
Development and Validation of Painting Skills Appropriate for Building Construction Students for Self-Employment in Technical Colleges in Southern Senatorial District of Cross River State

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Abstract: *This study sought to develop and validate painting skills appropriate by building construction students for self-employment in Technical Colleges in Southern Senatorial District of Cross River State. The research and development design was employed for the study. The population used for the study was 563 respondents, comprised 12 building construction teachers, seven experts (Lecturers) and 544 painters from the 51 registered painting companies in the Southern Senatorial District. The sample size used for the study was 335 respondents. Building construction teachers and experts were not sample, however simple random sampling technique was used to sample 316 painters. The instrument that was used for data collection was researcher structure questionnaire titled: "Painting Skills Appropriate for Self-employment (PASASE)". The instrument contained 13 items, 5 points Likert type scale of Very appropriate =5, appropriate =4, Fairly appropriate =3, Inappropriate =2 and Very Inappropriate =1. The instrument was validated by three experts while Cronbach Alpha reliability was used to determine the internal consistency of the instrument which yielded a reliability coefficient 0.81. The data collected were analyzed using mean, standard deviation, Lawshe Content Validity Ratio and One Way Analysis of Variance (ANOVA). The result shows that all the 13 items relating to painting skills were considered appropriate. The cumulative Content Validity Ratio gave an overall value of 0.956, indicating a high content validity of the painting skills. It was concluded and recommended among others that Teachers should adopt the developed painting skills for teaching painting in Technical College.*

Keywords: development, validation, painting skills, building construction, self-employment, technical colleges.

INTRODUCTION

Painting is the application of paint on the surface of a building to give the building a good, appreciable and final appearance. Painting is a type of building finishing which is required for aesthetic and protection of the internal and external walls. Painting is the application of paint on walls or solid surfaces using brushes. It is also the application of paint on the outer surface of a building which is easily visualized or seen by people. Lack of paint can affect the value and appreciation attached to a building. Painting of a building gives a building a good and final appearance. According to Emmitt and Gorse (2010) lack of good finishing can affect the psychology, appreciation, aesthetic and the atmosphere around buildings.

The skillful application of paint on walls can go a long way in enhancing the appearance as well as the value of any building. Painting provides protection to the surface of a building from various harmful environmental effects such as heat, sunlight, moisture, dampness among others. Painting is used for decoration and also as a hygienic and protective covering to building. Painting also enhances the life as well as the appearance of any of building. Painting is important because it is used to seal the surface of walls, timber, reduce moisture absorption in wood as well insects and fungus attacks.

Painting of plastered wall surfaces is carried out not only for hygienic or aesthetic reasons, durability and acceptability but also protecting the building against natural weathering, vegetable growth and chemical attacked from corrosive fumes. Since the surfaces are mostly plastered with lime or cement (calcareous surface) are highly alkaline and retain large quantities of water during construction (Kumar and Dadarya, 2007). Therefore, special care or treatment should be adopted before commencing painting work to prevent the surfaces from adverse effects of variable suction, insect attack, surface imperfections, growth of moulds, mosses, lichens and algae on most of the surface coating materials, finishing.

Successful painting exercise requires adequate planning. Preparation work like masonry work, crack filing, water proofing among others, should be preferably done before commencing actual painting work. This is also necessary to get the maximum life of the final paint film by doing proper planning for colour scheme and selection of brushes/rollers. Cement plastered surfaces with new Portland cement and renderings are strongly alkaline (Kumar and Dadarya, 2007). The application of paints on wall surfaces should only take place after the surfaces are completely dried (Otu, 2021).

The author maintained that, for newly plastered surface, the plastered surface should be left unpainted for at least one months to allow it to carbonate, dry thoroughly and harden well. The (Kumar and Dadarya, 2007) supported that if not possible to leave the plaster bare, a temporary decoration of soft distemper non-washable or a coat of lime may be applied. No attempt should be

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made to apply solvent based paints (especially gloss finishes) until the plastered surface of new brickwork, concrete or building blocks are thoroughly dry.

