Instructions to Authors

- The Red Sea University journal is a refereed scientific biannual journal.
- The journal accepts research papers that conform to its editorial standards in various disciplines of sciences.
- The journal will publish original scientific research.
- The papers are considered for publication on the understanding that they have not been published before or shall not be submitted for publication elsewhere.
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- Three copies of manuscript must be submitted, with one set of original illustrations.
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- Manuscript should not exceed 30 typewritten pages including references, tables, figures and indices.
- Illustrations and diagrams should be on separate sheets and referred to as figures and numbered in Arabic 1,2,3……etc.
- Repetition of numerical results should be avoided if they are presented in tables.
- The same material should not be presented in tables and figures.
- The figures must be labeled at the bottom with numbers and brief titles and should be on separate sheet.
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Editorial Note

In the name of Allah, Praise be to Allah and blessing for Prophet Mohammed (P.B.U.H), for the progress and stability attained in enriching the goal set for the University Journal and its impact on the ambitions of beneficiaries.

We take this opportunity to congratulate the university for the issuance of the third edition of the Journal. The editorial board welcomes all your constructive comments which will definitely upgrade the performance in our endeavor for excellence and uniqueness. The editorial committee was highly committed towards updating and improving policies related to scrutiny of issuance. This policy has been reflected in a lot of interest in the publication locally and abroad and for researchers outside the university.

We would like to welcome professor Abdul Raouf Ahmed Abbass Elbadawi, the Vice Chancellor of the Red Sea university as the general supervisor for the publication. It is our trust that under his supervision and guidance, the immediate goals of the Journal and the overall benefit for the Red Sea state, the country and humanity will be attained.

Appreciation is extended to Dr Hamid Mohammed Ibrahim, Dr. Khalid Abdel Fatah, Ustaz Jamal Abdel Wahab, and Ustaz Ashraf Tag Elsir for their diligence and patience in dealing with scientific papers for the processing of refereeing. Our appreciation is also extended to professor Ali El- Tahir Sharaf El-dien.

A vote of thanks is also extended to all the experts, refrees and proof readers for their utmost care in reviewing and refining all papers. We hope that the Journal will be a truly scientific reference in various fields of knowledge so as to satisfy all beneficiaries and stakeholders.

Editorial Board
Quality Changes in Marine Fish (*Plectropomus areolatus*) During Preservation In Different Rates of Ice

Hala Gindeel Abu Bakr Ahmadoon*

Abstract:
This work is meant to determine the effect of “fish to ice” ratio on the quality of marine fishes. *Plectropomus areolatus* (Najel, Sulimani) first class fish. The fish samples were kept in different ratios of ice (1fish: 1ice) and (1fish: 2 ice) in fiberglass ice boxes until the appearance signs of spoilage. The chemical composition, bacteriological assessment and sensory evaluation of fresh and chilled fish at 0, 7, 14, 21 and 28 days were studied. The different ratios of fish to ice have a significant effect (p< 0.05) on the acidity and it was highest at fish: ice ratio (1:1). All chemical composition decreased with preserving period except moisture and pH in both rates of ice. The study showed that the samples, before and after chilling with ice, were free from *Salmonella spp*, *Staphylococcus Spp* and *Vibrio spp*, however, *E. coli* appeared in fish of (1:1) ratio at day 21, total bacteria count increased with the preservation period in both rates of ice; the contamination was more in fish: ice ratio (1:1). Different fish: ice ratios has no significant effect (p > 0.05) on sensory characteristics except in firmness of flesh. Fish: ice ratio (1:2) showed the least sensory changes, and the sensory characteristics remained good until the day 14, but deterioration of all characteristics became noticeable at the day 21 and the fish became unacceptable at day 28 in both ice ratios.

Keywords: Ice ratios. Chemical changes. Microbiological. *Plectropomus areolatus*. sensory evaluation.

* Animal Resources Research Corporation.
**Introduction:**

The use of ice for preserving fish and fishery products has proved to be an effective handling method (Shawyer and Pizzali, 2003). It is a technique used to decrease the fish temperature to levels where metabolic activities, catalyzed by autolytic or microbial enzymes are reduced or completely stopped (Ababouch, 2005).

Furthermore, it can slow down the process of deterioration and prolong the shelf life of fish as food (Graham et al., 1992). Moreover, ice is available in many fishing areas and has a very large cooling capacity. It is harmless, it can keep fish moist, and as it melts it can wash surface bacteria from the fish (Shawyer and Pizzali, 2003). Both crushed or flaked ice, are good for rapid chilling (Graham et al., 1992), but it is important to completely surround the fish with ice so ice need to be in very small pieces or in slush forms (Shawyer and Pizzali, 2003). In Sudan at Red Sea coast, chilling by ice is the most important preservation method of whole fish, and fishermen preferred block ice after crushing it into small pieces in order to create good contact with the fish. The landing of fish at Red Sea between the catch and the arrival at the destination usually takes from five to fifteen days. There is need to optimize in refrigeration parameters to provide consumers fish with high quality (Khalid et al., 2000).

White fish in crushed ice remains edible for about 15 days but ice is not effective for long preservation because melting water bring about bleaching of valuable flesh contents which are responsible for flavour, taste and became dehydrated and loses texture. It has been widely reported that fish lose some of their nitrogenous constituents including proteins during preserving in ice (Shammi and Bhatnagar, 2002). It is possible to calculate the correct fish to ice ratio to be used to cool the fish and maintain chilling (Graham et al., 1992). Little empirical data reporting the potential practical advantages derived from the use of ice and fish to ice ratio for preserving marine species are available. The design, fish to ice ratio, size, insulation and management of cold stores are key factors for fish quality and energy saving (Ababouch, 2005).

