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AN EXPLORATORY STUDY OF THE EFFICACY OF SERVSAFE® ONLINE

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ABSTRACT

ServSafe® is the most widely utilized food safety training course in the United States, providing certification to over 300,000 learners in 2005. Because of its prevalence, there has been interest in offering this training online. Further, as online programs continue to proliferate in the hospitality industry, the authors hope to provide insight into methodologies designed to evaluate the effectiveness of online instructional systems. The primary objective of this study is to determine whether there is a significant increase in learners' food safety knowledge as a result of taking ServSafe Online. Three hundred forty-three participants with various backgrounds were used to take ServSafe Online. The mean improvement in the post-test score when compared to the pre-test score was more than 22 points. Overall, 81 percent of the respondents passed the exam, as compared to the 79 percent for those who took the traditional exam during 2005. A general linear model and analysis of variance was conducted to determine if various factors such as age and experience, significantly affected the results. No significant factors were found. These findings support the notion that ServSafe Online is an effective method of instruction.
Keywords: Online education, ServSafe, foodservice training.

INTRODUCTION

The primary purpose of this research is to determine the learning effectiveness of ServSafe Online. The National Restaurant Association Educational Foundation (NRAEF) introduced its Internet-based ServSafe Manager Certification Training Online Course (ServSafe Online) in the fall of 2003. As technological capabilities and demand for the convenience of delivering training online continued to grow in the foodservice industry, NRAEF wished to assess the effectiveness of the course in preparing learners for its ServSafe Food Protection Manager Certification Examination (ServSafe Exam).

Sanitation certification has taken on an increasingly important role in foodservice training in the United States. The U.S. Food and Drug Administration (FDA) recommends that the person in charge at an establishment service food demonstrate knowledge of foodborne disease prevention, application of Hazard Analysis Critical Control Point principles (HACCP), and the requirements of the FDA Food Code. Managers can become a certified food protection manager through demonstrating proficiency in the required information by passing a test that is part of an accredited program. Numerous states, counties, and municipalities have passed regulations that require a certified manager to be present at foodservice establishments. The ServSafe Food Safety Manager Training and Certification Program is the leading program of instruction and certification in this area.

The National Restaurant Association Educational Foundation (NRAEF), which offers this training program and examination, certified over 300,000 learners in 2005. Traditionally, this course is taught using a lecture-based format in a traditional classroom setting with a registered instructor. In the fall of 2003, however, the NRAEF introduced an online version of this course.

Many articles have been written about the critical need for safe food handling instruction in the U.S. and around the world (Mortimore, 2001; Pansiello & Quantick, 2001; Sun & Ockerman, 2005; Walker, Pritchard & Forsythe, 2003), but there has been only a limited amount of research done in the area of computer-based foodservice training – one of the motivations and secondary purpose for the current study.

Initial research on small samples has shown that training using technology effectively increases food safety knowledge and behavior (Eckerman, Abrahamson, Ammerman, Fercho, Rohlman, & Anger, 2004); thus, we have reason to believe that computer-based training regarding ServSafe may help improve the knowledge of foodservice managers and employees.

The remainder of the paper will sequentially discuss the relevant literature regarding online education, the methodology, assessment instrument, and the results of the

study. The paper concludes with recommendations for future research.

LITERATURE REVIEW

The review of the literature will begin by first examining the comparative studies that have focused on online and classroom education, including reference to the limitations of these studies. The literature review will then focus on the progress of online tools over time, as well as the factors that leverage the success of online educational experiences. Finally, a review of food safety studies that specifically utilize technology in the area of food safety education is presented.

