Do Teaching Models Affect Students' Academic Performance?

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Abstract: The study's objective was to evaluate the effect of the ADDIER and ASSURER models on the academic performance of students. A test was used to collect data from Sunyani Technical University's final-year hospitality students in Ghana as part of the study's experimental research design. SPSS version 20 was used to manage and process the data. The data were analysed using descriptive and inferential statistics. The study unveiled that the ADDIER and ASSURER models have impact on students' academic performance. Comparatively, it can be seen from the values of the effect size statistics that the ASSURER Model has a stronger impact on students' academic performance than the ADDIER Model. The study is important as it has provided empirical evidence on effect of reflection processes on the students' academic performance and expanded literature on hospitality education. It is recommended that the study be repeated with a large sample size in other tertiary institutions to confirm the external validity of the theoretical expansions.

Keywords: ADDIER, ASSURER, eta square, models, reflection

1. INTRODUCTION

It is predicted that more than one billion youth would enter the workforce globally in the next ten years based on the pattern of skills development in the various tertiary institutions around the world (Kamath, 2018). However, the biggest question that perhaps remains unanswered is: how could students be prepared for jobs that require plenty of high-profile skills? Therefore, Kamath (2018) has stated that it is challenging to foresee the kinds of skills employers will need in the future given the nature of job prescriptions, which are subject to rapid change. In contemporary times, employers focus on transferable soft skills that can be put to good use across a wide range of industries. Such skills are expected to enhance modern graduates' employability. In a similar line, adopting effective teaching techniques and exposing students to business norms, practices, and processes early on can help close the gap between theory and practice after graduation (Kamath, 2018).

Yemini and Maxwell (2020) have prescribed that in order to fit into the current global workforce within the purview of the fourth industrial revolution, students in Ghana's tertiary institutions need quality education and training aimed at providing practical skills to function as responsible employees to provide skills that are on higher demand in the present labour market. Kilcrease (2018) has also observed that effective participation in the current global market workforce requires the acquisition of highly sophisticated technological know-how and the development of 21st-century labour-market skills to compete and secure sustainable employment.

As a result of the Fourth Industrial Revolution, the Hospitality Skills Oversight Group (2018) proposed that the contemporary higher educational system strengthen the alignment of its hospitality-related education and training with the skill requirements of the hospitality industry. In response to the skills gap and the need to attract newly trained graduates with the necessary skills in the current changing workplace, business community stakeholders are significantly funding a variety of young workforce development initiatives to increase their productivity and profitability (Deloitte, 2018). In this

regard, Hospitality/Tourism students in Ghana's tertiary institutions need to be given the requisite training that would enable them to acquire practical education and skills to take advantage of the current industrial revolution (4IR) within the competitive global market (Labani et al., 2019). Tourism and hospitality industry in Ghana is viewed as a significant possible growth and development tool. For instance, the "Year of Return, Ghana 2019" initiated by the Government of Ghana, has led to an increase in tourist arrivals by 200,000 and generated a total of $ 1.9 billion (Oteng-Gyasi, 2019). These improvements have not been met with any corresponding improvement in service delivery in the hospitality and tourism management industry. The development has created a great opportunity for Hospitality and Tourism educators to train the needed manpower to address the service needs of the industry.

However, Ghana's tourism potential is still largely untapped, particularly in terms of service delivery and customer care at hotels, restaurants, fast food outlets, travel agencies, amusement parks, entertainment venues, tour operators, as well as sites and event attractions; and in tourism-related micro-businesses like the handicrafts industry, all of which fall far short of acceptable international standards (GTA, 2020).

In addition, the National Tourism Development Plan (2013–2027) states unequivocally that the level of service quality delivered in the Ghanaian hospitality and tourism sector falls short of acceptable and competitive international standards (Ministry of Tourism, 2012). The hospitality and tourism industry in Ghana has certain significant flaws that need to be fixed, according to studies that have been conducted (Mtshali et al., 2017; Adu-Ampong, 2018). The foregoing literature pointed out that, there is a significant disconnect between education and practice that has to be bridged. This brings up a serious problem that necessitated scientific action. In order to fill the gap, the researcher set out to adapt the ADDIER and ASSURER models as a form of intervention by looking at how they affected students' academic performance.

Hypotheses of the Study
i. H0: There is no statistically significant difference in the performance of students in the control group and treatment group after using the ADDIER and ASSURER models.

ii.H1: There is a statistically significant difference in the performance of students in the control group and

treatment group after using the ADDIER and ASSURER models.