Before painting especially a plastered wall, the surface should be well cleaned and treatment done. The surface should be thoroughly brushed to remove all dirt and remains of loose or powdered materials to provide a mechanical key between surface and paints for satisfactory adhesion. The authors affirmed that treatment of the surface with solution of acids or salts such as zinc sulphate is not advisable as the risk of alkali attack is not reduced appreciably and efflorescence may be increased.

For old unpainted plaster wall surface, painting should be deferred until the plastered wall is well treated. All major cracks or defects on a plaster wall should be cut out in V shape, filled and made good to avoid undue absorption of water and subsequent shrinkage of the filling. Minor cracks and repairs on walls may be carried out by filling the wall with cement mortar. Fine cracks may be primed and subsequently filled with a putty of suitable consistency made out of enamel, water and whiting powder.

Proper cleaning and treatment of old unpainted plastered surface is very important. It is necessary to completely remove any fungus and algae growth by brushing it vigorously with wire or hard brush and cleaning the wall with water. If there is any extensive growths of vegetable materials which cannot be removed by brushing, the growth should be destroyed by applying ammoniacal copper solution. The composition and concentration of the ammoniacal wash shall consist of 7g of copper carbonate dissolved in 80 ml liquor ammonia and diluted to one litre of water (kumar and Dadarya, 2007). This treatment should be done with greater care on the top of awnings, sunshades, parapets and other horizontal surfaces, where water is likely to accumulate.

However, for previously painted plaster wall surface is important to;

- i. Scrap and wash the existing paint and more so those showing excessive flaking by using scrapers and allowing surface to dry completely.
- ii. Sweeping, removing of cobwebs and cleaning of wall surfaces.
- iii. Allow wall to dry perfectly prior to the application of any priming coats.
- iv. Previously oil painted surfaces should be sanded thoroughly to remove loose particles and made dull and matt for better adhesion.

Exterior rough surface, previously coated with paint should be wire brushed and washed with water thoroughly and allowed drying. Before painting, ensure that the surface is free from chalking. The exterior surface should not be affected by any water or by constant dampness. In case of painting during the rainy season with so much moisture around buildings, the surface should be allowed to dry out completely for about 3 days before commencing painting. Local defective patches should be treated individually by removing all loose or softened paints and

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bringing forward the treated patches with primer and undercoating before applying a fresh coating over the whole area (Kumar and Dadarya, 2007).

Furthermore, after complete cleaning and treatment, then removal of the existing paint systems and if the plaster has been cured and dried completely, the painting operations can commence by;

- i. Apply premier coat
- ii. Application of Putty filler on holes and cracks on the walls to give smooth surface finish
- iii. Application of under coat
- iv. Application finishing coat
- v. Application of final finish as desired.

Painting skills are an aspect of the job areas in Building Construction curriculum that is taught in Technical Colleges. The implementation of the curriculum by teachers is intended to produce graduates who can perform painting for both private and public buildings. Painting skills embedded in Building Construction are part of the areas in which students are examined by the National Business and Technical Examination Board (NABTEB) based on the NBTE curriculum for the award of National Technical Certificate (NTC). Painting skills is a technical vocational skill of using paint to give a building a good, appreciable and final appearance. Therefore, for students to possess painting skills, teachers are expected to teach and perform practicals using machines, equipment, tools and materials required for painting. This is very important if students must excel in this area. These painting skills are very important, because acquiring these necessary skills will enable students to become self- employed or gainfully employed and enterprising in the building industry.

However, employers of labour have continued to express worry over the quality of graduates of Technical Vocational Education and training institutions in Nigeria who are experiencing setbacks due to lack of relevant skills for self and gainful employment and work place participation. Most employed graduates of Technical Education keep exhibiting low performance while other graduates have not been able to enter into employment in their respective fields of training due to deficiency in relevant skills areas especially in painting.