To maximize the use of chilling, it is necessary to understand the ways how these changes take place. Therefore to achieve the improving quality of chilling, need to understand the changes on the nutritious value, biological and sensory characteristics occurring during chilling. These keys were considered useful not only in investigating cooling, but also in the maintenance of low temperature and keeping the quality of chilling fish during storage. Many countries now have comprehensive system of inspection and control of at least
some aspects of fish quality. Thus from several points of view fish quality has become very important in the world. This is because consumers now are more aware of possible food hazards and malpractices which will affect the quality as a result of bad handling and processing (Adamand and Samia, 2011). This present study endeavors to determine the effects of chilling with different ice ratios in nutritive value, microbiological and sensory characteristics on *Plectropomus areolatus*.

**Material and methods**

Samples were collected from Port Sudan fish market. The species used in this study was *Plectropomus areolatus*, (1250 – 250) gm body weight, and (45- 60) cm in total length. All samples were thoroughly washed with tap water and blot dry. The samples were preserved in crushed ice in ratio of (1: 1) and (1: 2) “fish to ice”. Samples were kept in fiber reinforced plastic boxes that had drain holes allow to drain melted ice. Melting ice was recharged every day by new crushed ice. Samples on day 0, 7, 14, 21, 28, were subjected to chemical analysis, microbial assessment and sensory evaluation.

**Chemical analysis**

Flesh of fresh and chilled fish were subjected to gross chemical analysis; the parameters studied were, pH, acidity, moisture, protein, fat and ash. Acidity was measured by titration against 0.1N (NaOH) according to (Ronald, 1990). pH was measured using pH meters (Lutron pH-206,1930533). Moisture, protein, fat and ash were determined following (AOAC, 1990). Moisture was determined by drying the sample at (105°C) until constant weight (16 – 24 hour). Crude protein was obtained by measuring the total nitrogen adopting a modified micro Kjeldahl procedure (Love, 1970), using selenium and copper sulphate as a catalyst for the digestion, and a steam distillation apparatus to find the nitrogen content of the sample and titrate with (0.1 N) Hcl. The value for nitrogen was multiplied by a factor of 6.25. Fat was determined by extracting 1gm of dry sample with petroleum ether (boiling 40–80°C) for six hours in a Soxhelt continuous extraction apparatus. The extract was then dried in a water bath until constant weight was obtained. Ash content was determined by ignition of dried sample in a muffle furnace (550 – 600°C) for (3 - 4) hours.

**Microbiological test**

The FAO (1992) method was used for detection of the presence of *Salmonella* spp; *Coli* form Spp, *Staphylococcus* Spp, *Vibrio* spp and assessed total viable bacterial count.

**Sensory evaluation test**

According to the summated ratings to Likert (1932) cited by (Anan
Quality Changes in Marine Fish (Plectropomus areolatus) During Preservation In Different Rates of Ice

and Bahy, 2005) and quality index method (Huss, 1995), fish samples were subjected to sensory evaluation by untrained panelist consisting of 10 persons. A score of (5to7) indicates a high quality of sensory freshness, a score of (3to 1) indicates low quality of sensory freshness and (4) indicates midmost.

Statistical analysis

Statistical analysis were performed using (SPSS) to determine the effects of “fish to ice” ratio during preservation period of (0, 7, 14, 21, 28 days), on physical and chemical composition (pH, acidity, moisture, ash, protein and fat) as well as sensory characteristics (slime, smell, colour, form and colour of eyes, mucus and colour of gill, skin, firmness of flesh) for chilled fish. Confidence interval at (p<0.05) was used in all cases.

Results

Effect of fish to ice ratio on the chemical composition during preservation in ice:

The statistical analysis showed that different “fish to ice” ratio had significant effect (p < 0.05) on acidity at days 21 and 28, with higher value at ratio 1:1; but no significant effect in pH. Acidity decreased while pH increased with preservation period in both ice ratios. The obtained results are shown in table 1a.

Table 1 a:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>preservation</th>
<th>Fish : ice ratio</th>
<th>t value</th>
<th>P value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>day0</td>
<td>1:1</td>
<td>6.51±0.61</td>
<td>6.38±0.61</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>1:2</td>
<td>6.86±0.07</td>
<td>6.78±0.05</td>
<td>2.279</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td></td>
<td>6.72±0.27</td>
<td>6.73±0.24</td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td></td>
<td>6.88±0.38</td>
<td>7.25±0.17</td>
<td>✓ .776</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td></td>
<td>7.14±0.35</td>
<td>7.13±0.31</td>
<td>0.032</td>
</tr>
<tr>
<td>acidity</td>
<td>day0</td>
<td>1:1</td>
<td>0.98±0.21</td>
<td>0.98±0.21</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>1:2</td>
<td>0.98±0.43</td>
<td>0.87±0.35</td>
<td>0.366</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td></td>
<td>1.08±0.25</td>
<td>0.73±0.70</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td></td>
<td>0.75±0.37</td>
<td>0.68±0.19</td>
<td>1.309</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td></td>
<td>0.64±0.14</td>
<td>0.61±0.16</td>
<td>1.257</td>
</tr>
</tbody>
</table>
The results in table 1b showed that different ‘fish to ice’ ratio had no significant effect (p > 0.05) in fat, protein, ash and moisture. Fat, protein and ash decreased while moisture increased with preserving period in both ice ratios.