2. LITERATURE REVIEW

Definitions of Reflection
The word "reflection" has been loosely defined in a variety of literary settings. Essuman (2017) defined reflection as the activity of looking back on a practice experience in order to explain, analyze, and evaluate it to inform learning about practice. Reflection is the process by which experiences are transformed into dynamic knowledge, according to Korthagen (2017). It is also described by Farrell (2018) as the process of internally evaluating and studying a matter of concern that is brought about by an event, which clarifies and generates meaning for the self and leads to a modified conceptual and pedagogical perspective. Reflection is the process of thinking about the feedback from the instructor. This study is done by giving students some time to think of the responses provided.

Studies on the importance of reflection
Many academics believe that since reflection inspires teachers and students to acquire new abilities, reflection is crucial to the teaching and learning process. Olaya Mesa (2018) demonstrated that reflective practise improves teachers' professional practises and students' learning outcomes, contrary to Kheirzadeh and Sistani's (2018) finding that reflective practise helps ineffective instructors become effective since they can reflect. For instance, research by Goodley (2018) found that reflecting aids both instructors and students in enhancing their capacity for logical thought, metacognition, and decision-making.

In addition, Suphasn and Chinokul's study (2021) found that reflective practice raises instructors' standards. According to the Léon-Henri (2022) study, reflective teaching techniques foster students' creativity, motivation, critical thinking, and metacognitive abilities.

In a related study, Larsen et al. (2021) found that reflection processes help students to gain problem-solving skills. Chang (2019) asserted that through reflection, students build skills continuously. Farrell (2018) also argued that reflective practice improved professional behavior such as knowledge, skills, and attitudes. This perception that reflective practice assists teachers to comprehend how pupils build information and learn effectively was supported by a study done by

Lin and Jain (2019). Additionally, the research by Miradkhani et al. (2019) revealed that reflective practice boosts instructors' self-efficacy, whereas Amidu (2016) believed that teachers who used reflective practice might ensure good learning outcomes.

Addie Model

The Addie model is a foundational instructional design concept that has historically been utilized by instructional designers. Branson et al. (1975, as cited in Birgili, 2019) were the first to develop the ADDIE paradigm for the American army. Julien et al. (2018) highlight the fact that the ADDIE model consists of five steps: Analysis, Design, Development, Implementation, and Evaluation. They go on to explain that analysis, the first step in the ADDIE approach, identifies the instructional problem as well as learner characteristics. The second step is designed, where learning activities and assessments are chosen and an outline of instructional strategies is made. The third step is *development,* where the instructor builds his or her learning content, learning assignments, and assessment. The testing of models, followed by instructor training and student engagement in the lesson, is part of the *implementation* phase. The two components of *evaluation* are formative and summative. Summative assessment is the last step and measures learning results after training, while formative evaluation measures learning outcomes throughout the instructional process (Adri et al., 2020). The main components of the ADDIE model are shown in Figure 1.
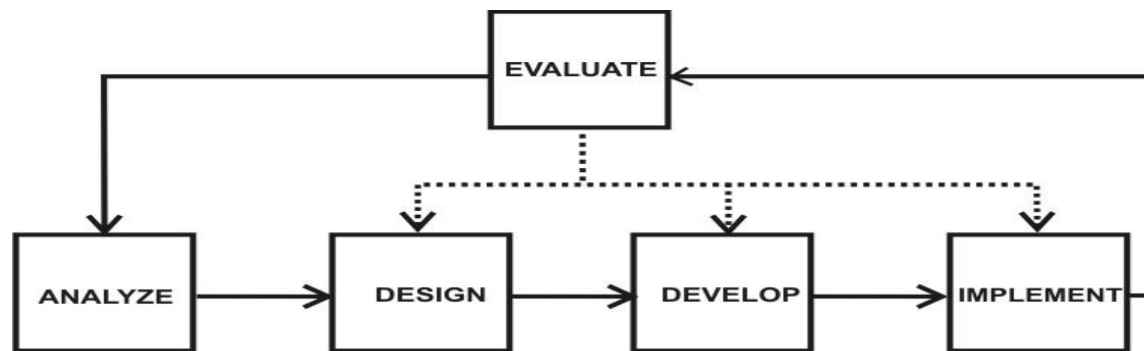

Figure 1: The ADDIE Model

Source: Adopted from *Principles of Instructional Design* (5th ed., p. 21), by Gagné, et al., 2005 cited in Morrison et al., 2019, CA: Wadsworth/Cengage Learning.