Technical College students still graduate without employable skills, though the building construction curriculum has up to 60 percent practical skills content (Cyril, Enock, Tahir and Adamu, 2014). Abanyam, Edeh and Abanyam (2016) perceived that it is very pathetic to see Technical Vocational Education and Training (TVET) students and graduates hovering everywhere in search of non-available jobs, when they should be at the fore front of job creation. Focusing on the training and Technical Vocational Education objectives, Technical Vocational Education and Training (TVET) students and graduates should be skills possessors, jobs creators and not jobs seekers.

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Skill is the ability acquired through training to perform tasks very well. Skill according to Otu (2024) is the knowledge acquired through training and practice, and the ability to translate this knowledge into performance of organized tasks. Allen (2000) opined that skill is a special ability in a particular field especially acquired by learning and practice. Otu and Usoro (2017) reiterated that, skill is the expertness ability to carry out practical tasks. Delacroix (2000) in Otu (2019) observed that skill is the ability to do something well after learning and practicing it. In the context of this study, skill is the evidence of knowledge acquired through training over a period of time in painting. Constant involvement of students in coordinated practical activity would build confidence, satisfaction, feeling of mastery and pride. With the high level of unemployment there is need for building construction students to possess painting knowledge and skills for self-reliant.

Development according to Ingwu (2003) defined development as change from traditionalism to modernism, that is, a change from the traditional cultural practices to a modern way of thinking and doing things following discoveries in science and technology. Development in this context could mean development of structures such as good and well painted buildings, well equipped and functional schools, airports, tourist sites, good roads, bridges, banks, good security network, employment opportunities as well as development of people in terms of education attained and skills possessed. In this study development represent skillful personnel, good educational system with facilities for teaching and learning appropriate skills for self-employment, especially painting skills. Skill development in painting therefore is the process of improving and advancing competency in painting tasks.

Furthermore, validity according to Joshua (2012) refers to the extent to which a test measures what it is designed to measure, serves the purpose for which it was designed or the degree to which a test actually measures the variable it claims or purports to measure. The validity of an instrument describes the extent to which the conclusions or interpretations derived from the results of any assessment are well grounded or justifiable that is appropriate and meaningful (Cook and Beckman, 2006). In order to develop a valid instrument, it is important to identify the objectives and contents of the programme. Thus, well-developed painting skills should measure what it is supposed to measure and produce dependable information with sufficient evidence when it is used. It is on this note that researcher studied development and validation of painting skills **appropriate for building construction students for self-employment in Technical Colleges in Southern Senatorial District of Cross River State**

Statement of the Problem

Painting is an important aspect of Building Construction that students need to acquire skills. Teachers are expected to teach these skills to students in such a way that at the end of the programme, students can acquired these skills to enable them become self- employed and contribute to societal development. However, the researcher has observed that the teaching of painting skills in Technical Colleges in Southern Senatorial Zone of Cross River State is not very effective. This could be due to the absence of well-developed painting skills which would guide

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the teachers in the teaching of these painting skills. It could also be due to lack of painting skills by the teachers. It is therefore difficult for teachers to teach painting skills to students and their performance in painting has been very poor. Thus, many Technical Education graduates trained in painting skills turn to keke riders while others become hawkers in cities, some still roam the streets looking for unavailable jobs. Some have even turn to prostitution, arm robbery, kidnapping for ransom, 419, stealing among others, due to lack of skills and high rate of unemployment. Based on this that the researcher sought to developed and validate painting skills appropriate by building construction students for self-employment in Technical Colleges in Southern Senatorial Zone of Cross River State.

Purpose of the Study

The major purpose of this study was to develop and validate painting skills appropriate for teaching painting in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State. Specifically, the study sought to:

1. Develop painting skills appropriate for building construction students in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State.
2. Determine the content validity of the painting skills appropriate for building construction students in Technical College for self-employment in Southern Senatorial Zone of Cross River State?