**Table 1 b: Chemical composition of P. areolatus with respect to ‘fish to ice’ ratio during ice preserving period (Means ± SD).**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Preservation</th>
<th>Fish : ice ratio</th>
<th>t value</th>
<th>P value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture %</td>
<td>day0</td>
<td>1:1</td>
<td>76.59±1.78</td>
<td>77.62±2.25</td>
<td>0.718</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:2</td>
<td>77.82±2.62</td>
<td>77.73±1.22</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td></td>
<td>79.97±1.23</td>
<td>79.12±1.16</td>
<td>1.009</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td></td>
<td>80.19±0.99</td>
<td>79.88±0.65</td>
<td>0.526</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td></td>
<td>80.64±0.89</td>
<td>79.91±1.34</td>
<td>0.908</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td></td>
<td>4.23±0.13</td>
<td>4.23±0.13</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td></td>
<td>3.34±0.87</td>
<td>3.79±0.22</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td></td>
<td>3.54±0.38</td>
<td>3.78±0.17</td>
<td>0.142</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td></td>
<td>3.63±0.37</td>
<td>3.37±0.25</td>
<td>0.407</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td></td>
<td>3.05±0.81</td>
<td>3.66±0.31</td>
<td>1.145</td>
</tr>
<tr>
<td>Protein %</td>
<td>day0</td>
<td></td>
<td>69.95±1.05</td>
<td>70.26±1.28</td>
<td>0.383</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td></td>
<td>61.13±1.94</td>
<td>60.13±1.62</td>
<td>0.792</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td></td>
<td>54.06±1.98</td>
<td>54.28±2.00</td>
<td>0.162</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td></td>
<td>40.91±7.93</td>
<td>41.54±4.46</td>
<td>0.139</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td></td>
<td>40.16±6.16</td>
<td>38.85±5.50</td>
<td>0.317</td>
</tr>
<tr>
<td>Ash %</td>
<td>day 0</td>
<td></td>
<td>5.51±0.90</td>
<td>6.10±1.25</td>
<td>0.766</td>
</tr>
<tr>
<td></td>
<td>day 7</td>
<td></td>
<td>4.86±1.09</td>
<td>4.47±0.20</td>
<td>0.708</td>
</tr>
<tr>
<td></td>
<td>day 14</td>
<td></td>
<td>4.18±0.74</td>
<td>5.04±2.19</td>
<td>0.736</td>
</tr>
<tr>
<td></td>
<td>day 21</td>
<td></td>
<td>3.52±0.39</td>
<td>4.57±0.68</td>
<td>0.671</td>
</tr>
<tr>
<td></td>
<td>day 28</td>
<td></td>
<td>4.11±0.96</td>
<td>3.63±0.54</td>
<td>1.082</td>
</tr>
</tbody>
</table>
2- Microbiological assessment of *P. areolatus* during preservation period in both ratios of ice:

The total viable bacterial count as well as pathogenic bacteria of fresh and chilled fish was determined. The results indicated no contamination with *Staphylococcus Spp, Salmonella spp* and *Vibrio spp* in both ratios of ice for all fresh and preserved samples, *E.coli* appeared in some cases after 21 days of preservation in ratio of (1:1). The increase in preservation period increased total viable bacterial count in both ratios of ice, The highest viable bacterial count being in ratio of (1:1). As presented in table 2.

**Table 2:**
Microbiological viable count during chilling in ice of *P. areolatus* flesh with respect to “fish to ice” ratio.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Preservation period</th>
<th>fish: ice ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1:1</td>
</tr>
<tr>
<td>Total bacterial count</td>
<td>day0</td>
<td>5.0 x10³</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>6.6 x10³</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>2.8 x10³</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>1.3 x10⁴+</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>5.1 x10⁴</td>
</tr>
</tbody>
</table>

* + *E.coli* Detected.

3- Effect of “fish to ice” ratio on sensory evaluation of *P. areolatus* flesh during preservation period in ice.

Statistical analysis showed that different between “fish to ice” ratios had no significant effect (p>0.05) in all sensory parameters, however the ratio of 1:2 had higher scores than ratio 1:1 except in skin and scales, firmness of flesh and form of eye. All sensory parameters decreased with preservation period in both ratios. The results are shown in table 3a, 3b and 3c.
Table 3 a:
Sensory evaluation of appearance of *P. areolatus* during chilling with respect to ice ratio.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>preservation</th>
<th>Fish : ice ratio</th>
<th>t value</th>
<th>P value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
<td>1:1</td>
<td>1:2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>slime</td>
<td>day0</td>
<td>6.50±0.58</td>
<td>6.50±0.58</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>4.75±1.26</td>
<td>5.00±2.16</td>
<td>0.200</td>
<td>0.435</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>4.75±1.50</td>
<td>4.25±0.96</td>
<td>0.562</td>
<td>0.134</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>3.75±0.96</td>
<td>4.00±1.41</td>
<td>0.293</td>
<td>0.604</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>3.00±0.82</td>
<td>3.00±0.82</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Skin and scales</td>
<td>day0</td>
<td>6.25±0.50</td>
<td>6.25±0.5</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>5.00±1.15</td>
<td>5.00±1.83</td>
<td>0.000</td>
<td>0.134</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>5.25±0.96</td>
<td>4.75±1.26</td>
<td>0.632</td>
<td>0.780</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>4.75±1.89</td>
<td>5.50±0.58</td>
<td>0.758</td>
<td>0.140</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>3.00±0.82</td>
<td>2.00±0.82</td>
<td>0.000*</td>
<td>0.732</td>
</tr>
<tr>
<td>firmness of flesh</td>
<td>day0</td>
<td>5.75±0.96</td>
<td>5.5±1.29</td>
<td>0.311</td>
<td>0.506</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>5.00±0.00</td>
<td>5.5±1.20</td>
<td>1.964</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>3.75±1.26</td>
<td>3.75±0.96</td>
<td>0.000</td>
<td>0.780</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>4.00±1.63</td>
<td>4.5±0.58</td>
<td>0.577</td>
<td>0.420</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>4.63±1.00</td>
<td>2.75±2.06</td>
<td>0.218</td>
<td>0.021*</td>
</tr>
<tr>
<td>pressed</td>
<td>day0</td>
<td>5.75±0.96</td>
<td>5.50±1.29</td>
<td>0.311</td>
<td>0.506</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>4.75±1.26</td>
<td>5.50±1.00</td>
<td>0.933</td>
<td>0.791</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>3.75±1.26</td>
<td>4.25±0.96</td>
<td>0.632</td>
<td>0.780</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>4.00±1.41</td>
<td>4.25±0.50</td>
<td>0.333</td>
<td>0.194</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>2.25±0.50</td>
<td>2.50±1.29</td>
<td>0.361</td>
<td>0.094</td>
</tr>
</tbody>
</table>
Table 3 b: Sensory evaluation of eyes during chilling in ice of *P. areolatus* with respect to ice ratio.

