Soap Making Skills Acquisition Training: Test of Dreyfus Model of Career Guidance on Apprentices in Niger State, Nigeria

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Abstract: The study was on Soap Making Skills acquisition training: a test of Dreyfus Model of career guidance on apprentices. Three research questions and three null hypotheses were tested at 0.05 level of significance guided the study. The research design was the quasi-experimental non-equivalent group in which a total of 84 apprentices were purposively sampled. Instrument used for data collection was Soap Making Skills Acquisition Test (SMSAT). The reliability of the instrument in terms of internal consistency was established and a reliability index of 0.81 reached. Two skills acquisitions centers were purposively sampled for experimental and control groups. Data collected were analyzed using mean and ANCOVA. The findings showed among others that there was significant difference between the mean achievement scores of apprentices after training on Dreyfus Model. However, there were no significant difference in mean scores achievement based by age and gender.

Key words: Dreyfus Model • Soap Making Skills • Career Guidance • Apprentices • Unemployment

INTRODUCTION

The viewpoint of unemployment in developed countries varies from that of developing countries due to level of industrialization that characterizes the society. Rashma [1] described unemployment as a condition of joblessness. In this regard, the Nigeria National Bureau of Statistics provided data on unemployment with figures for 2010 according to state, gender, level of education and sector. The national unemployment rate has moved up from 19.7 in 2009 to 21.1 in 2010. The distribution by educational qualification shows that the rate was highest among Bachelor of Arts/Bachelor of Science/Higher National Diploma holders with a figure of 24.6% followed by those who had below primary education 22.7%, 22.2% for holders of Nigeria Certificate in Education/Ordinary National Diploma/Nursing Certificate and the lowest is 13.7% for holders of Masters in Science/Masters in Arts/Education [2]. Unemployment rate based on gender across the states of the Federation is 17.7% for male and 24.9% for female while both genders are 21.1%. The statistics also revealed that the unemployment situation in Niger State Nigeria has been 3.85, 3.8, 4.6, 6.3, 6.7, 3.5, 0.2, 3.6, 4.2 and 2.8% for the years in between 1999-2008 respectively. The statistics showed that in Niger State Nigeria 8.3% of the males and 9.3% of the females are unemployed.

In view of the current unemployment trend, it is important to expose youth to the process of skills acquisition in such area like soap making. The core skills in soap making are measurement, stirring, scenting, moulding, drying and cutting. The work of Fisher and Linauer [3] and Home Shopping Network [4] elaborated that basic soap is created when fats such as coconut oil, olive oil, palm oil, Shea-butter oil, tallow (beef) and lard (pork) among others are mixed with lye (ashes or sodium hydroxide or caustic soda) that has been dissolved in water. The chemical reaction that occurs when these two ingredients are stirred together changing them into soap is called Saponification. The specific skills for soap making are measurement, mixing, observation, stirring, scenting, cutting, drying, cooking, timing and moulding. There are three common ways of producing soap as identified by Home Shopping Network [4]. These are: Hot method which involves the process of boiling up the mixture of oils in large open pans with a solution of caustic soda. In addition, a process called salting out is applied in the method to extract glycerol. The other is
Cold method in which the soap is produced without heating the raw materials of soap thus the glycerol is not removed. The third is Melt and pour method where premade soap are melted and molded again to avoid waste of soap particles. The oil from brebra can serve as raw material for soap production [5]. According to Okolie et al. [6], the sandbox tree (Hura crepitans) seed oils can be used for soap-making because of its high Saponification. On another note, soaps could be further put into use to produce other economically important products. For instance, an environmental friendly biogrease based on modified palm oil has been made using lithium soap as thickener [7].

A theory of skills acquisition which forms the basis of this study is highlighted by Pena[8] as proposed by two brothers, Stuart Dreyfus and Hubert Dreyfus in 1980 named the Dreyfus Model of skills acquisition. The original model has only five stages which include: Novice where the learner follows rules as they are given without context; Advance Beginner in which the learner is limited to situational perception; Competence where the learner develops perception of action in relation to goals; Proficient is the stage where learners develop intuition to guide their decision and even able to develop their own rules. The Expertise stage is where the learner develops analytical approach to a new problem. These stages of Dreyfus model can be related to the process of soap making skills acquisition in the sense that at Novice stage the apprentice as a new comer learns the utensils and equipment in the production of a final product while at Advance Beginner stage the apprentice becomes conversant with the ingredients used in the skills acquisition center for the production of their products. At the Competence stage the apprentice goes further to see that all actions or procedures are directed towards a goal when learning the procedures in the production of a final product of soap. As the apprentice progresses to the Proficient stage the apprentices becomes familiar with practical processes of production of soap and can even guide other apprentices at the end. The individual can develop personal rules and regulations based on peculiarities of circumstance. Finally, at the Expertise stage the apprentice can provide an analytical approach to common faults or problems in relation to the soap that is produced. In any skill acquisition process, three variables are common and include: the instructor, the skill and the apprentice. The apprentice could maximally attain the set goals with the active participation of a guidance counselor who offers career guidance to the apprentice.