Research Questions

The following research questions were answered in this study:

1. What are the painting skills appropriate for building construction students in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State?
2. What is the content validity of the painting skills appropriate for building construction students in Technical College for self-employment in Southern Senatorial Zone of Cross River State?

Research Hypothesis

The following null hypothesis was formulated to guide this study:

H₀₁. There is no significant difference between mean response of technical teachers and Building Construction workers on the painting skills appropriate for teaching building construction students in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State.

METHODOLOGY

This study sought to develop and validate painting skills appropriate by building construction students for self-employment in Technical Colleges in Southern Senatorial District of Cross River State. The research design that was employed for this study was research and development (R and D) design research design. Research and development design is used by engineers, technicians and

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educationists who develop new products, tasks and technologies that typically involve extensive research (Kenton, 2019). The study was carried out in five Local Government Areas in Southern Senatorial District of Cross River State, Nigeria. The population for the study was 563 comprised 12 building construction teachers in the five Technical Colleges in the district, seven experts (Lecturers) four from University of Cross River State, Calabar and three from College of Education, Akamkpa and 544 painters from the 51 registered painting companies in the Southern Senatorial District. The sample size used for the study was 335 respondents. Building construction teachers and experts were not sample, however simple random sampling technique was used to sample 316 painters. The instrument that was used for data collection was researcher structure questionnaire titled: “Painting Skills Appropriate for Self-employment (PASASE)”. The instrument contained 13 items, 5 points Likert type scale of Very appropriate =5, appropriate =4, Fairly appropriate =3, Inappropriate =2 and Very Inappropriate =1. The instrument was validated by three experts. One from Ekoinika Technical College, Ekor; one from government Technical College, Ekpashi Boki and one from Industrial Technology Education, University of Uyo. Cronbach Alpha reliability was used to determine the internal consistency of the instrument which yielded a reliability coefficient 0.79. The instrument was administered to respondents and all were retrieved. The data collected were analyzed using mean, standard deviation, Lawshe Content Validity Ratio and One Way Analysis of Variance (ANOVA). Mean and standard deviation were used to answer the research questions, Lawshe Content Validity Ratio was used to determine the content validity of the painting skills while ANOVA was used to test the null hypotheses at .05 level of significance. Items with mean of 3.00 and above were considered appropriate while items with mean below 3.00 were considered not appropriate.

RESULTS

Research Question 1

1. What are the painting skills appropriate for building construction students in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State.

**Table 1: Summary of Mean and Standard Deviation of Responses on the Painting Skills.
n=335**

Skills in Painting	X	SD	Remarks
1. Allowing newly erected wall to dry	3.91	0.77	Appropriate
2. Selecting appropriate brushes and rollers.	3.89	0.87	Appropriate
3. Brushing wall to remove all dirt.	3.81	0.81	Appropriate
4. Scraping and removing remains of loose or powdered materials.	3.62	1.12	Appropriate
5. Brushing wall to remove vegetable and algae growth.	3.93	0.84	Appropriate
6. Destroying any growths that cannot be removed by brushing, by applying ammonia copper solution.	3.99	0.71	Appropriate
7. Scraping existing paint with scraper and sand paper.	3.57	1.30	Appropriate
8. Applying mortar to fill major cracks.	4.17	0.58	Appropriate
9. Applying first coats of primer of the paint to be used.	3.70	1.06	Appropriate
Table 4.2 continued			
10. Applying putty filler to fill minor cracks.	3.82	0.81	Appropriate
11. Allowing the wall to dry after applying the primer	3.63	1.15	Appropriate
12. Applying second undercoat and allow to dry.	3.83	0.79	Appropriate
13. Applying two coats of the paint for the final finish.	3.65	1.10	Appropriate
* Appropriate ** Not Appropriate			

Analysis of table 1 above shows the summary of teachers, experts and painting practitioners' responses on the suitability of the painting skills appropriate by students for self-employment. The result shows that all the 13 items have their mean responses above 3.00. Thus, the respondents agreed that all 13 items are required by students for self-employment. The standard deviation of the items ranges from 0.58- 1.15 and were not too far from the mean.