<table>
<thead>
<tr>
<th>Appearance of Eyes</th>
<th>Parameter</th>
<th>preservation period</th>
<th>Fish : ice ratio</th>
<th>t value</th>
<th>P value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1:1</td>
<td>1:2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>color of eye</td>
<td>day0</td>
<td>6.00±0.82</td>
<td>6.00±0.82</td>
<td>0.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>5.5±1.29</td>
<td>4.00±2.00</td>
<td>1.260</td>
<td>0.420</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>3.75±1.50</td>
<td>4.25±0.96</td>
<td>0.562</td>
<td>0.143</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>2.75±0.96</td>
<td>3.75±0.50</td>
<td>0.852</td>
<td>0.168</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>2.00±1.15</td>
<td>2.25±0.96</td>
<td>0.333</td>
<td>0.267</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td>form of eye</td>
<td>day0</td>
<td>6.50±0.58</td>
<td>6.50±0.58</td>
<td>0.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>6.62±1.71</td>
<td>4.50±1.91</td>
<td>0.585</td>
<td>0.697</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>4.00±1.15</td>
<td>3.75±0.96</td>
<td>0.585</td>
<td>0.267</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>3.75±1.26</td>
<td>4.25±0.50</td>
<td>0.330</td>
<td>0.267</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>3.25±1.26</td>
<td>2.75±0.96</td>
<td>0.632</td>
<td>0.780</td>
<td>p &gt; 0.05</td>
</tr>
</tbody>
</table>

Table 3 C: Sensory evaluation of gills during chilling in ice of *P. areolatus* with respect to “fish to ice” ratio (Means ± SD).

<table>
<thead>
<tr>
<th>Appearance and smell of Gills</th>
<th>Parameter</th>
<th>preservation period</th>
<th>Fish : ice ratio</th>
<th>t value</th>
<th>P value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1:1</td>
<td>1:2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smell</td>
<td>day0</td>
<td>6.25±0.50</td>
<td>6.25±0.50</td>
<td>0.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>5.5±0.58</td>
<td>6.75±0.50</td>
<td>0.273</td>
<td>0.356</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>5.00±0.82</td>
<td>5.00±0.82</td>
<td>0.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>4.25±1.26</td>
<td>5.25±0.96</td>
<td>0.256</td>
<td>0.780</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>3.25±0.96</td>
<td>3.759±0.5</td>
<td>0.926</td>
<td>0.168</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td>color of gill</td>
<td>day0</td>
<td>6.50±0.58</td>
<td>6.50±0.58</td>
<td>0.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>3.75±1.50</td>
<td>5.00±1.73</td>
<td>0.260</td>
<td>0.420</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>3.75±1.26</td>
<td>3.75±0.96</td>
<td>0.562</td>
<td>0.134</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>3.75±0.96</td>
<td>4.25±0.96</td>
<td>0.852</td>
<td>0.168</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>2.25±0.50</td>
<td>2.75±0.96</td>
<td>0.333</td>
<td>0.267</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td>mucus in gill</td>
<td>day0</td>
<td>6.50±0.58</td>
<td>6.5±0.58</td>
<td>0.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day7</td>
<td>4.00±1.41</td>
<td>5.50±1.73</td>
<td>0.342</td>
<td>0.267</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day14</td>
<td>3.50±1.00</td>
<td>3.75±0.50</td>
<td>0.447</td>
<td>0.228</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day21</td>
<td>4.00±0.82</td>
<td>4.50±0.58</td>
<td>1.000</td>
<td>1.000</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>day28</td>
<td>3.00±0.82</td>
<td>3.75±1.26</td>
<td>0.333</td>
<td>0.458</td>
<td>p &gt; 0.05</td>
</tr>
</tbody>
</table>

* Unacceptable (1), Very Bad (2), Bad (3), Acceptable (4), Good (5), Very Good (6) And Excellent (7).
4- Quantity of melting ice
Results of this study showed that the quantity of ice had inverse effect with melting ice; the melting ice in the ratio of 1:1 was more than in the ratio 1:2. Figure (1) showed the relation between quantity of ice and melting ice.

![Graph showing the relation between quantity of ice and melting ice at temperature 31°C.](image)

**Fig1. Quantity of melting ice respected to different ice ratios at temperature 31°C.**

Discussion
Chemical analyses, bacteriological assessment and sensory evaluation related to quality loss were investigated in this study. No significant spoilage differences revealed between ‘fish to ice’ ratios during the preservation period in chemical composition. The different ice ratios was only clear in acidity at day 21 and 28 of the storage period, with high value in ratio (1:1); which may be related to the change in Glycolysis by the tissue enzymes and production of lactic acid (Jones, 1963). The results were agreed with Martinsd et al (2002) who found that no significant spoilage differences were observed between the two methods of icing in the case of warm-water fish.