Some academics have questioned the ADDIE paradigm, focusing in particular on its inefficiency and lack of effectiveness (Gordon & Zemke, 2000). The model, it is said, neither guarantees the finest instructional solutions nor does it deliver them quickly or effectively. Others claim that the paradigm is overly cumbersome and slow because ADDIE has been abused or applied in an unimaginative way (Seel et al., 2017).

On the other hand, the ADDIE model is effective when used by learners to perform a certain task (Branson et al., 1975 cited in Kristanto, 2019).

Notwithstanding, this study expanded the stages of the ADDIE Model to include the "reflection component. The goal of the current study is to close that gap by giving both teachers and students the chance to reflect both during and after an action. For this reason, Figure 1.1. depicts the ADDIE(R) model.
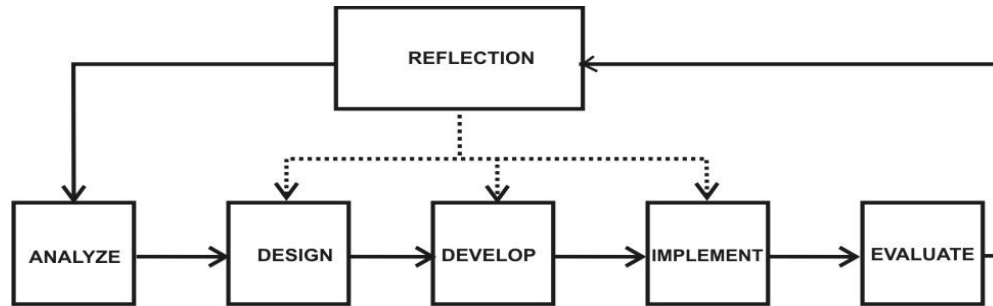
Figure 1.1: The ADDIE(R) model
Source: Adapted from *Principles of Instructional Design* (5th ed., p. 21), by R. M. Gagné, W. W. Walter, K. C. Golas, and J. M. Keller, 2005, CA: Wadsworth/Cengage Learning.

Assure Model

The Assure model, established by Dwivedi (2022) as an expanded development of the ADDIE general model, is another model that is significant to this study. The five stages of the ASSURE model are Analysis, State, Select, Utilize, Require, and Evaluate.

According to Luna (2012), the designer must start by analyzing the learner and then state the principles to determine the knowledge and skills that the student should have attained by the end of the relevant education. In the third stage, the designer chooses the method and materials to achieve the objectives. In the fourth stage, the designer employs the method and materials. In the fifth stage, the designer requires learner participation through both in-class and follow-up activities. In the last stage, the designer evaluates all learning components to achieve qualified learning outputs. Figure 2. depicts the ASSURE model.
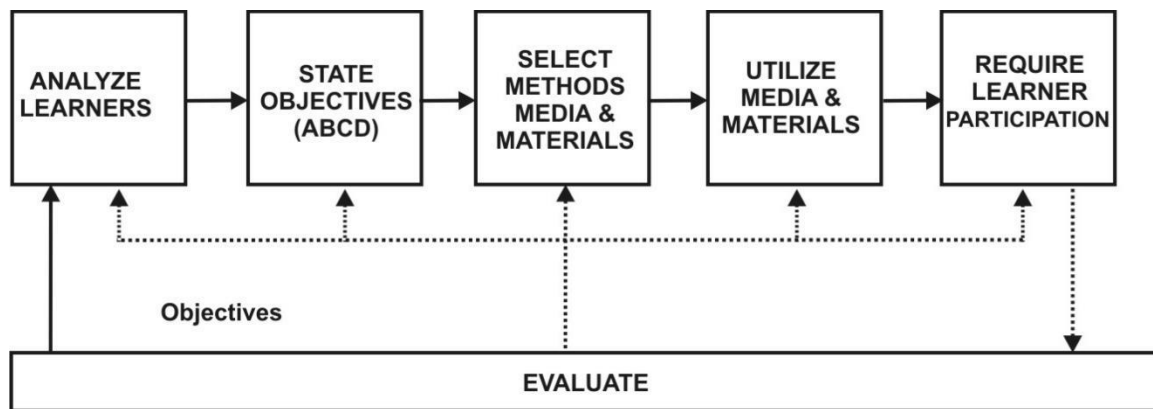