A significant amount of research, writing, and publications have explored the effectiveness of online education; with much of it comparing traditional classroom training techniques with those involving computer technologies. Several researchers (e.g., Feinstein, 2004; Russell, 1999), however, believe that the methodology used in such studies is flawed. The primary reason for this belief is that the statistical approaches used to analyze the data collected require all extraneous variables (i.e., variables beyond those being studied) to be held relatively constant, so as to achieve a controlled environment. In the real world of hospitality – especially foodservice – such control is virtually impossible. The failure, and inability, to control the extraneous variables may explain the conflicting results found in the literature.

Nevertheless, this literature is worthy of examination. A good example of comparative work focusing on online and traditional learning is the research by Dellana, Collins and West (2000). This study investigated student performance in a traditional classroom course and an online course and found no significant difference between the two learning approaches. The success in online courses was predicted by (1) each student's GPA and (2) each student's attendance rate. These success factors match those found in the study's traditional course.

Attendance rates were higher in the traditional course, but this is not surprising. Having an instructor at each meeting face-to-face elicits different behavior routines from students in general, from elementary school to college and beyond. In a traditional classroom setting, students often attempt to hide behind anything that would break eye-contact with the instructor (e.g., a tall student sitting in front of him or her). Learning in an online environment is no different. Procrastination, even if one is sitting in front of an LCD monitor, is a similar, expected, and typical behavior in many learning environments. Other researchers have suggested that online courses can not provide everything students needed to learn – but only when designed without considering the possible outcomes (Sweeney & Ingram, 2001).

A number of other studies have also investigated whether online classes are more effective that traditional classes. Zhang, Zhao, Zhou and Nunamaker, Jr. (2004) compared an interactive learning environment with a virtual mentor to a traditional classroom and found that the e-learning group outperformed the classroom group. A number of other studies also found that online learners outperformed traditional classroom learners (e.g., Mao & Brown, 2005; Vachris, 1999; Zhang, Zhao, Zhou & Nunamaker Jr., 2004). However, a study by Brown & Liedholm (2002) found the online approach to be inferior to the traditional teaching approach while Picccoli, Ahmad, & Ives (2001) found no significant difference between the approaches. Mixed results of this nature leads to a state of puzzlement.

There also has been some work done regarding learner characteristics that influence the level of effectiveness of online education. Such research has found that the following student characteristics are crucial determinants of online performance: Flexibility with work and family (Marks, Sibley & Arbaugh, 2005; Parnell & Carraher, 2003), age (Brown, 2001; Parnell & Carraher, 2003), gender (Marks, Sibley & Arbaugh, 2005), education, and computer experience (Brown, 2001; Marks, Sibley & Arbaugh, 2005).

Even more perplexing is research that initially finds no significant difference in effectiveness between the two approaches to learning but, after controlling for certain factors, obtains results that show the online learning environment to be inferior to traditional classrooms (e.g., see Anstine & Skidmore, 2005). Results of this nature may indicate that there is an interaction between the learning environment and the learning material: Certain subject areas may be more suitable for the online environment and others more suitable for the face-to-face environment. Past research clearly indicates there is a lack of consensus with respect to online learning outcomes; it seems that there are some good, some bad, and some ugly (Parks, 2004). Thus, the need for further investigation in this area of pedagogy is sufficient motivation for the current research study.

Many articles have been written about the critical need for safe food handling instruction in the U.S. and around the world (Mortimore, 2001; Pansiello & Quantick, 2001; Sun & Ockerman, 2005; Walker, Pritchard & Forsythe, 2003), but there has been only a limited amount of research done in the area of computer-based foodservice training – another one of the motivations for the current study. Initial research, based on small respondent sample sizes, has shown that training using computer technology can increase the learner's level of food safety knowledge—(Eckerman, Abrahamson, Ammerman, Fercho, Rohlman, & Anger, 2004), thereby providing evidence that computer-based training with respect to ServSafe, should lead to the same result for participating foodservice managers and employees.