Except for pH and moisture in both chilling methods, other parameters of the chemical composition showed decrease with increase the in preservation period, which agreed with the results reported by Yagoub...
(2005); and Arannilewal et al (2005) who recorded decrease in protein and fat contents with increasing duration of preservation. Bacteriological test seldom used for acceptance or rejection of fish because of the time required to obtain the results, however it is useful as an indicator of the effectiveness of hygienic procedures (Huss et al., 1974). Total viable counts have been found to be very poor indicator of both quality and remaining shelf life of chilled fish (Huss et al., 1974); but logical use bacterial number as an index of fish quality because bacterial growth is the main cause of fish spoilage (Adamand and Samia, 2011). This study showed that ‘fish to ice’ ratio of (1:1), showed the highest microbial count, and that total microbiological count increased with chilling period from 5x10³ in some fresh samples to 5.1 x10⁴ at the end of preservation in both chilling ratios. That they are within the acceptable ranges of the specified microbiological limits and recommended for fish and fishery products according to the International Commission on Microbiological Specification for Food (ICMSF, 1988) cited in (Connell, 1995) that the maximum recommended bacterial count for good quality fish product is (5x10⁵). Huss (1995) mentioned that when a healthy fish is caught the flesh is sterile, as its immune system prevents bacteria to proliferate easily; whereas after death the fish immune system collapses allowing easy access of microorganisms into the flesh. Alfred (1998) reported that many bacteria are unable to grow at temperatures below 10°C and even cold–tolerant bacteria grow slowly and sometimes with extended lag phases when temperature approach 0°C. This result agree with Arannilewal et al (2005) and Ames et al. (1991), but less than which was found by Ahmed (2007) who reported that the total viable count of bacteria of fresh catfish was 3.7x10⁵ cfu\g. The study showed that there was no Salmonella spp, Staphylococcus spp and Vibrio spp in both icing conditions, but E.coli was detected at the day 21, in samples of the batch preserved in ratio of (1:1). This bacterial species was in seawater near the shore (Abdalla, 2006). Huss (1994) recorded that E.coli and fecal Coli form bacteria can be found in unpolluted warm tropical water. Falco et al. (2002) found E.coli in ice used in fish markets that contaminated or polluted by natural water where these microorganisms may survive (Liston, 1991). They clearly stated that significant decrease in the growth of this bacterial group in fish muscle preserved in ratio of (1:2). The delay in the appearance of E.coli in the batch stored in ratio of (1:2) may be attributed to differences in the bacterial growth rates with a 1-2 week slow growth phase or to a period of adaptation to chilling.
temperatures in tropical fish stored in ice (Shawyer and Pizzali, 2003). It is concluded that the application of ratio 1:2 slowed down the growth of *E. coli* and total viable bacterial count. In sensory evaluation of chilled fishes, the scores assigned to each batch, at each sampling time were determined by consensus among the specialists according to the results of the sensory analyses (Table 3a, 3b and 3c). The study showed no significant differences in the sensory characteristics due to “fish to ice” ratios during the preservation period, but the main negative aspect related to quality loss in the ratio of (1:1) group. Corresponded to the appearance of slime, smell, color of eye, color of gill and pressed parameters that obtained best scores of skin and scales, firmness of flesh and form of eye, which were judged to maintain acceptable rates. The significant effect in firmness of flesh may be due to the pressed from ice in the end of preservation. The simple change in the quality started to appear at day 14 and by day 28 fish became no longer acceptable in both icing ratios. This agrees with Connell (1995) and Surti *et al.* (2001) who reported that the shelf life of Grouper stored in ice was 18 days at tropical temperature. This was due to bacterial and enzymatic change that breaks down the constituents of complex structure of fish lipids which are characterized by a high degree of instauration; which is susceptible to oxidation forming hydroperoxides, odorous compounds of low molecular weight, polymerized product and rancid odours and flavours (Jones, 1962 and 1963). Textural changes result from protein reaction as loss of biological value (Carpenter and Lea, 1962). This study showed that both ratio of (1:1) and (1:2) maintain lower temperature in fish during the storage days. This is clearly explained by the lower initial temperature of the cooling medium in these two cases. However, the ice in the (1:1) ratio melts faster than in the ratio of (1:2) resulting in higher temperature for the ratio of (1:1). This was in agreement with (Bjorn. (and Sigurjon, 2007
Reference
Bjorn, M. and Sigurjon, A. M. o. (2007). Comparison Between Different Ice Media For Chilling Fresh Fish / University of Iceland, Borgartun 21, 105 Reykjavik, ICELAND.
Falco, J. P.; Dias, A. M. G.; Correa, E. F. and Falco, D. P. (2002). Microbiological Quality of Ice Used to Refrigerate Foods. Department of
Biological Science. Faculty of Science. Farmaceuticas UNESP, Rodovia, Araraguara.
Quality Changes in Marine Fish (Plectropomus areolatus) During Preservation In Different Rates of Ice

Hala Gindeel Abu Bakr Ahmadoon


المستخلص:
أجريت هذه الدراسة لمعرفة تأثير نسبة الثلج في جودة الأسماك البحرية المبردة أثناء فترة الحفظ. استخدم سمكة الناجل السليماني Plectropomus areolatus (من أسماك الدرجة الأولى) ووضعت الأسماك في نسب مختلفة من الثلج وحفظت داخل صناديق الثلج المصنوعة من الفايبرغلاس إلى حين ظهور معالم الفساد. تمت دراسة المكونات الكيميائية والتغيرات الميكروبيولوجية والصفات الحسية للأسماك، وهي طازجة (p<0.05). أظهر اختلاف نسبة الثلج تأثير معنوي (p<0.05) على الحموضة فقط وكانت أعلى قيمة لها في نسبة الثلج 2:1، بينما كانت أدنى قيمة للحموضة كانت في نسبة الثلج 1:1. أوضحت الدراسة أن كل المكونات الكيميائية قد تناقصت عدا الأس الهيدروجيني والرطوبة للعينات في نسبة الثلج أثناء فترة الحفظ. أوضحت الدراسة خلو كل العينات من باكتريا السالمونيلا و استافيلوكوكس Salomonella spp واستافيلوكوكس و استافيلوكوكس Vibrio spp والكولاي Coli form Spp التي ظهرت منذ اليوم 11 في الأسماك المحفوظة في نسبة الثلج 1:1. وتزايدت الأعداد الميكروبيولوجية مع زيادة فترة الحفظ مما كان التلقى اظهراً في نسبة الثلج 1:1. أوضحت الاختبارات الحسية التي تمت على العينات أنه لم يكون لاختلاف كمية النحل تأثيراً معنويًا (p<0.05) على الصفات الحسية ماعدا في تماسك اللحم. وكانت النتائج الحسية أقل في نسبة الثلج 2:1. كانت الأسماك المحفوظة جيدة حتى اليوم الرابع عشر وبدا التدهور مع مرور فترة الحفظ حتى اليوم الحادي والعشرين وعند اليوم الثامن والعشرون كانت الأسماك في نسبتي الثلج مرفوضة.
An investigation into the differences between English and Arabic position and order of adjectives: A contrastive study with pedagogical implications