Figure 2: The ASSURE Model for Creating Learning Experiences
Source: http://www2.sjsu.edu/depts/it/edit186/mod3b.html

The ASSURE model has been applied by many researchers, such as (Göksu et al., 2017; Dwivedi, 2022) to provide a framework in which instructional design models could be compared. Conversely, all the researchers who adopted the ASSURE model did not allow the learners to reflect at the stages of the study. Hence, the ASSURE model does not take into account the concept of 'reflection', just as was the case for the ADDIE model. The reflection stage is often overlooked, though, the most important of all. This study fills the 'reflection' gap by allowing both the teacher and the learner an opportunity to reflect in action and reflect on action. Figure 2.1 shows the adapted ASSURE(R) model which allows 'Reflection'
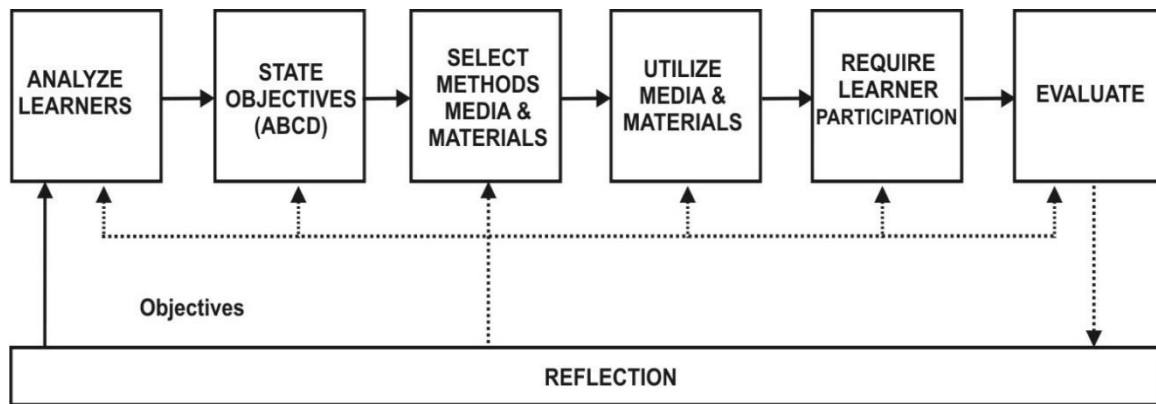
Figure 2.1: ASSURER Model

Source: Adapted from *Principles of Instructional Design* (5th ed.), by R. M. Gagné, W. W. Walter, K. C. Golas, and J. M. Keller, 2005, CA: Wadsworth/Cengage Learning.

3.   MATERIALS AND METHODS

Research Design

An experimental research design is a researcher's plan or the conceptual framework within which an experiment is done (Kuranchie, 2021). Experimental design was used for the study since it allowed the independent variables to be manipulated to determine the effectiveness of the intervention (ADDIER and ASSURER Models). The design also helped in analysing whether there is enough evidence to reject or accept the research hypothesis that there is no statistically significant different between the pre-test and post-test in terms of mean scores.

Population and Sampling Procedure

The population is made up of Sunyani Technical University's Department of Hospitality and Tourism final-year students. Forty (40) third-year students were chosen at random to participate in the exercise. A simple random procedure was used to ensure that every member of the population had an equal and independent chance of being picked.On separate pieces of paper, the researcher wrote "Yes" or "No," and the papers were then jumbled before being placed in a container. The researcher led the students in choosing a piece of paper without allowing them to see the container. To take part in the exercise, only the students who selected "Yes" were chosen. The third-year students were picked because they had been in the school for at least two years and might know about the various modes of delivery employed by their lecturers.

Data Collection Tools and Procedure

The primary tool utilised to collect initial data from the respondents was a test. A test is a series of tasks, which are used to gather data from participants of a study. Test as a tool is intended to measure a test taker's knowledge, skill, or physical fitness on a given task. The test could be oral, written, or practical and the results obtained are analysed and discussed in relation to the literature (Thanavathi, 2017). With this method, a researcher subjects respondents to test conditions and uses their performance to determine the nature of what is being investigated.

