Original Article

Hands-On Workshop on Museum And Plastination Techniques, at the National Postgraduate Medical College of Nigeria, Ijanikin: An Objective Impact Assessment of Participants

Dele Eradebamwen Imasogie, Olawale Victor Adeteye[1]

Department of Morbid Anatomy, University of Benin Teaching Hospital, Benin City, Edo State, [1]Department of Academic, National Postgraduate Medical College of Nigeria, Ijanikin, Lagos State, Nigeria

Abstract

Introduction: Pre- and post–assessment examinations are invaluable to evaluate the knowledge base of participants in educational programs or workshops. It is plausible that there is no significant effect on the knowledge base of participants at the end of the hands on workshop. The aim of this study is to test this hypothesis by determining the effect of the hands-on workshop on the knowledge gained by the participants. **Materials and Methods:** This was a retrospective study. The targets were all participants who partook in both the pre - and post-assessment examinations of the hands on workshop on museum and plastination techniques, organized by the National Postgraduate Medical College of Nigeria (NPMCN), held from, 21st to 25th of August, 2017. The effect of the hands-on workshop was tested, using self-pairing of data obtained from the scores of the pre- and post-test assessment. The self-paired data were analyzed with the Statistical Package for Social Sciences, version 16 (SPSS 16, SPSS Inc. Chicago, Illinois, United States of America) using the paired t-test, with the level of statistical significance set at $P \leq 0.05$. The critical t value was obtained from the tables of critical values of t distribution[4] at $P = 0.05$ and the degree of freedom (df) = n-1, where n is the sample size. **Result:** The result showed a substantial increase in the knowledge gained by the participants. Statistically, there was a significant difference between the mean percentage pre- and post-assessment test scores at $P = 0.03$ for museum techniques, $P \leq 0.0001$ for plastination techniques and $P \leq 0.0001$ for the overall assessment. **Discussion:** This workshop has significantly improved the knowledge of participants in museum and plastination techniques, hence, we reject the aforementioned hypothesis. **Conclusion:** It brings to fore the usefulness of hands-on techniques in passing knowledge from tutors to tutees.

Key-words: Hands-on, Pre-test, Post-test, Overall assessment, tutees, tutors

Introduction

The presentation of an educational workshop is now regarded as a scholarly work.[1] The workshop provides the forum for mentors or tutors to share knowledge with a wide range of audience,[1] while, hands-on relates to providing direct practical experience in the operation or functioning of something,[2] which in this case were museum and plastination techniques. Plastination is long-term tissue preservation using polymers.[3] It is plausible that there is no significant effect on the knowledge base of participants at the end of the hands-on workshop. The aim of this study, therefore, is to test this hypothesis by assessing the impact of the workshop on the knowledge base of the participants.

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Methodology

This was a retrospective study. The targets were all participants who partook in both the pre and postassessment test of the hands-on workshop on museum and plastination techniques organized by the National Postgraduate Medical

Address for correspondence: Dr. Dele Eradebamwen Imasogie, Department of Morbid Anatomy, University of Benin Teaching Hospital, P.M.B 1111, Ugbowo Lagos Road, Benin City, Edo State, Nigeria.
E-mail: eradebamwen4real@yahoo.com

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College of Nigeria held from August 21st to 25th, 2017 at the college premises. The pre- and post-test question/answer papers for each participant were identified using an assigned corresponding serial number in place of their written names on the question/answer papers. Each participant in the cohort is given a preworkshop assessment test of 30 main questions. Each of these questions has five options that require either a true (T) or false (F) answer, making it a total of 150 questions/answers. Of these, 9 main questions were on museum techniques, while, 21 main questions were on plastination, giving it a total of 45 and 105 subquestions, respectively. At the end of the workshop, a postworkshop assessment test using the same questions as the preworkshop assessment was administered to the participants. The pre- and the post-test result were converted to a hundred per cent. The effect of the hands-on workshop was tested, using self-pairing of data obtained from the scores of the pre- and post-test assessment. The self-paired data were analyzed with the Statistical Package for Social Sciences, version 16 (SPSS 16, SPSS Inc. Chicago, Illinois, United States of America) using the paired *t*-test, with the level of statistical significance set at $P \leq 0.05$. The critical *t* value was obtained from the tables of critical values of *t* distribution[4] at $P = 0.05$ and the degree of freedom (df) = *n*-1, where n is the sample size.