Walid Mohammed Amer *

Abstract
Lots of studies have been done on the position and order of adjectives in English. However, as far as my knowledge is concerned, no analytical and contrastive study has been conducted on this point in English and Arabic. Thus, this paper reviews the latest studies done on the position and order of adjectives in English and Arabic. Then, it describes the differences between the position and order of adjectives in both languages. The study also touches upon pedagogical implications for teaching adjectives in English. Here, it is believed that the Arab learners of English encounter great difficulty in constructing sentences involving a number of adjectives. One of the most prominent causes of making errors found in this area is assumed to be the linguistic differences between the adjective position and order in English and Arabic. To prove this assumption, the researcher applied his study on the IUG freshman students majoring in English to test their perception of the position and order of English adjectives and to shed light on the areas of difficulty that students encounter when using English adjectives. The paper focuses on the errors most students commit concerning the position and order of English adjectives and ends with recording some recommendation for solving this pedagogical problem.

* Associate Professor of linguistics, Islamic University of Gaza.
1. Introduction
The English learning-teaching process aims at having the speakers who can communicate effectively using English. Therefore, the first duty is to find the fastest shortcuts to determine the problematic issues in learning such a language and find quick solutions for them.

One of the most problematic issues facing IUG freshman students majoring in English is the mastery of the position and order of English adjectives. These students encounter great difficulty in constructing sentences involving a number of adjectives. One of the most prominent causes of making errors in this area is assumed to be the linguistic differences between the adjective position and order in English and Arabic.

To prove this assumption the study investigates the IUG freshman students’ perception of the position and order of English adjectives. It attempts to shed light on the areas of difficulty that such students encounter in using such English adjectives.

After introducing the topic, the paper highlights the purpose of study, research questions, research hypothesis, and limitations of the study. (Sec.1). (Sec2) refers to literature review; it summarizes some of the works done in the field of position and order of English adjectives.

The theoretical framework is then described (Sec.3). After then the study shifts to describing the position and order of adjectives in English (sec. 4). Then it touches the position and order of adjectives in Arabic (sec 5). (Sec 6) discusses the methodology to be adopted in this study, along with results and analysis. (Sec 7) is left for summary remarks and recommendations.

1.2 Purpose of the study
This study aims at
Investigating the IUG freshman students’ perception of the position and order of English adjectives.

1. Attempting to shed light on the areas of difficulty that students encounter regarding the use of English adjectives.
2. Identifying the type of errors students commit concerning the position and order of English adjectives.
3. Giving some recommendations that may help to reduce errors committed when using English adjectives.

1.3. Research question
To what extent do the Islamic university freshman students majoring in English perceive the correct position and order of English adjectives?

1.4. Research hypothesis
The Islamic university freshman students’ perception of the correct position and order of English adjectives is very limited.
1.5. Limitations of the study
The study is limited to the following:
1. This study is interested in the position and order of English adjectives only.
2. This study is applied upon 65 female Islamic university freshman students majoring in English.
3. The study was applied in the summer term of the academic year 2010-2011.

2. Literature review
A few studies were conducted in the position and order of adjectives. Thus the researcher managed to review two previous studies which focus on adjective order.

2.1. David Kemmerer et al. (2008)
This study aims at investigating the neutral substrates of the semantic constraints of multiple adjectives order that are used to modify a noun. The researcher administered three tests on 34 brain-damaged patients and 19 healthy participants.
Six patients failed a test that required them to discriminate between semantically determined correct and incorrect sequences of adjectives e.g., thick blue towel vs. *blue thick towel but they passed a test that assessed their knowledge of two purely syntactic aspects of adjective order, specifically, that adjectives can precede nouns, and that adjectives can precede other adjectives. Moreover, they also passed a test that assessed their knowledge of the categorical (i.e., class-level) features of adjective meanings that interact with the semantic constraints underlying adjective order - e.g., that thick is a dimensional adjective and that blue is a color adjective. These behavioral findings suggest that the six patients have selectively impaired knowledge of the abstract principles that determine how different semantic classes of adjectives are typically mapped onto different syntactic positions in NPs.

This study tests how children learn to use many adult-like grammatical rules in the preschool years. The researcher argued that children make the biggest strides in learning to use many adult-like grammatical rules in the preschool years. This argument is based on how children use novel verbs in verb clauses: many English speaking 2-year olds are willing to use novel verbs in ungrammatical order; by four, few children are willing to use novel verbs in a non-SVO order. In verb clauses, the word order determines the semantic/syntactic role (e.g., subject). By focusing on verbs, researchers have failed to take into account that children might also be learning how meaning and semantic/syntactic function are related. To test this interpretation, novel adjectives are taught to 35 monolingual English-speaking children between 2 and 4 years old, either in a prenominal or
postnominal position. Results showed that, children were more likely to reverse the order of novel postnominal adjectives, even 4-year olds used the new adjectives in the order they were modeled more than half the time. The results of this study suggest that during the preschool years, children are learning to map word order onto semantic/syntactic function.