The researcher-made test was employed in this study since it allowed the researcher to set questions on the area of study after a lesson to match the objectives of the study and thereby helped in evaluating the learning outcomes of what had been taught to the group of learners in the study.

The researcher set twenty multiple objective test items and three essay items. One mark was allotted to each correct answer for each multiple objective test item to sum up to 20 marks whilst 10 marks were awarded to each three-essay test item, to sum up to 30 marks. The test items from multiple objectives and essays were chosen from the core areas such as cake making, bread making, biscuit making, sandwiches, salad making, tour booking, guest registration, reservation form, and guest cycle among others. Two (2) hours were allowed for the test and two sets of questions were set for the participants of the exercise. One set of questions was employed to test the students for the pre-test and post-test. The marks obtained were recorded. The researcher

then taught the class without ADDIER/ASSURER model at different times. Thereafter, ADDIER/ASSURER model was introduced to the two treatment groups. Later, the researcher administered one set of questions to the treatment groups, and the marks obtained were recorded.

To strengthen the outcomes of the study, a normality test was conducted for ADDIER and ASSURER test scores. According to Pallant (2011), normality can be determined using skewness statistic values. Thus, when skewness of $\pm$ 0.5 is calculated for data distribution in continuous scale of measurement, then the appropriate measure of central tendency and measures of dispersion to be used are mean and standard deviation, respectively.

On the other hand, if the assumption of normality is not met, then the median and quartile deviation will be suitable for a measure of central tendency and measure of dispersion respectively.

Table 1: Descriptive Statistics and Normality Test

Descriptive Statistics: Sunyani Technical University							
Pre-test and post-test variables	N	Min	Max	Mean	Std. Dev	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Pre-test ADDIER control	20	40.00	90.00	65.50	11.91	-.028	.512
Post-test ADDIER treatment	20	40.00	90.00	65.50	13.95	.145	.512
Pre-test ASSURER control	20	40.00	80.00	62.25	12.62	-.241	.512
Post-test ASSURER treatment	20	50.00	95.00	75.00	13.57	-.211	.512

Source: Field Data, 2019

As can be observed from Table 1. all the skewness statistic values indicate that the distribution of the marks obtained by the students in both the pre-test and post-test fall within the normal region and that the normality assumption required as a prerequisite for the t-test was not violated. This, therefore, warranted the use of mean and standard deviation as part of the descriptive analysis as presented in Table 1. In this regard, skewness statistic values were used to examine the normality of 40 students' data that were used for the paired sample t-test. The results show that all the skewness values for both the pre-test and post-test for ADDIER and ASSURER models are less than the $\pm$ 0.5 benchmarks used as a rule of thumb to ascertain whether or not a dataset is normally distributed.

Data Analysis
Frequencies and percentages were used in analysing the test results obtained from the exercise. Paired sample t-test was further used to ascertain whether there were statistically significant mean scores for the pre-test (without ADDIER and ASSURER) and post-test (with ADDIER and ASSURER Models) in teaching. This was done to examine the effect of ADDIER and ASSURER Models on students' academic performance. Additionally, eta square was employed to test whether there was enough evidence to reject or accept the research hypothesis that there is no statistically significant different between the pre-test and post-test in terms of mean scores.

4. RESULTS AND DISCUSSION

Table 2: Distribution of Pre-Test/Post-Test Score for ADDIER Model

Score	Percentages of Students	
	Pre-Test Score N (%)	Post-test score N (%)
Above – 80	4 (20.0)	12 (60.0)
79-70	13 (65.0)	7 (35.0)
69-60	2 (10.0)	1 (5.0)
59-50	1 (5.0)	0 (0.0)
Below 50	0 (0.0)	0 (0.0)
Total	20 (100)	20 (100)

Source: Field Data, 2019
(Scale: A = **Above 80; B =79-70; C = 69-60; D = 59-50; E = Below 50)

Pre-Test Result: ADDIER Model

Table 2 shows the pre-test and post-test results before and after the intervention at the beginning of the study and after the intervention using the ADDIER Model. It was found that, during the pre-test, most of the students did not perform well as compared with the results from the post-test. Out of the 20 students who took part in the test, 20.0 percent of them scored marks above 80, 65.0 percent scored marks between 79-70, 10.0 percent scored marks between 69-60 and 5.0 percent scored marks between 59-50. Therefore, the study concludes that the majority of the students scored marks between 79-70 indicating that, the performance of students without the use of the ADDIER Model could be graded "B" according to the scale under Table 2.