PURPOSE OF THE PROJECT

The purpose of this study is to determine the learning effectiveness of ServSafe Online. The research questions of this study are:

1. Is there a significant increase in learners' food safety knowledge as a result of taking ServSafe Online?
2. Does ServSafe Online adequately prepare learners for the ServSafe Exam?
3. Do ServSafe Online learners pass the ServSafe Exam as frequently as those who take the traditional classroom form of instruction?
4. Are there any characteristics of learners that might explain any differences in exam scores?
5. Do users of ServSafe Online significantly increase ServSafe Exam scores (gain scores) in any of the knowledge domains described below?

METHODOLOGY

PARTICIPANTS

Participants in this study were drawn from three sources: the St. Joseph County, Indiana Health Department (foodservice industry workers), the University of Minnesota Extension Service (foodservice industry workers), and the University of Nevada, Las Vegas (students in the William F. Harrah College Hotel of Hotel Administration, more than half of whom also have industry work experience). Selected demographic characteristics of the subjects are presented in Appendix 1. The subjects were not paid for their participation, as it was thought this might change the nature of the sample and reduce its generalizability to the population taking ServSafe Online and the ServSafe Exam.

INSTRUMENT

The study relied upon the ServSafe Exam, an exam that is accredited by the American National Standards Institute (ANSI) and the Conference for Food Protection (CFP) and has been used and regularly updated for over a decade. This examination consists of ninety, 4-option multiple-choice questions containing 80 operational and ten pilot items randomly placed within the examination (National Restaurant Association Educational Foundation, 2006).

For purposes of the study, the ten pilot items were eliminated from the analysis. The exam is designed to assess the knowledge required of food protection managers to protect the public from food borne illness and is broken down into content domains. We tested two domain structured exams in this study – one containing seven (7) domains, and one containing ten (10). The domain structures of the two exams are shown in Table 1 below.

DATA COLLECTION

Before taking the SafeServ exam, participants first signed a consent form required by UNLV and completed a demographic profile survey. After completing these tasks, each participant was assigned a login user-ID and a password for ServSafe Online and then took the ServSafe Exam to assess the individual's level of food safety knowledge before having the opportunity to take the actual online course. The exam was administered in a secure, proctored environment, supervised by registered ServSafe instructors/proctors, in accordance with NRAEF specifications.

All participants subsequently took the online course, accessing it through the NRAEF website using the login user-ID and password provided. The time allotted to complete the course varied by organization, ranging from two weeks to sixty days. The learners were free to use any Internet-enabled computer they chose – personal/home computer, work computer, school or library (computer specifications for optimal course performance were provided). Technical support was available through NRAEF Customer Service. The average time required for the participants to complete the course was 8 hours.

After completing the online course, the participants took a version of the ServSafe Exam that was different than the one taken before content instruction. However, both versions were ANSI accredited for consistency. The exam was, once again supervised by registered ServSafe instructors/proctors in a secure environment. The pre- and post-exams were administered in paper and pencil form, since the online version of the exam was not available at the

Table 1
Domains Assessed

Seven-Domain Structure			
1.	Ensure Food Protection	5.	Serve and Display Foods
2.	Purchase and Receive Food	6.	Maintain Equipment and Supplies
3.	Store Food and Supplies	7.	Monitor Food Personnel
4.	Prepare Foods		

Ten-Domain Structure			
1.	Foods	6.	Allergens
2.	Clean, Sanitize, and Maintain Equipment	7.	High-Risk Populations
3.	Facilities	8.	Legal and Regulatory Issues
4.	Personnel	9.	Facility Layout and Design
5.	Temperature Measurement Devices	10.	Train Employees

onset of the study.

ANALYSES

We attempted to assess if any significant differences in ServSafe Exam scores exist between a pre-test and a post-test. We chose this method because we were unable to organize a control group and compare their scores to other students. Furthermore, rather than calculate a simple raw difference between pre- and post-test, we created a percentage gain score between pre- and post-test. This takes into account that some participants started out knowing more of the ServSafe Online material than others and more accurately measures the relative participant acquisition of material resulting from the ServSafe Online course.

