.249
	BA	19.88	3.07016	51		
RT	High school	25.28	4.45618	197	.190	.663
	BA	25.58	4.37802	51		

Question 2c: Are there significant differences in perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training by Gender?

Table 2c shows that there are significant differences in the perceptions of BST and IFP between the males and females with females reporting higher means for BST while males reported higher means for IFP. However, there are no significant differences for PFB, Expertise and RT.

Females reported significantly higher perception towards BST but males reported significantly higher perceptions toward IFP. Females are good learners, so they appreciate the learning at BST while males, consistent with the findings by Vance (2007), Cole et al. (2003) and Frome and Eccles (1995) who reported that males significantly overestimate their abilities while scoring lower on tests, reported higher confidence and abilities than females in applying their knowledge and skills onboard. The studies also reported that females lowered their self-perceptions as a result of evaluating their abilities relative to the expected high standard of competency.

There are no significant differences for PFB, Expert and RT. In the PFB both males and females show no significant differences. This might be due to the fact that PFB does not pose concern in terms of gender unlike the case between supervisors and flight attendants. Both males and females are expected to have the same perceptions for PFB as it is of the same value to them. There are also no significant differences on expertise as well. Expertise is identified here as the flight attendants' safety knowledge and skills (SKS) schema which enhances their competency and ability in solving emergency problems onboard. Both males and females have no preference over expertise because they are not sure of the potential of developing expertise after the BST, PFB and RT. As for RT, both males and females have also the same perception since RT is a routine for them and it is just a repetition of what they learnt in the BST without making use of educational technologies. This finding is consistent with JSI Research & Training Institute (2004) that stresses the idea that refresher training is meant to repeat hand written material taught in earlier trainings; this gives an idea that RT is meant to emphasize what has been learnt in BST and does not add anything new to training, which might justify why both males and females have no significant differences over RT. The findings show that males were more confident or capable of using the safety knowledge and skills (SKS) in solving emergency problems while females were as capable but were more reserved.

Table 2c. The means, standard deviations, and results of ANOVA for the dimensions of ISA by gender

ISA Dimensions	Gender	Mean	Std. Deviation	N	F	Sig.
BST	Male	29.03	3.34	90	10.800	.001
	Female	30.82	4.48	158		
PFB	Male	17.12	2.40	90	.799	.372
	Female	16.86	2.09	158		
IFP	Male	48.37	9.36	90	8.912	.003
	Female	45.16	7.37	158		
Expert	Male	19.74	2.93	90	1.240	.267
	Female	19.34	2.62	158		
RT	Male	24.73	3.79	90	2.724	.100
	Female	25.69	4.73	158		

Question 2d: Are there significant differences in perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training by Work Experience?

Table 2d shows that there are significant differences in the perceptions of BST, PFB, and IFP between respondents by work experience. For BST all groups reported significantly higher than the newcomers, For PFB the group with 12-16 years of experience reported significantly higher means than other groups but equal to the group with less than one year experience. For IFP the group with 12-16 years of experience reported significantly higher means than groups with 1-6 and 7-11 years of experience. Also, there were no significant differences on expertise.

The findings of the ISA factors by experience were varied. For BST, experience appears to positively modify the perceptions of its importance. All groups who have had more than one year experience reported significantly higher scores than those who had less than one year experience. This finding indicates that the content of the BST was relevant and remained relevant throughout their career. This is due to the fact that the content of the BST is actually the content of the safety manual that they have to read and refer to continuously and the manual has undergone very little content, structural or design changes or use of educational technologies over the last twenty years.

For PFB, experience appears to somewhat negatively modify the perceptions of its importance. Flight attendants in groups below eleven years and above seventeen years of experience moderately agree to the importance of PFB but the perceptions were significantly larger for flight attendants with twelve to sixteen years of experience. This sudden spike in positive perception among flight attendants with twelve to sixteen years of experience but decline after seventeen years of experience could be due to changes in employment or expected motivations and incentives from the management (Hsieh, 2005). Promotions or other benefits would generally be offered to employees at this time of experience.