Table 1: The sex, age, and educational qualification of the participants in the study

Characteristics	Frequency (%)
Sex	
Female	5 (25)
Male	15 (75)
Total	20 (100)
Age group	
15-24	2 (10)
25-34	6 (30)
35-44	8 (40)
45-54	4 (20)
Total	20 (100)
Level of education	
Undergraduate	2 (10)
B.Sc/HND	6 (30)
M.Sc	5 (25)
P.hD/fellows	7 (35)
Total	20 (100)

Results

Twenty participants sat for the pre- and the post-workshop assessment test, thus making them eligible for this study. Of these, 15 were male, while, 5 were females [Table 1]. Their age distribution and educational qualifications are shown in Table 1.

Museum techniques

The pre- and post-assessment test for the museum techniques were 65 (13 participants) and 100 (20 participants) percentage pass, respectively, [Table 2]. The percentage scores were higher in the posttest than the pretest. The minimum pretest score was 8.80%, while, that for the post test was 53.28%. The maximum percentage scores of 82.14% and 91.02% for the pre- and post-assessment test, respectively, were recorded. The range of 73.3% and 37.74% was noted

Table 2: Percentage pre-, post- and overall-assessment test scores

Participants	Museum technique		Plastination technique		Overall assessment	
	Pretest scores (%)	Posttest scores (%)	Pretest scores (%)	Posttest scores (%)	Pretest scores (%)	Posttest scores (%)
1	82.14	53.28	35.15	41.80	49.58	45.56
2	60.60	79.92	28.50	75.05	40.20	77.05
3	77.70	67.71	33.25	83.60	46.90	79.06
4	19.98	62.16	8.55	72.20	12.06	69.68
5	17.76	68.82	7.60	78.85	10.72	76.38
6	53.28	88.80	22.80	76.00	32.16	80.40
7	51.06	71.04	12.35	95.00	30.82	88.44
8	59.94	91.02	25.65	82.65	36.18	85.76
9	28.86	75.48	12.35	71.25	17.42	73.03
10	17.76	71.04	7.60	65.55	10.72	67.67
11	28.86	79.92	12.35	79.80	17.42	77.72
12	28.86	86.58	17.10	67.45	20.77	71.69
13	71.04	59.94	30.40	71.25	42.88	76.38
14	75.48	68.82	32.30	44.65	45.56	49.58
15	77.70	68.82	33.25	59.85	46.90	62.98
16	8.80	77.70	3.80	60.80	5.36	63.65
17	71.04	84.36	30.40	63.65	42.88	68.34
18	73.26	71.04	31.35	69.35	44.22	74.37
19	68.82	73.26	29.45	63.65	41.54	66.33
20	79.92	86.58	34.20	62.70	48.24	66.33

Table 3: The minimum and maximum test scores, range, and mean percentage scores

	Museum technique		Plastination technique		Overall assessment	
	Pretest scores (%)	Posttest scores (%)	Pretest scores (%)	Posttest scores (%)	Pretest scores (%)	Posttest scores (%)
Minimum test score	8.80	53.28	3.80	35.15	5.36	45.56
Maximum test score	82.14	91.02	41.80	95.00	45.56	88.44
Range	73.30	37.74	31.35	53.20	44.22	42.88
Mean score±SD	56.64±25.13	74.32±10.08	22.42±10.88	69.26±12.54	32.13±15.09	71.02±10.50

SD: Standard deviation

Table 4: The *P* value, degree of freedom, calculated, and critical *t*

	Museum technique	Plastination technique	Overall assessment
P	0.03	≤0.0001	≤0.0001
df	19	19	19
Calculated *t*	3.436	10.808	8.613
Critical *t* ($t_{critical}$)	2.093	2.093	2.093

df: Degree of freedom

for the pre- and post-assessment test, respectively. The mean percentage scores for the pre- and post-assessment test were 56.64% (standard deviation (SD) = 25.13) and 74.31% (SD = 10.18), respectively [Table 3]. There is a statistical significant difference between these two means at $P = 0.03$, df = 19, calculated t, $t_{calculated} = 3.436$ and critical *t* value, $t_{critical}$ ($t_{0.05(2),\ 19}$) = 2.093, [Table 4].