Of the 523 study participants who took the pre-test, 84 did not take the post-test. The latter group of students were removed from the data sample. Another 48 subjects did not take the same form (7-domain, 10-domain) of the test for their pre-test/post-test pairing. These subjects were also excluded. Another 48 subjects who scored a passing grade (75% or higher) on the pre-test were excluded, since they showed sufficient comprehension of the content to be certified at the study's onset. The remaining 343 subjects were used in the computation and analysis of the results.

We first compared results from the two domain structured examinations to determine if participants scored differently on these two exams. Independent-samples t-tests revealed no significant differences between mean pre-test scores on the seven-domain and ten-domain ServSafe Exam structures and between the learning gains (computed as the

Table 2
Descriptive Statistics, Domain Structures by Pre-Test Score

	Test Type	N	Mean	Std. Deviation	Std. Error Mean
Pre-Test Score	7 Domains	160	58.188	11.297	0.893
	10 Domains	183	58.601	11.961	0.884

Table 3
Independent-Samples T-Test, Domain Structures by Pre-Test Score

		Levene's Test		T-Test				
		F	**Sig.**	**T**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**
Pre-Test Score	Equal Variances Assumed	0.803	0.371	-0.328	341	0.743	-0.414	1.262
	Equal Variances Not Assumed			-0.329	339	0.742	-0.414	1.257

Table 4
Domain Structures by Learning Gain Score

	Test Type	N	Mean	Std. Deviation	Std. Error Mean
Learning Gain Score	7 Domains	160	0.507	0.423	0.033
	10 Domains	183	0.417	0.437	0.032

Table 5
Independent-Samples T-Test, Domain Structures by Learning Gain Score

		Levene's Test		T-Test				
		F	**Sig.**	**T**	**df**	**Sig., 2-tailed**	**Mean Difference**	**Std. Error Difference**
Learning Gain Score	Equal Variances Assumed	0.005	0.943	1.935	341	0.054	0.090	0.047
	Equal Variances Not Assumed			1.939	337	0.053	0.090	0.047

Figure 1
GLM Assessing Moderating Effects of Descriptive Data on Participant Gain Scores

$Y = \mu + Age_i + Gender_j + Education_k + FoodServExp_l + StudentStat_m + EmpFoodServ_n + HoursWrkWkly_o + JobPosition_p + MgmntExp_q + ComputerCmfrt_r + FoodSftyCert_s + Ethnicity_t + \varepsilon$

Where:
Y = Response for ijklmnopqrst – th individual
μ = Overall Mean
Age_i = Fixed Effect, i = 1, 2, 3, 4, 5, 6, 7, 8, 9 (<21, 21 to 25, 26 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 54, 55 or older)
$Gender_j$ = Fixed Effect, j = 1, 2 (Male, Female)
$Education_k$ = Fixed Effect, k = 1, 2, 3, 4, 5, 6 (Some High School, High School Graduate, Some College, Community College or trade School Degree, Four Year College Degree, Graduate Degree)
$FoodServExp_l$ = Fixed Effect, l = 1, 2, 3, 4 (0, < 1, ≥1 but < 3, > 3)
$StudentStatus_m$ = Fixed Effect, m = 1, 2, 3 (No, Full Time, Part Time)
$EmpFoodServ_n$ = Fixed Effect, n = 1, 2 (Yes, No)
$HoursWrkWkly_o$ = Fixed Effect, o = 1, 2, 3, 4 (< 20, 20 to 29, 30 to 39, ≥ 40)
$JobPosition_p$ = Fixed Effect, p = 1 through 12 (Server, Cook, Chef, Manager, Supervisor, F&B Director, Regional Manager, General Manager, Owner, Corporate Executive, Trainer/Instructor, Other)
$MgmntExp_q$ = Fixed Effect, q = 1, 2, 3, 4 (0, < 1, ≥1 but < 3, > 3)
$ComputerCmfrt_r$ = Fixed Effect, r = 1, 2, 3, 4, 5 (Very Uncomfortable, Somewhat Uncomfortable, Neutral, Somewhat Comfortable, Very Comfortable)
$FoodSftyCert_s$ = Fixed Effect, s = 1, 2 (No, Yes)
$Ethnicity_t$ = Fixed Effect, t = 1, 2, 3, 4, 5, 6 (Asian or Pacific Islander, Black/African-American, Hispanic, Native American, White/Caucasian, Other)
ε = Error Term = All two way and higher interactions