It has not been empirically established that Dreyfus Model can be used in career guidance for skills acquisition although some of its identified uses are assessing progress in the development of skills, helping to define a desired level of competence, supporting progress in the development of skills and helping to determine when a learner is ready to train others in relation to apprenticeship. While commenting on skills acquisition, Pena[8] asserted that the Dreyfus Model has successfully been used to develop problem solving skills in medical education among nurses. North [9] agrees with the opinion that most people do not get beyond the competence stage of the Dreyfus Model at most skills acquisition process including those in their everyday work. This is basic human traits that do not like to expend energy once the outcome has been achieved and for most activities the outcomes is simply getting the job done. This performance level can be influenced by gender and age. It is erroneously thought that male perform better than female academically. When it comes to age, the older individual is always scolded where the performance is lower than the younger one.

Gender related difference could be one of the factors that may influence the outcome of skills acquisition. In learning outcomes, Olukayode [10] found that male students performed better than their female counterpart in environmental education. Similarly, Oluwatoyn and Adesina [11] opined that there is significant difference between male and female achievement in mathematics. Gambari and Fabgemi [12] reported no gender differences on performance of pupils on compugraphics software in mathematics. Furthermore, Nsofor[13] and Umeh[14] separately revealed that there is no significant difference in gender regarding achievement of learners. Salahudeen [15], his findings revealed that age and gender have no significant effect on the mean achievement of the experimental group. These divergent views on the influence of gender and age on learners provides the need to research on the place of gender and age on the effect of Dreyfus Model of career guidance on skill acquisition of apprentices.

Surprisingly, as these skills acquisition centers increase, so also is the degree of unemployment increasing. The existing quantum of data on unemployment in Nigeria is very worrisome; especially one notes that, unemployment is a password to poverty which government attempts to ameliorate through the establishment of skills acquisition centers. In order to change this sordid tide of unemployment, now more than ever before is the time to experiment the Dreyfus Model.
which has not received much attention around the world including Nigeria. Therefore, the main purpose of this study was to determine the effect of Dreyfus Model training in skills acquisition of apprentices for career guidance in soap making skills in Niger State of Nigeria. Specifically, the study sought to:

- Determine the mean achievement score in soap making skills acquisition of apprentices exposed to Dreyfus Model training of career guidance.
- Determine the mean achievement score in soap making skills acquisition by gender of apprentices exposed to Dreyfus Model training of career guidance.
- Determine the mean achievement score differences in soap making skills acquisition by gender of apprentices exposed to Dreyfus Model training of career guidance.

**Theoretical Framework:** The Dreyfus model of skills acquisition was first published as a five-stage model of the mental activities involved in directed skill acquisition by Stuart Dreyfus and Hubert Dreyfus [16] in 1980. They stated that in acquiring a skill by means of instruction and experience, the student normally progresses through five developmental stages which are designated as novice, advance beginner, competence, proficient and expertise. As a student becomes skilled, he depends less on abstract principle and leans more on concrete experience. At each stage of training the appropriate issues involved in facilitating skill acquisition is addressed.

There are two divergent approaches to learning a skill; either through imitation or trial and error or through an instructor or instruction manual. The later approach is adopted by Dreyfus model because of its efficiency as demonstrated in aircraft skills of flying as a learning process by students. The stages of the model are:

**Stage 1: Novice:** The task environment of the learner is divided into features and rules. The feature is the context-free environment which the learner can freely recognize without benefit of experience as non-situational. The learner is then given rules for determining an action on the basis of these features. To improve, the novice needs monitoring either by self observation or instructional feedback as to bring his behavior closer to the rule.