For IFP, experience also appears to somewhat negatively modify the perceptions of its importance. Flight attendants in groups below seven years and above seventeen years of experience reported significantly higher importance of IFP but the perceptions were significantly lower for flight attendants with seven to sixteen years of experience. This sudden drop in perception among flight attendants between seven to sixteen years of experience could be due to decrease in meaningfulness of the flight safety knowledge and skills (SKS) as they go repetitively through the Flight Duty Loop of the ISA model. Based on the ISA model, flight attendants would complete one flight duty loop comprising PFB, IFB and Expertise for every flight assignment. Flight assignments could be a minimum of 120 flights a year, giving the flight attendants a minimum of 700 cycles to the Flight duty Loop over six years of flying. The decrease in meaningfulness despite the high frequency of attendance to the PFB, IFP and Expertise could be due to the mechanical, repetitive and theoretical nature towards the assessment and observance of the requirements for safety knowledge and skills. No new inputs such as the use of educational technologies to SKS or no new challenges to flight attendants SKS are enforced by the supervisor means that Flight Duty Loop consisted only of mandatory compliance to systems and procedures requirements based on repetitive maintenance of memorized text-based knowledge.

The findings show that the perceptions towards Expertise were moderate and that the supervisors reported higher

means but the difference was not significant. According to ISA model, Expertise in onboard safety is promoted by PFB and IFP but is enhanced by job commitment and emergency experience. Flight attendants get onboard to perform their regular duties while the supervisors have to monitor the whole procedures and attend to and take charge of any arising safety situations. Thus the higher means by the supervisors were due to additional responsibility that requires the supervisor to be more alert and experienced with emergency situations onboard.

The findings show that the perceptions towards RT were low and that there was a gradual increase in perception with experience but there were no significant differences between the scores. The perceptions towards RT were low because it is attended once a year and did not add any use of educational technologies or multimedia significant to the SKS or to the content of the flight duty loop.

Table 2d. The means, standard deviations, and results of ANOVA for the dimensions of ISA by experience

ISA Dimension	Experience	Mean	Std. Deviation	N	F	Sig.	Tukey's Test
BST	< 1 year	26.85	4.04	20	4.055	.003	All groups X < 1yr (p = .003)
	1-6 years	30.81	4.88	115			
	7-11 years	29.97	3.28	62			
	12-16 yrs	30.35	3.01	37			
	> 17 years	30.07	2.02	14			
PFB	< 1 year	17.40	1.50	20	5.081	.001	12-16 years X 7-11 years (p = .003); 12-16 years X 1-6 years (p = .001); 12-16 years X > 17 years (p = .015)
	1-6 years	16.81	2.05	115			
	7-11 years	16.48	2.21	62			
	12-16 years	18.27	2.51	37			
	>17 years	16.14	2.32	14			
IFP	< 1 year	45.85	5.24	20	10.050	.000	1-6 yrs X 7-11 yrs (p = .005); 1-6 yrs X 12-16 yrs (p = .001)
	1-6 years	46.58	6.10	115			
	7-11 years	42.29	9.16	62			
	12-16 yrs	42.29	9.99	37			
	>17 years	46.71	8.96	14			
Expert	< 1 year	20.25	3.58	20	.664	.617	
	1-6 years	19.52	2.69	115			
	7-11 years	19.38	2.75	62			
	12-16 yrs	19.05	2.32	37			
	>17 years	19.71	2.81	14			
RT	< 1 year	24.20	4.41	20	2.793	.027	
	1-6 years	24.72	4.66	115			
	7-11 years	25.53	4.09	62			
	12-16 yrs	26.81	3.78	37			
	>17 years	27.42	4.48	14			

Question 2e: Are there significant differences in perceptions of the cabin crew towards Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training by Onboard Emergency Experience?