Post-Test Result: ADDIER Model

The outcomes of the post-test taken following the intervention are shown in Table 2. It was found that 60.0 percent of the students scored marks above 80. This was followed by 35.0 percent of the students who scored marks between 79-70 while 5.0 percent of the students scored marks between 69-60. Thus, the majority of the students scored marks 80 and above indicating that, the performance of students after introducing the ADDIER Model could be graded "A" according to the scale under Table 2. The results from the post-test show clearly that there has been a tremendous improvement in student's performance after the intervention.

Table 3: Results of Paired Sample T-test analysis between the control and treatment groups using the ADDIER Model

Variables	Group Statistics				Paired Sample T-test		
	Control Group (n=20)		Treatment Group (n=20)		T	Df	Sig (2-tailed)
Assisting Students using the ADDIER MODEL	Mean	SD	Mean	SD			
	65.500	11.91	77.75	12.08			
Pre-test and Post-test Results					-2.625	19	.017

Source: Field data, 2019

As evident in Table 3, the Paired Sample T-test was conducted to investigate whether the variances between the two groups (Control and Treatment) were

significant. The results from the test indicated that the differences in the performance of students in both the control and treatment groups using the ADDIER Model were statistically significant (p < 0.05).

From Table 3, the Paired Sample T-test results showed that there is a statistically significant difference in the control group (M = 65.50; SD=11.91) and treatment group using the ADDIER Model (M= 77.75; SD=12.08; t = -2.625; df = 19, p < .05, 2-tailed). Therefore, it can be said that after using the ADDIER Model, there is a statistically significant difference between the academic performance of students in the control and treatment groups.

Magnitude of effect of ADDIER Model on Students' Academic Performance

Pallant (2020) contends that just identifying a significant different between the pre-and post-intervention mean scores is insufficient to conclude the intervention's effectiveness. This is the case because the amount of an intervention's effect cannot be inferred from the presence of significant variations in mean scores between a pre-and post-test. However, to determine the magnitude of the intervention's effect, the effect size statistic is calculated. Eta square is one of the often employed statistics for estimating effect magnitude, according to Pallant (2020).

Eta square can be obtained using the formula:

$$\text{Eta square} = \frac{t^2}{t^2 + N - 1}$$

Where t = t statistic for the paired sample = 2.625
N = Sample size for pre-test and post-test = 20

$$\text{Eta square} = \frac{(2.625)^2}{(2.625)^2 + 20 - 1}$$

Eta square (η^2) = .266

Cohen (1988), referenced in Pallant (2020), asserts that an eta square value of .01 denotes a minor influence, .06 a moderate effect, and .14 a significant effect. The application of the ADDIER Model in teaching had a significant impact on the academic achievement of hospitality students in this instance, as indicated by the eta square value of .266.

Table 4: Distribution of Pre-Test/Post-Test Score for ASSURER Model

Score	Percentages of Students	
	Pre-Test Score N (%)	Post-test score N (%)
Above – 80	3 (15.0)	10 (50.0)
79-70	11 (55.0)	8 (40.0)
69-60	4 (20.0)	2 (10.0)
59-50	2 (10.0)	0 (0.0)
Below 50	0 (0.0)	0 (0.0)
Total	20 (100)	20 (100)

Source: Field Data, 2019
(Scale: A = **Above 80; B = 79-70; C = 69-60; D = 59-50; E = Below 50)

Pre-test Result: ASSURER Model

Table 4 shows the pre-test and post-test results before and after the intervention at the beginning of the study and after the intervention using the ASSURER Model. It was found that, during the pre-test, most of the students did not perform well as compared with the results from the post-test. Out of the 20 students who took part in the test, 15.0% of them scored marks above 80, 55.0%

scored marks between 79-70, 20.0% scored marks between 69-60 and 10.0% scored marks between 59-50. Therefore, it can be concluded that the majority of the students scored marks between 79-70 indicating that, the performance of the students without the use of the ASSURER Model could be graded "B" according to the scale under Table 4.

Post-test Result: ASSURER Model
Table 4 provides the results of the post-test conducted after the intervention. It was found that 50.0 percent of the

students scored marks above 80. This was followed by 40.0 percent of the students who scored marks between 79-70 while 10.0% of the students scored marks between 69-60. Thus, the majority of the students scored marks 80 and above indicating that, the performance of the majority of the students taught using the ASSURER Model could be graded "A" according to the scale under Table 4.