**Stage 2: Advance Beginner:** As the learner is exposed to various experiences that are actually coping with the real situation in the environment, it leads to advance beginner. The learner notes or an instructor points out recurrent meaningful component pattern or guidelines in his brain.

**Stage 3: Competence:** The competence stage is achieved through increased practice which exposes the learner to a wide variety of typical whole situation. Each whole situation for the first time has a meaning and is relevant to the achievement of a long term goal. Now aspects are less important to the whole situation as recognized by the brain. The memorized principle by the brain is called a maxim which is used to determine the appropriate action in a situation.

**Stage 4: Proficient:** Up to this stage, the performer needed some sort of analytical principles, in form of rules, guidelines or maxims to connect his experience of general situation to a specific action. This is the trial stage in the step-wise improvement of mental processing as the experience situation is so vast that normally each specific situation immediately dictates an intuitively appropriate action. As he almost masters the skills, he becomes capable of supervising others and developing his own rules.

**Stage 5: Expertise:** The mastery stage is achieved when the learner no longer needs principle, can cease to pay conscious attention to his performance and can let all the mental energy previously used in monitoring his performance go into almost instantaneously, the appropriate perspective and associated actions. The training implications of the stages of the model includes the fact that, it facilitates advancement to next stage and help to avoid the temptation of introducing intricate and sophisticated aids. Besides, it does not impede advancement to higher level and prevents regression to a lower level.

**MATERIALS AND METHODS**

**Scope of the Study:** The study was carried out in Niger State of Nigeria. Niger State is situated in the middle belt (north central) of Nigeria. It is an amalgam of different ethnic groups from Nigeria but is dominated by Nupe, Hausa and Gwari tribes with a population figure of 3.95 million in the 2006 National population census. The state comprises 25 Local Government Areas with a land mass of 86,000km² in about 8.6million hectares constituting about 9.3% of the total land area of the country, making it the largest state in Nigeria[17].
Participants and Procedures: The quasi-experiment using the non-equivalent group of pre-test and post-test design was adopted. In this type of design, there is no randomization of the respondents and the existence of treatment and control group that are subjected to pre-test in order to establish a baseline data to work with before the posttest after the treatment [18]. The population of the study comprised of over 3,358 registered unemployed youths captured in the various skills acquisition centre in Niger State. There were over Seventy-five (75) Skills Acquisition Centers in the state with the Ministry of Women and Gender Affairs, Mass Literacy Agency and Ministry of Education all having at least one in each of the twenty-five (25) Local Government Areas of the state. This is with exception of skills acquisition centers controlled by NGO’S and Local Governments. They train mainly graduates and drop-outs from secondary schools and tertiary institutions that are either male or female in different age brackets.

The sample for the study was 84 youths. Purposive sampling technique was used to select the skill acquisition centers. The chanchaga skills acquisition center with 45 apprentices was the experimental group while the control group was located at St. Clement with 31 apprentices.

Measures: The instrument for the collection of data is the Soap Making Skills Acquisition Test (S.M.S.A.T). The instrument was divided into Section A and Section B, while section A seeked for background information of the apprentices, Section B was divided into five Clusters each representing a stage in skills acquisition of the Dreyfus Model namely the Novice, Advance Beginner, Competent, Proficient and Expert. Each sub-section captured the varying degree in the level of attainment in skills acquisition. Therefore, questionnaire consisted of a total of twenty Multiple Choice questions. On each item the apprentice scores correct, five marks was awarded making an aggregate of 100 marks for the instrument. The reliability of the scoring guide was determined using Kendall’s coefficient of concordance (W). The result obtained was 0.81 which is high enough that makes the instrument reliable.

The researchers administered the instrument on the apprentices with the assistance of their instructors who acted as research assistant. The experimental group was engaged for eight weeks with guidance on the segments and stages of skills acquisition. However, both the experimental group and the control group were exposed to pre test and post test instrument.

Control of Extraneous Variables: The following measures were adopted to control extraneous variables that may introduce bias to the study.

Initial Group Difference: In an attempt to eliminate the errors of non-equivalence arising from the non-randomization of the subjects, the researchers used the analyses of covariance (ANCOVA) for data analysis.

Timing of Pre-test and Post Test: The time lapse between the pre-test and post-test was eight weeks. This was considered high enough to disallow the pre-test score from affecting the post-test scores. The pre-test items were not only shuffled but different colours (blue and pink) papers and size (pocket size) was used for the post test.