difference between post-test and pre-test score, divided by pre-test score) on these respective structures (Tables 2 - 5).

Table 6 shows the details of online participant learning. The mean pre-test score of 58.41 percent (a failing grade) for the selected group of students, indicates that participants did not have sufficient knowledge before taking the course to pass the ServSafe Exam. The average grade after participating in the online course was 81.23%, an increase of over twenty-two (22) percentage points, or relative gain of 39.07 percent over the pre-test. The mean post-test score of 81.23 percent signifies that participants did not simply pass the examination, but scored over six (6) points higher than the standard examination cutoff of 75 percent. Moreover, 81 percent of participants passed the ServSafe Exam, a value similar to that obtained in 2005 (i.e., 79%) using the traditional classroom approach.

It was first hypothesized that ServSafe Online would significantly increase participant's knowledge of food safety. The results support this hypothesis. Paired sample t-test results revealed that there was a significant difference between groups (t (342) = 35.836, p < .001; see Table 6 below), meaning that participants learned a significant amount through Servsafe Online.

As can be seen in Table 7, the test scores of the

Table 6
Pre-Test and Post-Test Scores

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreTestScore	58.41	343	11.641	.629
	PostTestScore	81.23	343	8.598	.464

Table 7
Paired-Sample T-test, Pre-Test and Post-Test Scores

	Paired Differences	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	Pre-Test and Post-Test Scores	22.825	11.796	0.637	35.836	342	0.000

participants increased very substantially—over 22 points. Additionally, the average pre-test score was a failing grade while the average post-test score was a passing grade.

In an effort to further explain the gains in the group's mean post-test scores over its mean pre-test scores, a second phase of analysis examined whether demographic characteristics identified homogeneous traits in some of the participants within their respective group; that is, do participants with certain demographic characteristics respond to ServSafe Online differently, as evidenced by the level of learning? The different demographic traits (see Appendix 1), or moderating variables, were statistically