Analysis by of the ISA factors by emergency experience (Table 2e) revealed that flight attendants, who saw but were not involved directly with onboard emergencies, reported significantly higher perceptions for BST while flight attendants, who were involved with onboard emergencies, reported significantly higher scores for

perception of Expertise. The higher perceptions for BST among the flight attendants, who saw but were not involved directly with onboard emergencies, indicate that, from their point of view, the emergencies were handled properly and that the safety knowledge and skills, that were applied, were attributed to the BST. However, flight attendants who were involved with onboard emergencies reported lower scores for BST but higher scores for PFB, but the difference is not significant. The findings suggest that flight attendants who were involved with onboard emergencies attributed their success to PFB. Flight attendants who were involved with onboard emergencies also reported significantly higher scores for Expertise. The findings suggest that experiencing onboard emergencies and successfully solving the issues improves the perceptions of the usefulness of the manual, importance of PFB and continuous mental practice and rehearsal. The findings suggest that SKS and the procedures to establish and maintain SKS become meaningful after real-life experiences which is similar to using educational technologies and simulations in training.

Table 2e. The means, standard deviations, and results of ANOVA for the dimensions of ISA by Onboard Emergency Experience

ISA Dimensions	Mean	Std. Deviation	n	F	Sig.
BST					
No	29.70	3.87	198	14.052	.000
Not involved	33.90	5.50	28		
Yes	30.17	2.40	22		
PFB					
No	16.97	2.21	198	1.468	.232
Not involved	16.43	2.42	28		
Yes	17.50	1.90	22		
IFP					
No	46.34	8.70	198	.007	.993
Not involved	46.18	5.94	28		
Yes	46.45	7.31	22		
Expert					
No	19.14	2.72	198	10.350	.000
Not involved	20.21	1.79	28		
Yes	21.70	2.78	22		
RT					
No	25.24	4.40	198	1.914	.150
Not involved	24.78	4.90	28		
Yes	27.04	3.97	22		

Question 3: Are there significant correlations between the perceptions of Basic Safety Training, Pre-Flight Briefing, In-Flight Preparedness, Own Expertise, and Refresher Training?

A series of correlations analysis among the ISA factors (Table 3) revealed that there was a small but significant negative correlation between BST and PFB and there were no other significant correlations among the factors. This finding is consistent with that of Question 2a above, confirming that the flight attendants liked BST but did not like PFB. The absence of many significant relationships also suggests that, in the course of executing their duties, the ISA factors were attended to separately or individually and only in fulfilling the minimum required level.

Table 3. Correlation values between the factors of the ISA model

	BST	PFB	IFP	Expert	RT	
BST	1	-.132(*)	.048	-.085	.118	Pearson Correlation
		.038	.447	.183	.062	Sig. (2-tailed)
	248	248	248	248	248	N
PFB	-.132(*)	1	-.084	-.009	-.074	Pearson Correlation
	.038		.186	.887	.249	Sig. (2-tailed)
	248	248	248	248	248	N
	.048	-.084	1	.054	-.020	Pearson Correlation
IFP	.447	.186		.400	.756	Sig. (2-tailed)
	248	248	248	248	248	N
	-.085	-.009	.054	1	-.022	Pearson Correlation
Expert	.183	.887	.400		.727	Sig. (2-tailed)
	248	248	248	248	248	N
	.118	-.074	-.020	-.022	1	Pearson Correlation
RT	.062	.249	.756	.727		Sig. (2-tailed)
	248	248	248	248	248	N

*Correlation significant at 0.05 level (2-tailed).