The results from the post-test show clearly that there was a tremendous improvement in student performance after the intervention (ASSURER Model) was introduced.

Score	Percentages of Students	
	Pre-Test Score N (%)	Post-test score N (%)
Above – 80	3 (15.0)	11 (55.0)
79-70	11 (55.0)	9 (45.0)
69-60	4 (20.0)	0 (0.0)
59-50	2 (10.0)	0 (0.0)
Below 50	0 (0.0)	0 (0.0)
Total	20 (100)	20 (100)

Source: Field Data, 2019
(Scale: A = **Above 80; B = 79-70; C = 69-60; D = 59-50; E = Below 50)

Table 5: Results of Paired Sample T-test analysis between the Control and Treatment Groups using the ASSURER Model.

Variables	Group Statistics				Paired Sample Test		
	Control Group (n=20)		Treatment Group (n=20)		T	Df	Sig (2-tailed)
Assisting Students using the ASSURER MODEL	Mean	SD	Mean	SD			
	63.75	12.34	74.75	10.19			
Pre-test and Post-test Results					-3.023	19	.007

Source: Field data, 2019

As evident in Table 5, the Paired Sample T-test was conducted to investigate whether the differences between the two groups (Control and Treatment) were significant. The results from the test indicated that the differences between the control and treatment groups using the ASSURER Model in assisting students in learning hospitality programmes were statistically significant ($p < 0.05$). From Table 5. the Paired Sample T-test results showed that there is a statistically significant difference in the control group (M = 63.75; SD=12.34) and treatment group using the ASSURER Model (M= 74.75; SD=10.19; t = -3.023; df = 19, p < .05, 2-tailed). As a result, it can be said that utilising the ASSURER Model, there is a statistically significant difference between the control and treatment groups.

Magnitude of effect of ASSURER Model on students' academic performance
Eta square can be obtained using the formula:

$$\text{Eta square} = \frac{t^2}{t^2 + N - 1}$$

Where t = t statistic for the paired sample = 3.023
N = Sample size for pre-test and post-test = 20

$$\text{Eta square} = \frac{(-3.023)^2}{(-3.023)^2 + 20 - 1}$$

Eta square (η^2) = .325

5. CONCLUSION AND IMPLICATIONS

The post-test results of this study, which evaluated the impact of the ADDIER and ASSURER Models on Ghanaian hospitality students' academic performance, conclusively demonstrate that the student's performance significantly improved after the intervention of both (the ADDIER and ASSURER Models) in the experiment. The study further concluded that there is a statistically significant difference between the control and treatment groups using the ADDIER and ASSURER Models. Comparatively, the study established that the values of the effect size statistics of ASSURER Model (eta square = .325) on students' academic performance are greater than that of ADDIER Model (eta square = .266). This finding suggests that if a model would be employed by hospitality trainers in tertiary institutions in Ghana, it should be the ASSURER Model since its effect on students' academic performance is greater than the ADDIER Model. The study has broadened the scope and horizon of literature on the impact of ADDIER and ASSURER models on students' academic performance in an attempt to fill the void in hospitality education. The researcher recommends that the study be repeated with a large sample size in other tertiary institutions to confirm the external validity of the theoretical expansions.

Theoretical Implications

The study's findings have provided current data on the effect of reflection processes on students' academic performance by expanding the frontiers of the ADDIE(R) and ASSURE(R) models and added to the literature in that regard. All the researchers who adopted the ADDIE and ASSURE model ended at evaluation and did not allow learners to reflect on what they have learned after they have been evaluated. The study, therefore, extends the scope by adding reflection to the stages to make them ADDIE(R) and ASSURE(R) models. The study has

also, contributed to the literature on the few models that have been developed in existing hospitality literature and provided the basis for the development of further models in a developing country context. This would enhance knowledge and understanding of the usage of models in teaching to enhance students' performance. The model developed in this study has important implications for researchers seeking to understand the dynamics of models used in hospitality education in tertiary institutions in Ghana.

Practical Implications

The outcome of the study is expected to be of importance to Hospitality educators as they may adopt new ways of training their students by using ADDIER and ASSURER models and thereby assist students to acquire new knowledge and the necessary skills to meet the industry requirements. It is further expected that Technical Universities would adopt the proposed ADDIER and ASSURER models of this study.

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