Research Question 2: What is the content validity of the painting skills appropriate for building construction students in Technical College for self-employment in Southern Senatorial Zone of Cross River State?

Table 2: Summary of Lawshe's Content Validity Ratio (CVR) for Painting Skills Appropriate for Self-employment.

S/N	Painting Skills	Panellists							N	Mean (x)	CVR	Remarks
		1	2	3	4	5	6	7				
	Painting Skills include:											
1	Allowing newly erected wall to dry	1	1	1	1	1	1	1	7	1	1	Appropriate
2	Selecting brushes and rollers.	1	1	1	1	1	1	1	7	1	1	Appropriate
3	Brushing wall to remove all dirt.	1	1	1	1	1	1	1	7	1	1	Appropriate
4	Scraping and removing the remains of loose or powdered cement materials.	1	1	1	1	1	1	1	7	1	1	Appropriate
5	Brushing wall to remove vegetable and algae growth.	1	1	1	1	1	1	1	7	1	1	Appropriate
6	Destroying any growths that cannot be removed by applying ammonia copper solution.	1	1	1	1	1	1	1	7	1	1	Appropriate
7	Scraping existing paint with scraper and sand paper.	1	1	1	1	1	1	1	7	1	1	Appropriate
8	Applying mortar to fill major cracks.	1	1	1	1	1	1	1	7	1	1	Appropriate
9	Applying first primer coat of the paint to be used.	1	1	1	1	1	1	1	7	1	1	Appropriate

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10	Applying putty filler to fill minor cracks.	1	1	1	1	1	1	1	7	1	1	Appropriate
11	Allowing the wall to dry after applying the primer	1	1	1	1	1	1	1	7	1	1	Appropriate
12	Applying second undercoat and allow to dry.	1	1	1	1	1	1	1	7	1	1	Appropriate
13	Applying two coats of the paint for the final finish.	1	1	1	1	1	1	1	7	1	1	Appropriate
Content Validity Ratio (CVR)											1.00	Appropriate

In determining the quantitative content validity of the painting skills for self-employment, Lawshe's content validity ratio (CVR) method was employed. The process involved a panel of seven experts who rated the instrument. The Summary of the result is presented in Table 2. The Content Validity Ratio (CVR) ranges from 0.71- 1.0. Items with CVR between 0.71- 0.79 should be revised while items with CVR of 0.80 – 1.00 indicate that the skills are appropriate. All the 13 items had Content Validity Ratio had CVR of 1.0. The Content Validity Ratio gave a value of 1.00, indicating a high content validity of the painting skills items for self-employment.

Research Hypothesis

H₀₁. There is no significant difference between mean response of technical teachers and **paint practitioners** on the painting skills appropriate for teaching building construction students in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State.

Table 3: Summary of Analysis of Variance (ANOVA) Test for significant difference in Mean responses of technical teachers, painting practitioners and building experts on the painting skills appropriate for self-employment n=335.

FT	Sum of Squares	Df	Mean Square	F-cal	F-crit	Decision
Between Groups	145.442	2	72.721	2.341	1.018	**
Within Groups	9754.958	333	.494			
Total	9900.390	335				

** significant @2, 333 degree of freedom and $p > .05$.

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Table 3 shows the summary of Analysis of Variance (ANOVA) Test for significant difference in Mean responses of technical teachers, painting practitioners and building experts on the painting skills appropriate for teaching painting skills in Technical Colleges for self-employment. The result of the analysis in Table 3 shows that the calculated F-value was 2.341 and the F critical was 1.018. Since the calculated F value was greater than the F critical at 2 and 333 degrees of freedom, the null hypothesis was rejected. Thus, there is significant difference in the mean response of technical teachers, painting practitioners and building experts on the painting skills appropriate for teaching painting skills in Technical Colleges for self-employment in Southern Senatorial Zone of Cross River State.