4. Conclusion & Recommendations

The findings of this study showed that the flight attendants and supervisors reported surprisingly low perceptions towards all the ISA factors. In addition, the absence of many significant relationships between the ISA factors suggest that each factor was attended to separately or individually and only in fulfilling the minimum required levels without support of multimedia and educational technologies. Added to the findings are the job and gender related significant differences where the flight supervisors were more concerned with IFP while the flight attendants were more concerned with PFB. Male flight attendants reported higher preparedness for the safety knowledge and skills. These findings are disquieting as they report the quality of engagement or the residual effects of each factor over a period of time and reflect the deterioration or uneven distribution of focus and levels of confidence among the flight attendants and supervisors in assuring onboard safety. The low levels of perceptions and the uneven distribution of focus and confidence reported in this study should be seen as indicators of poor training or poor maintenance of safety knowledge and skills that does not rely on the support of educational technologies among the flight attendants. These findings can be interpreted as calls for help by the flight attendants and they should be attended to immediately to avoid more negative findings such as reported by Mahony et al. (2008), Rosenkrans (2006), Phillips (1992) and Cushman (1992). These findings are also consistent with the findings by (Liang & Hsieh, 2005) who referred to critical job burnout among flight attendants.

An interesting finding of this study was that flight attendants who experienced onboard emergencies and successfully solved the emergency situations improved their perceptions of the usefulness of the safety manual, the importance of PFB, and continuous mental practice and rehearsal. These findings showed that among flight attendants, experience was the best teacher and the safety knowledge and skills as well as the procedures to establish and maintain the SKS became meaningful and fully appreciated only after experiencing real-life emergencies. Real-life experiences are similar to simulations that are provided by the use of multimedia and educational technologies which are not used in training. This is a very expensive and risky way maintaining expertise. Thus, realistic and more meaningful training exercises using educational technologies are suggested. From the findings of this study, it suggested that a) more studies be conducted to investigate the confidence levels of the flight attendants, b) BST, PFB, and RT employ realistic well-designed interactive multimedia training packages using educational technologies for the flight attendants, and c) a program of continuous professional development (CPD) be instituted for flight attendants.

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Appendix A

No	Question	Scale				
	Basic Safety Training	**SD**	**D**	**U**	**A**	**SA**
1	The content material in the basic safety training is the same content material of the safety manual.	1	2	3	4	5
2	The basic safety training covers the safety knowledge and skills as provided in the safety manual.	1	2	3	4	5
3	Each lesson in basic safety training includes knowledge related to the topic from other sections.	1	2	3	4	5
	Pre-Flight Briefing	**SD**	**D**	**U**	**A**	**SA**
12	The safety knowledge and skills discussions during pre-flight briefing focus on remembering.	1	2	3	4	5
13	The safety knowledge and skills discussions during pre-flight briefing focus on problem solving.	1	2	3	4	5
14	After each pre-flight briefing, I become more competent in the safety knowledge and skills.	1	2	3	4	5
	In-Flight Preparedness	**SD**	**D**	**U**	**A**	**SA**
21	I can apply the fire-fighting procedure competently onboard.	1	2	3	4	5
22	I can apply the appropriate procedure in case of rapid decompression.	1	2	3	4	5
23	I can use the proper commands in case of unplanned emergency.	1	2	3	4	5
31	I do not panic in case of real emergency onboard.	1	2	3	4	5
32	Little time is needed to look up the relevant safety knowledge and skills sections from the safety manual for a given emergency/situation.	1	2	3	4	5
33	I can build proper mental model of a potential emergency onboard	1	2	3	4	5
	Expert Memory	**SD**	**D**	**U**	**A**	**SA**
34	I become competent to handle emergency situations after the basic safety training.	1	2	3	4	5
35	I become more competent onboard because of the repetition of the discussion of safety knowledge and skills during pre-flight briefing.	1	2	3	4	5
36	I become more competent because of the constant monitoring and mental alertness to use the safety knowledge and skills during the flights.	1	2	3	4	5
	Refresher Training	**SD**	**D**	**U**	**A**	**SA**
43	I review the safety knowledge and skills from the safety manual before I start the refresher training.	1	2	3	4	5
44	Each lesson provided in the refresher training includes all the safety knowledge and skills required to this specific topic.	1	2	3	4	5
45	The refresher training provides thorough safety knowledge and skills.	1	2	3	4	5