RESULTS

Table 1 shows that at post test, apprentices in the experimental group had overall mean achievement score of 77.00 with standard deviation of 10.52. While, the control group had overall mean achievement score of 56.28 with a standard deviation of 11.90. Therefore, the treatment had exerted substantial influence on both the variation and on level of performance too of the experimental group. The mean gain score of the experimental group was 39.55 as opposed to 17.82 of the control group, which was a clear indication that there was a difference in the variability of their scores judging from the disparity of the gain score. To ascertain whether the observed differences were significant it could only be proven by a tested hypothesis.

The results shown in Table 2 indicated that treatment as a main factor had significant effect on apprentices’ achievement in acquisition of soap making skills in apprentices. F value of 113.74 in respect of treatment as main effect was shown to have significance of 0.000 levels because it was lower than 0.05 level at which the hypothesis was tested. The Table shows that the exact probability level 0.000 is less than 0.05, hence, the researcher rejected the null hypothesis in favour of the alternative. Therefore, there was significant difference between the mean pretest and post test achievement score of apprentices exposed to Dreyfus Model training on skills acquisition in soap making and those not exposed to the model for career guidance.
Table 1: Mean and Standard Deviation of Achievement Score of Apprentices after Training in Dreyfus Model.

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Pre test M</th>
<th>SD</th>
<th>Posttest M</th>
<th>SD</th>
<th>Mean Gain Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>45</td>
<td>37.44</td>
<td>10.90</td>
<td>77.00</td>
<td>10.52</td>
<td>39.5</td>
</tr>
<tr>
<td>Control Group</td>
<td>39</td>
<td>38.46</td>
<td>12.93</td>
<td>56.28</td>
<td>11.90</td>
<td>17.82</td>
</tr>
</tbody>
</table>

Table 2: Summary of ANCOVA in the Mean Pre-test and Post-test scores between Soap Making Apprentices after Training and those without Training in Dreyfus Model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Squares</th>
<th>F</th>
<th>Sig</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Group</td>
<td>45451.60</td>
<td>3</td>
<td>15150.53</td>
<td>113.74</td>
<td>0.000</td>
<td>Rejected</td>
</tr>
<tr>
<td>Within Group</td>
<td>21844.70</td>
<td>164</td>
<td>133.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>67296.28</td>
<td>167</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Mean and Standard Deviation of Achievement Score by Gender of Apprentices after Training in Dreyfus Model.

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>N</th>
<th>Pretest M</th>
<th>SD</th>
<th>Posttest M</th>
<th>SD</th>
<th>Mean Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>26</td>
<td>36.16</td>
<td>11.25</td>
<td>76.35</td>
<td>10.25</td>
<td>40.19</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>39.21</td>
<td>10.44</td>
<td>77.89</td>
<td>11.10</td>
<td>38.68</td>
</tr>
</tbody>
</table>

Table 4: Summary of ANOCVA in Soap Making Skills Scores by Gender of Apprentices after Training in Dreyfus Model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sum of squares</th>
<th>Df</th>
<th>Mean Squares</th>
<th>F</th>
<th>Sig</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Group</td>
<td>26.326</td>
<td>1</td>
<td>26.326</td>
<td>234</td>
<td>0.631</td>
<td>Accepted</td>
</tr>
<tr>
<td>Within Group</td>
<td>4843.674</td>
<td>43</td>
<td>112.644</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4870.000</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Mean and Standard Deviation Scores between Young Adults and Older Adults Apprentices in Soap Making Skills after Training in Dreyfus Model.

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>N</th>
<th>Pretest M</th>
<th>SD</th>
<th>Posttest M</th>
<th>SD</th>
<th>Mean Gain Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young Adults</td>
<td>14</td>
<td>40.27</td>
<td>9.64</td>
<td>78.95</td>
<td>9.66</td>
<td>38.68</td>
</tr>
<tr>
<td>Older Adults</td>
<td>31</td>
<td>35.38</td>
<td>11.48</td>
<td>75.58</td>
<td>11.08</td>
<td>40.19</td>
</tr>
</tbody>
</table>