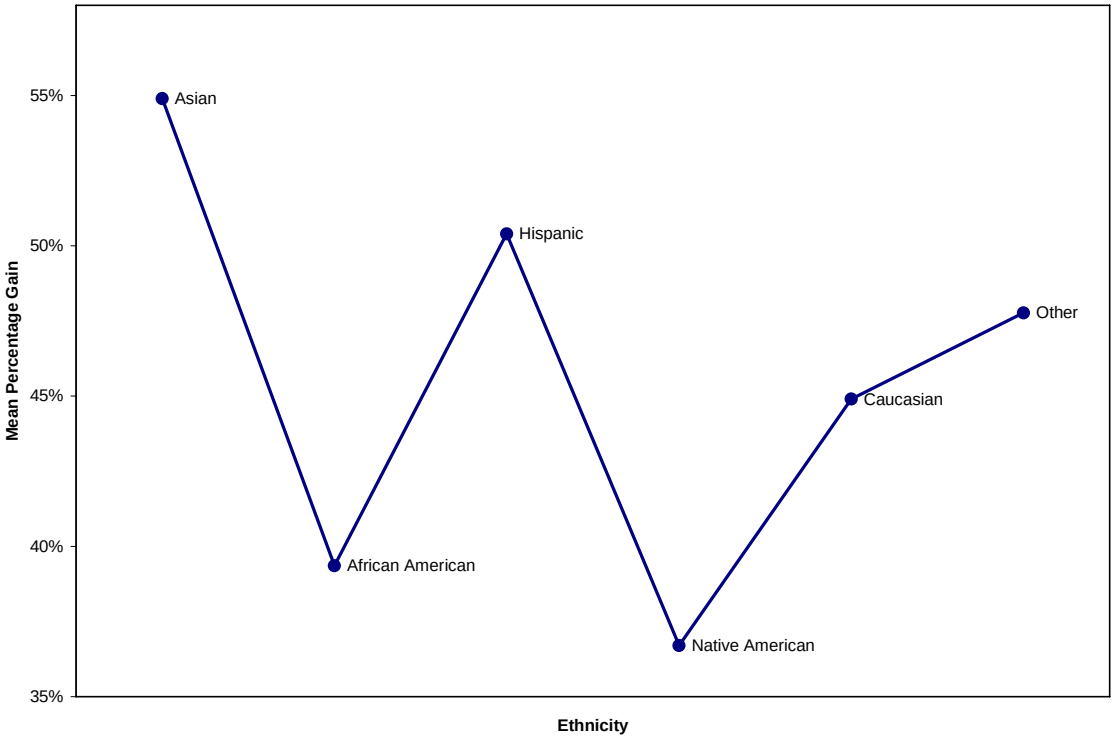
Table 8
One-Way ANOVA, Ethnicity and Learning Gain Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.781	5	.156	9.908	.000
Within Groups	4.776	303	.016		
Total	5.557	308			

Table 9
SAMPLE SIZES FOR GROUPS DELINEATED BY ETHNICITY

	N	Mean	Std. Deviation	Std. Error
Asian or Pacific Islander	103	.5490	.14492	.01428
Black/African-American	12	.3936	.13886	.04008
Hispanics	15	.5040	.11003	.02841
Native American	3	.3670	.05019	.02897
White/Caucasian	164	.4490	.11351	.00886
Other	12	.4777	.11555	.03336
Total	309	.4832	.13432	.00764

Figure 2
Plot of Gain Score Means by Ethnicity



compared to gain scores (post-test score minus pre-test score divided by pre-test score) transformed using an arc sine transformation. The calculation for this transformation is as follows:

$$\Phi = 2 * \sin^{-1} \sqrt{p}$$ with the angle *p* expressed in radians

The gain score, as the dependent variable, must be transformed by converting the scores from proportional to continuous data in order to obtain data in a form that fulfills one of the basic assumptions of General Linear Models (GLM). To determine a transformation technique that would yield a high consistency of error variance, data were transformed using two methods: arc sine and logit. After careful review, it was determined that the arc sine transformation yielded the best results.

The analysis also called for the calculation of Pearson's Product-Moment Correlations using the moderating variables in order to identify and minimize any multicolinearity that may be present. Based upon these steps, the model, as described in Figure 1, was constructed.

The results of the GLM indicate that ethnicity ($F(5) = 3.557$, $p = 0.004$) is the only significant variable moderating gain scores at the $\alpha = .05$ significance level. Therefore, it was our initial concern that ethnicity may moderate the effectiveness of ServSafe Online. Because ethnicity was identified as a significant moderator of ServSafe Online's learning effect, we investigated further, using a one-way ANOVA test (Table 8) and a plot of mean scores for ethnic groups (Table 9 and Figure 2) to graphically depict what various participants gained using ServSafe Online.

The one-way ANOVA test confirms previously suggested relationships between ethnicity and learning (see Enoch and Soker, 2006); but despite the previous statistical analyses, it does not conclusively mean that ServSafe Online inherently differentiates between participants of varying ethnicities. It is highly likely that there are two factors at work: (1) that the sample here includes some ethnic groups of such low numbers that it skews statistical results and (2) that there may be underlying or latent variables at work – that is, it may not be ethnicity, but another hidden variable, that truly caused the effect seen. In order to answer questions about the relationships between ethnicities and learning, a study with a greater number of each ethnicity would need to be conducted.