Plastination techniques

Eighteen participants (90%) passed the postassessment test for plastination technique, while none of the participants (0%) passed the preassessment test, [Table 2]. The minimum pretest score was 3.80%, while, that for the posttest was 41.80%. The maximum percentage scores of 35.15% and 95.00% for the pre- and post-assessment test, respectively were observed in this study. The range of 31.35% and 53.20% was noted for the pre- and post-assessment test, respectively. The mean percentage scores for the pre- and post-assessment test were 22.42% (SD = 10.88) and 69.26% (SD = 12.54), respectively [Table 3]. The difference between these two means is statistical significant at $P \leq 0.0001$, df = 19, calculated t, $t_{calculated} = 10.808$ and critical t value, $t_{critical}$ ($t_{0.05(2),\ 19}$) = 2.093, [Table 4].

Overall pre- and post-assessment test for museum and plastination techniques

Eighteen participants (90%) passed the overall postassessment test, while none of the participants (0%) passed the overall preassessment test [Table 2]. The percentage scores were higher in the overall postassessment test than the preassessment test. The minimum overall preassessment test score was 5.36%, while, that for the overall postassessment test was 45.56%. The maximum percentage scores of 49.58% and 88.44% for the overall pre-and post-assessment test, respectively, were observed in this study. The range of 44.22% and 42.88% were noted for the pre- and post-assessment test, respectively. The mean percentage scores for the overall pre- and post-assessment test were 32.13% (SD = 15.09) and 71.02% (SD = 10.50), respectively [Table 3]. The difference between these two means is statistically significant at $P \leq 0.0001$, df = 19, calculated t, $t_{calculated} = 8.613$ and critical t value, $t_{critical}$ ($t_{0.05(2),\ 19}$) = 2.093, [Table 4].

Discussion

Learning objectives according to the University of Guelph Teaching Support Services includes, but, not limited to the objectives, been measurable.[5] The pre- and post-assessment test in this study provides an avenue for measuring the knowledge acquired by participants at the end of this workshop. The result of these assessments showed that there is a significant difference between the pre- and post-test scores at $P = 0.03$ for museum techniques, $P \leq 0.0001$ for plastination techniques and the overall assessment encompassing both museum and plastination techniques. The hypothesis that "it is plausible that there is no significant effect on the knowledge base of participants at the end of the hands-on workshop" is therefore rejected. This rejection is further reinforced since the calculated *t* ($t_{calculated}$) value is greater than the critical *t* ($t_{critical}$) value for museum techniques, plastination techniques, and the overall assessments encompassing both museum and plastination techniques as shown in Table 4. Engaging tutees in learning activities are invaluable to the understanding of what is being taught. Factors that can affect tutees engagement in the learning process include but not limited to boredom during lectures and the techniques of imparting knowledge. These factors can lead to a gap in the engagement of tutees during learning (engagement gap), if not addressed. More than two-thirds of tutees in high schools in the United States were exited and engaged by techniques of imparting knowledge in which playing a role in learning activities; active participation in the learning processes; performing group project during learning; discussions and debate among peers, were employed.[6] They are however least engaged in lectures in which they do not play active roles.[6] During this workshop, groups were formed that actively participated in group projects, thus allowing for maximum engagement of participants. This was reflected in group discussion, workshop tutor, and peer-review reenforcement of task or activity. These were invaluable during the hands-on-sections. Engaged tutees consciously make efforts to understand what is being taught

and they are more likely to get better scores or grades when faced with standardized test.[6] In the same vain, the grades of the participants at the end of the index hand-on-workshop were better than that of the pretest. Hands-on learning is a double-edge sword. On the one hand, it helps tutees to gain substantial knowledge of what has been taught, while on the other hand, it boosts tutors confidence.[7] Hands-on activities are connections between routine lectures on the one hand, and visualizing what has been taught using real objects on the other hand.[8] Using pre- and post-test to assess the impact of knowledge acquired is not novel to this study. Lee *et al*.[8] in their study used pre- and post-test assessment over the school year to measure the impact of fidelity of implementation of science achievement. They noted that there was no significant difference between the pre- and post-test assessments scores; hence, they concluded that none of their interventions (i.e., teachers' self-reports or classroom observations) had significant effects on science achievement gains. The importance of hands on as a veritable tool in impacting knowledge has also been acknowledged in several previous studies.[9-13] Hands-on activities help tutees acquire knowledge and the ability to think.[14] It also inspires an enduring affection for learning and at the same time motivate learners to search and learn new things.[15]

Conclusion

This study has shown a statistically significant effect or gains on the postworkshop knowledge of participants. This piece of information serve as a feedback to the organizers of the hands-on workshop on how they have fared, thus, giving room for reappraisal and improvement in subsequent workshops. It also bring to fore the usefulness of hands-on techniques in passing knowledge from tutors to tutees.

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Conflicts of interest

There are no conflicts of interest.

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