Table 6: Summary of ANCOVA in Soap Making Skills Scores between Young Adults’ and Older Adults’ Apprentices after Training in Dreyfus Model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Squares</th>
<th>F</th>
<th>Sig</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Group</td>
<td>124.706</td>
<td>1</td>
<td>124.706</td>
<td>1.130</td>
<td>.294</td>
<td>Accepted</td>
</tr>
<tr>
<td>Within Group</td>
<td>4746.294</td>
<td>43</td>
<td>110.356</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4870.000</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 revealed that at post test, male apprentices in the experimental group had overall mean achievement score of 76.35 with standard deviation of 10.25. While, the female apprentices of the experimental group had overall mean achievement score of 77.89 with a standard deviation of 11.10. Therefore, the treatment had exerted substantial influence on both the variation and on level of performance too of the experimental group. This is because; the gain score of the male and the female was close with 40.19 and 38.68 respectively, which indicated that there was no much difference in the variability of their scores judging from the closeness of the gain score. To ascertain whether the observed differences were not significant it could only be proven by a tested hypothesis.

The results shown in Table 4 indicated that treatment as a main factor had significant effect on male and female apprentices’ achievement in acquisition of soap making skills. As a result the F value of 234 in respect of treatment as main effect was shown to have significance of 0.631 levels which is higher than 0.05 level at which the hypothesis was tested. This therefore showed that at 0.05 the F-value of 234 is not significant. The Table shows that the exact probability level 0.631 is higher than 0.05. Hence, the researchers accepted the null hypothesis. Therefore, there was no significance difference between the mean pretest and post test achievement score of the male and female apprentices exposed to Dreyfus Model training on skills acquisition in soap making and those not exposed to the model for career guidance.
Table 5 illustrated that at post test, young adults apprentices in the experimental group had overall mean achievement score of 78.95 with standard deviation of 9.66. While, the older adults had overall mean achievement score of 75.58 with a standard deviation of 11.08. Therefore, the treatment had exerted substantial influence on both the variation and on level of performance too on both groups. This is because; the gain score of the young adults and the older adults is close with 38.68 and 40.19 respectively, which indicated that there was no much difference in the variability of their scores judging from the closeness of the gain score. To ascertain whether the observed differences is not significant can only be proven by a tested hypothesis.

The result shown in Table 6 indicated that treatment as a main factor has significant effect on young adults and older adults’ apprentices’ achievement in acquisition of soap making skills. As a result the F value of 1.130 in respect of treatment as a main effect is shown to have significance of 0.294 levels which is higher than 0.05 level at which the hypothesis was tested. This therefore shows that at 0.05 the F-value of 1.130 is not significant. The Table shows that the exact probability level 0.294 is higher than 0.05. Hence, the researchers accepted the null hypothesis. Therefore, there was no significant difference between the mean pretest and post test achievement score of young adults and older adults apprentices exposed to Dreyfus Model training on skills acquisition in soap making for career guidance.

DISCUSSION

The results from the study showed that the experimental group achievement score is higher than that of the control group in soap making skills acquisition after employing Dreyfus model of career guidance. In addition, there was significant difference in mean achievement between the experimental group and control group in soap making skill acquisition when exposed to Dreyfus Model of career guidance. The apprentices of the experimental group did better than those of the control group because the Dreyfus model exposed them to analytical approach to acquisition of skills and expectation at the five stages of the model. The apprentice were able to learn systematically or in stages, names of the instruments/apparatus, uses, minor repairs and substitution, ingredients/reagents, procedure in the production of final product; performing practical activity and finally provide answer to common faults in production of soaps. The result of this study is in conformity with the earlier research findings on the place of guidance in order to acquire a skill[19, 20].

Another finding from the research was that there is no significant difference in mean achievement between male and female of the experimental group exposed to Dreyfus model of skills acquisition in soap making as depicted by analysis of covariance. The findings corroborate the work of Gambari et al. [21]. However, other researchers that contradicted earlier findings –Ogunbiyi[22] and Umar [23] – could have been influenced by environmental factors.

The ANCOVA statistics indicated that there is no significant difference in the mean achievement between young adults and older adults in the experimental group in soap making skills acquisition. This result is in agreement with other research conducted by Salahudeen[15] and Aremu and Ajanaka[24] because interest and other factors influence learning than age especially at the youthful stage when the brain is matured. On the contrary, Ewumi[25] is of the opinion that the relevance of age to skill attainment could be due to the sampling technique and the methodology or gender of the instructor.

Based on the findings of the study the following recommendations have been proffered:

- The academia should produce skill-oriented textbooks and other learning materials so that the Dreyfus Model could be explored for maximum benefit of the educational system.
- The teacher should employ the Dreyfus model as it has inherent advantage in providing systematic approach to problem solving in the classroom.

REFERENCES