3. Theoretical framework
In studying adjectives in English and Arabic, this study will adopt Contrastive Analysis (CA) Or Contrastive Linguistics approach as a theoretical framework. This describes similarities and differences among two or more languages at various linguistic levels. “This approach was developed and practiced in the 1950s and 1960s as application of structural linguistics to language teaching” (Richards, Platt & Platt, 1992, p. 83).

In the late 1950s, Robert Lado proposed contrastive analysis as a means of identifying areas of difficulty for language learners, although already in 1945 Charles Fries had formulated the theory.

The study here applies this theoretical framework to discover areas of difficulties that result mostly from the asymmetries between the adjective position and order in both English and Arabic.

4. Adjectives in English
Definition of adjective
The adjective can be defined as «a word that modifies, or qualifies, a noun or pronoun, in one of three forms of comparative degree: positive (Strong, beautiful), comparative (stronger, more beautiful), or superlative (strongest, most beautiful).

It is also described as “... a word whose main syntactic role is to modify a noun or pronoun, giving more information about the noun or pronoun’s definition. Collectively, adjectives form one of the traditional English eight parts of speech, though linguists today distinguish adjectives from words such as determiners that also used to be considered adjectives. Wikipedia

Consequently, the main role of the adjective is to add some quality to a noun or pronoun to distinguish it from others. Meetu (2009, NA) states:

For better understanding let us break the word Adjective as ‘Ad+ject; i.e., adds to the subject’. So it can be said that words that add to the subject are known as adjectives. Adjectives are words that modify, and add more meaning to the noun or the pronoun. E.g.: lazy girl. (What kind of girl is Rania? The answer is lazy. The word ‘lazy’ is an adjective as it gives more information about the noun Rania.) The naughty boy was punished. (Which boy was punished? The answer is naughty. The word ‘naughty’ is an adjective.)
To introduce more about adjectives let us consider some examples about adjectives quoted from MacFadyen (NA):

- e.g. large towers could be seen from long distance.
- The fish-shaped balloon floated over the treetops.
- The back room was filled with large, yellow rain boots.
- The girls are happy.

In the preceding examples, the adjectives large, long, fish-shaped and large, yellow modify the nouns towers, balloon and rain boots successively. Whereas the adjective dark, dank and happy modify the nouns mines and girl.

It is worth noting that adjectives can be formed from two or more words combined by the use of hyphens.

- e.g. the three-year-old child
- a sixty-dollar sweater.
- a two-week journey.

As illustrated in these examples, the nouns in such hyphenated expressions are generally in the singular. Thus, the singular forms of the nouns year, dollar and week are used. (cf Amer 2011 for more details).

Most English adjectives have the same form for the singular as for the plural. The only exceptions are the demonstrative adjectives this and that.

4.1 Position of adjectives
According to Swan (2005) and Meetu (2009), most adjectives can go in two main places in a sentence.

1/ Attributive adjectives: When an adjective is used before the noun it is said to be used attributively.

- The new secretary is a Bsc. holder.
- The tall men are basket ball players.

2/ Predicative adjectives: When an adjective is used after the verbs ‘be, seem, look, become and other ‘link verbs’” and is a part of the predicate, it is said to be used predicatively.

- She is afraid of ghosts
- That dress is new, isn’t it?
- She looks rich. I feel unhappy.

However, there are some exceptions that let adjectives not follow the main grammatical rules. Here are some of these exceptions that Swan (2005, 9-10) mentions:

- Adjectives come immediately after nouns in a few special cases.

**Fixed phrases**

Adjectives come after nouns in some fixed phrases.

- Secretary General, President elect, court martial (= military court) God Almighty!
- Poet Laureate, Attorney General
- The Secretary General of the United Nations has called for new peace talks.

**Available, possible etc.**

Some adjectives can be used after nouns in a similar way to relative clauses.

This is common with adjectives ending in -able-ible.
Send all the tickets available, available tickets.
(= ... tickets which are available.)
It’s the only solution possible, possible solution.

**Something, everything etc**
Adjectives come after something, everything, anything, nothing, somebody, anywhere and similar words.
Have you read anything interesting lately?
Let’s go somewhere quiet.

**Present, proper**
Before a noun, present refers to time; after a noun it means ‘here/there’, ‘not absent’. Compare:
the present members (= those who are members now)
the members present (= those who are/were at the meeting)
Before a noun, proper means ‘real’, ‘genuine’. After a noun it refers to the central or main part of something. Compare: Snowdon’s a proper mountain, not a hill.

**4.2 Types of adjectives**
Linguists used to classify adjectives into different types. Meetu (2009) mentions some of these types as follows:

**4.2.1. Proper adjectives**
Proper adjectives are adjectives derived from proper nouns. In English, proper adjectives must begin with a capital letter. The proper adjectives in the following sentences are underlined.
e.g. Jerusalem the Palestinian capital has an interesting history.
Many of my friends are Norwegians.
This house is a fine example of Islamic architecture.
The derivation of some proper adjectives from proper nouns is somewhat irregular. The spelling of the following proper nouns and proper adjectives is a case in point.

<table>
<thead>
<tr>
<th>Proper Noun</th>
<th>Proper Adjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>America</td>
<td>American</td>
</tr>
<tr>
<td>China</td>
<td>Chinese</td>
</tr>
<tr>
<td>Germany</td>
<td>German</td>
</tr>
<tr>
<td>Mexico</td>
<td>Mexican</td>
</tr>
<tr>
<td>George</td>
<td>Georgian</td>
</tr>
<tr>
<td>England</td>
<td>English</td>
</tr>
</tbody>
</table>
4.2.2 Attributive adjectives
As mentioned earlier, the adjective which precedes the noun it modifies is usually referred to as attributive adjective. Attributive adjectives are of various types. Consider:

4.2.2.1 Adjectives of Quality
Adjectives of quality refer to a quality of the subject.
Egypt is a beautiful country.
She is a tall girl.

4.2.2.2 Adjectives of Quantity
Quantitative Adjectives answer the question how much?
He is a little stupid.
I had some tea.