An alternative statistical approach to this issue would be to analyze the data using nonparametric statistics; thus, a Chi-square test (Table 10) was conducted on the ethnicity variable alone. Results again suggested that varying ethnic groups experienced significantly different learning gains from ServSafe Online from both statistical analyses.

Table 10
Chi Square Test, Ethnicity and Learning Gain Score

	PostTest
Chi-Square	12.026
df	5
Asymp. Sig.	.034

Next, we investigated the possibility that significant differences may be due to a skewed gain score (the difference between post-test score and pre-test score, divided by pre-test score) measurement. This could be caused by (1) a significantly higher pre-test score by participants in some sub-groups, (2) a significantly lower post-test score by participants in some sub-groups, or (3) a combination of the two.

A quick examination of pre-test scores shows that skew is a likely contributing factor. In Table 11, it is clear that the Asian/Pacific Islander sub-group had a significantly lower pre-test score mean, at approximately 52%; while the Native American sub-group's pre-test score averaged about 71%. This would limit the amount of knowledge that could be gained of the Native American sub-group compared to the amount that the Asian/Pacific Islander sub-group would have.

Due to the high probability of skew in the gain score measurement and the considerably low numbers of participants in some ethnic sub-groups, it cannot be concluded that some ethnic groups learned significantly more or less than others using the online course. The only conclusive finding we can present from these investigations with statistical certainty is that the online course effectively increased ServSafe Exam scores, regardless of one's ethnic background, to the passing range.

Table 11
Mean Pretest Scores by Ethnicity

Ethnicity	Mean	N	Std. Deviation
Asian or Pacific Islander	51.87	104	11.929
African American	59.17	12	9.331
Hispanic	58.81	16	9.174
Native American	71.33	3	2.309
White/Caucasian	63.14	166	8.601
Other	60.08	12	12.325
Total	58.98	313	11.235

CONCLUSIONS AND IMPLICATIONS FOR FURTHER RESEARCH

The purpose of this study was to assess if ServSafe Online is an effective learning tool. The answer, as was discussed in this report, is unequivocally yes, according to the results from our sample. The mean scores for the

ServSafe Exam improved 22 points, from a failing grade to a passing one. Additionally, we examined the potential effects of a variety of demographic factors and the results were not shown to be affected by any demographic demarcation found in other research. The results of the study indicate that online learning was shown to significantly increase exam scores when comparing the post-test scores to the pre-test scores–across all participant demographic groups examined.

The relationship between ethnicity and online learning should be investigated in future studies, ensuring that appropriate ethnic group sample sizes are used. A similar analysis should also compare the learning results of those who have had previous foodservice or industry experience to those who have had not such experience. It may be that there are different training needs based on the level of experience.

Further research may target those demographic groups of limited representation in this sample. The most notable of these groups are (a) African-American participants (by statistical identification), and (b) those with previous foodservice or industry experience (of non-statistical but practical importance).

Determining the relative worth or value of the different domain structures (i.e., 7-domain versus 10-domain) remains open to future investigation. To solidify the analysis and subsequent findings presented here, a comprehensive domain analysis is recommended, if possible. This action would further improve the reliability and validity of the findings presented here.