Table 4: Post hoc test for significant difference of raters (building experts, technical teachers and paint practitioners' workers) on painting skills appropriate by building construction students for self-employment.

(I) RATERS	(J) RATERS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Painting Practitioners	Technical teachers	-6.05375*	2.81966	.006	-7.4421	-3.7536
	Building Experts	3.98308	3.61826	.076	-7.1148	1.4385
Technical teachers	Painting Practitioners	5.77123*	3.12887	.181	1.8682	7.1971
	Building Experts	3.50310	1.84189	.076	-2.7113	4.9018
Building Experts	Painting Practitioners	5.76707	3.96121	.181	-2.4161	5.6042
	Technical teachers	-1.77034	1.71251	.040	-4.70649	3.1574

*. The mean difference is significant at the 0.05 level.

Table 4 shows the summary of the post hoc test for direction of significance on painting skills appropriate by students for self-employment by raters. The result shows that technical teachers differed significantly from experts and painting practitioners, with positive mean differences between the two groups and significant values less than .05. Thus, the significance lies in the technical teachers group. Thus, it could be because experts and practitioners are constantly carrying out these tasks while teachers do not have such opportunity.

FINDINGS OF THE STUDY

The findings are summarized as follows:

1. All the 13 items relating to painting skills had mean responses above 3.00. Thus, all 13 items were found by technical teachers, building experts and painting practitioners as appropriate by building construction students for self-employment in Technical Colleges in Southern Senatorial District of Cross River State.
2. The content validity analysis of the validated painting skills shows that all the 13 items had CVR of 1.00. The Content Validity Ratio gave a value of 1.00, indicating a high content validity of the painting skills items included in the painting package.
3. There is significant difference between building construction teachers, experts and painting practitioners.

DISCUSSION OF FINDINGS

Analysis of the related research question reveals the painting tasks to be completed by students in order to develop painting skills. All the 13 tasks identified by the study were appropriate by the respondents. The teachers, experts as well as the painting practitioners agreed that the painting steps developed should be included in the task instructional package. This is found in the mean responses above 3.00 the weighted mean. The hypothesis test shows that there is significant difference in the mean response of technical teachers, painting practitioners and building experts on the specific tasks for inclusion in the instructional package for teaching requisite painting skills to Technical College students in Southern Senatorial District of Cross River State. This is so because continuous practice is the key to mastering of skills. This findings is supported by Fanegan (2013) which found that in surface preparation, various tools and equipment for smoothing the surface to be painted or decorated are learned; ways of handling each tool and equipment and their application and uses should be taught to students. Surface preparation by stripping, cleaning, filling, abrading and smoothing are learnt. Careful preparation of surfaces to be decorated is the key to a job well done. Good surface preparation requires a selection of basic tools used both indoors and outside. Also different methods and techniques for preparing surface for painting and decoration are concerned.

CONCLUSIONS

Based on the findings of the study, it is concluded that the developed painting skill items are valid and reliable to be used by technical teachers for teaching painting skills to students in technical education programmes. The developed painting skills if applied by the technical teachers, would help in developing key competencies in painting that are appropriate for students to become self-employed.

Recommendations

On the bases of the findings, the following recommendations were proffered:

- i. The National Board for Technical Education (NBTE) as well as sister agencies should adopt the developed painting skills as an update to existing painting curriculum.
- ii. Teachers should adopt the developed painting skills for teaching painting skills to Technical College students.
- iii. Government should encourage teachers to make use of the developed painting skills in teaching painting to building construction students in Technical Colleges.

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