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APPENDIX 1
DESCRIPTIVE INFORMATION OF PARTICIPANTS

Table A: Descriptives of Participants by Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 21 years old	135	39.4	39.6	39.6
	21 to 25	134	39.1	39.3	78.9
	26 to 29	25	7.3	7.3	86.2
	30 to 34	18	5.2	5.3	91.5
	35 to 39	6	1.7	1.8	93.3
	40 to 44	8	2.3	2.3	95.6
	45 to 49	5	1.5	1.5	97.1
	50 to 54	7	2.0	2.1	99.1
	55 or older	3	.9	.9	100.0
	Total	341	99.4	100.0	
Missing	System	2	.6		
Total		343	100.0		

Table B: Descriptives of Participants by Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	139	40.5	40.6	40.6
	Female	203	59.2	59.4	100.0
	Total	342	99.7	100.0	
Missing	System	1	.3		
Total		343	100.0		

Table C: Descriptives of Participants by Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Some High School	2	.6	.6	.6
	High School Graduate	64	18.7	18.7	19.3
	Some College	187	54.5	54.7	74.0
	Community College or Trade School Degree	47	13.7	13.7	87.7
	Four Year collegedegree	35	10.2	10.2	98.0
	Graduate degree	7	2.0	2.0	100.0
	Total	342	99.7	100.0	
Missing	System	1	.3		
Total		343	100.0		

Table D: Descriptives of Participants by Previous Foodservice Experience

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		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	144	42.0	42.2	42.2
	Less than 1 year	44	12.8	12.9	55.1
	One year but less than 3	67	19.5	19.6	74.8
	Three or more years	86	25.1	25.2	100.0
	Total	341	99.4	100.0	
Missing	System	2	.6		
Total		343	100.0		

Table E: Descriptives of Participants by Student Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	41	12.0	12.1	12.1
	Yes - Full time student	280	81.6	82.4	94.4
	Yes - Part time student	19	5.5	5.6	100.0
	Total	340	99.1	100.0	
Missing	System	3	.9		
Total		343	100.0		

Table F: Descriptives of Participants by Current Foodservice Employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	90	26.2	26.5	26.5
	No	250	72.9	73.5	100.0
	Total	340	99.1	100.0	
Missing	System	3	.9		
Total		343	100.0		

Table G: Descriptives of Participants by Foodservice Hours Worked Per Week

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 20	18	5.2	19.4	19.4
	20 to 29 hours	19	5.5	20.4	39.8
	30 to 39 hours	26	7.6	28.0	67.7
	40 hours or more	30	8.7	32.3	100.0
	Total	93	27.1	100.0	
Missing	System	250	72.9		
Total		343	100.0		

Table H: Descriptives of Participants by Current Foodservice Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Server	19	5.5	20.4	20.4
	Cook	6	1.7	6.5	26.9
	Chef	1	.3	1.1	28.0
	Manager	22	6.4	23.7	51.6
	Supervisor	2	.6	2.2	53.8
	General Manager	7	2.0	7.5	61.3
	Owner	6	1.7	6.5	67.7
	Corporate Executive	2	.6	2.2	69.9
	Trainer/Instructor	1	.3	1.1	71.0
	Other	27	7.9	29.0	100.0
	Total	93	27.1	100.0	
Missing	System	250	72.9		
Total		343	100.0		

Table I: Descriptives of Participants by Previous Foodservice Management Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	224	65.3	69.6	69.6
	Less than one year	34	9.9	10.6	80.1
	One year or more but less than 3 years	36	10.5	11.2	91.3
	Three or more years	28	8.2	8.7	100.0
	Total	322	93.9	100.0	
Missing	System	21	6.1		
Total		343	100.0		

Table J: Descriptives of Participants by Ease with Using a Computer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Uncomfortable	81	23.6	23.8	23.8
	Somewhat uncomfortable	28	8.2	8.2	32.1
	Neutral	37	10.8	10.9	42.9
	Somewhat comfortable	98	28.6	28.8	71.8
	Very Comfortable	96	28.0	28.2	100.0
	Total	340	99.1	100.0	
Missing	System	3	.9		
Total		343	100.0		

Table K: Descriptives of Participants by Previous Food Safety Certification Testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	302	88.0	88.6	88.6
	Yes	39	11.4	11.4	100.0
	Total	341	99.4	100.0	
Missing	System	2	.6		
Total		343	100.0		