4.2.2.3 Adjectives of Number
As the name implies, Adjectives of number denote numbers. They can be:
- **Definitive Numeral Adjectives**: Used to denote exact numbers.
  Give me five pencils.
  I have one pencil with me.
- **Indefinite Numeral Adjectives**: Do not denote a specific number.
  Give me some pens.
Several students attended the meeting.
- **Distributive Numeral Adjectives**: Distributive Adjectives refer to each one of a number. Words like each, every, either and neither fall in this category.
  1. Each of the students is to pay a fine.
  2. Our country expects every man to do his duty.
  3. Each student must take his turn.
  4. Every boy, girl, man, and woman was enjoying the fine weather.
  5. Neither side was secured.
  6. Mohammed wanted everyone to do his duty honestly & efficiently.
  7. Either reference will meet my need.

4.2.2.4 Demonstrative Adjectives
Demonstrative Adjectives point at a specific person or thing.
This boy is my brother. (Which boy?)
These fruits are spoiled.

4.2.2.5 Interrogative Adjectives
When words like what, which, whose are used with nouns to ask questions; they are known as Interrogative Adjectives.
Whose car is this?
Which lecture did you attend?

4.2.2.5 Possessive Adjectives
A possessive adjective (“my,” “your,” “his,” “her,” “its,” “our,” “their”) is similar or identical to a possessive pronoun; however, it is used as an adjective and modifies a noun or a noun phrase, as in the following sentences:
I can’t complete my assignment because I don’t have the textbook.
What is your aim?

One can use multiple adjectives on one subject, using commas. For example:
- The white, hungry cat ate the cheese.
- The bike is red, slow and very old.
When using adjectives after the subject, with less than three adjectives, “and” is used to join these multiple...
adjectives. For anything above two, one uses commas. Consider:
• Alistair is cool, funny, intelligent and smart.
• Mary is silly and annoying

4.2.6. Distributive Numeral Adjectives: These adjectives refer to each one of a number. For example:
1. Each student must take his turn.
2. Every boy, girl, man, and woman was enjoying the fine weather in the rainy season.
3. Neither side was safe.
4. the leader wanted every soldier to do his duty honestly and efficiently.
5. Either book will solve my purpose.
• A participial adjective is one that has the form of a participle, but differs from it by rejecting the idea of time; as, “An amusing story,” “A lying divination”
• A compound adjective is one that consists of two or more words joined together, either by the hyphen or solidly: as, nut-brown, laughter-loving, four-footed; threefold, lardlike, lovesick.

Furthermore, the following are further classifications of adjectives:
- Cardinal; One, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty, twenty-one, twenty-two, &c.
- Ordinal; First, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth, thirteenth, fourteenth, fifteenth, sixteenth, seventeenth, eighteenth, nineteenth, twentieth, twenty-first, twenty-second, &c.

- Multiplicative; Single or alone, double or twofold, triple or threefold, quadruple or fourfold, quintuple or fivefold, sextuple or sixfold, septimele or sevenfold, octuple or eightfold, &c. But high terms of this series are seldom used. All that occur above decuple or tenfold, are written with a hyphen, and are usually of round numbers only; as, thirty-fold, sixty-fold, hundred-fold.

4.2 Order of adjectives
In many languages, attributive adjectives usually occur in a specific order; for example, in English, adjectives pertaining to size generally precede adjectives pertaining to age (“little old”, not “old little”), which in turn generally precede adjectives pertaining to colour (“old green”, not “green old”). This order may be more rigid in some languages than others; in some, [as Arabic] it may only be a default (unmarked) word order, with other orders being permissible to shift the emphasis. (Wikipedia).
Swan (2005, 11) states that there is not specific and agreeable criteria for ordering a cluster of attributive adjectives. “When several adjectives come before a noun, they usually have to be put in a particular order.
The rules for adjective order are very complicated, and different grammars disagree about the details.” Wikipedia (internet) adds that “English has no official order for attributive adjectives, but English students are often taught the mnemonic OSASCOMP, which stands for Opinion, Size, Age, Shape, Color, Origin, Material, Purpose. (Wikipedia)

The order of predicate adjectives relative to one another is generally the same as the order of attributive adjectives relative to one another. The following examples illustrate the order of predicate adjectives.

e.g. The package is small and light.

The weather is clear, cold and dry.

The footstool is round and black.

In the first example, the adjective small, indicating size, precedes the adjective light, indicating weight. In the second example, the general descriptive adjective clear precedes the adjective cold, indicating temperature, which precedes the adjective dry, indicating humidity. In the third example, the adjective round, indicating shape, precedes the adjective black, indicating color.

**Punctuation**

As can be seen in these examples, the last two adjectives in a list of predicate adjectives are usually separated from each other by the word *and*, and any preceding adjectives are usually separated from one another by commas.

e.g. The clothes were clean and dry.
The dancers were tall, slender and graceful.

In a list of three or more predicate adjectives, an additional comma is sometimes placed before the word *and*.

e.g. The dancers were tall, slender, and graceful.

However, this additional comma is usually considered unnecessary.

**b. Adjectives which can be used only as predicate adjectives**

The following are examples of adjectives with the prefix *(a)* which can be used only as predicate adjectives, not as attributive adjectives. The prefix *(a)* was formerly a preposition meaning *(on)*.

Adjectives used only Predicatively

afloat
afraid
aglow
alive
alone
asleep

In some cases, related words can be used as attributive adjectives. In the following examples, words used only as predicate adjectives and related words used as attributive adjectives are underlined.
As illustrated below, the words **here**, **there** and **ready** can be used as predicate adjectives.

**e.g.** The children are **here**.

The records were **there**.

I am **ready**.

The words **here** and **there** are often used as adverbs, and cannot be used as attributive adjectives. The word **ready** is used as an attributive adjective only in certain expressions such as **ready money** and a **ready answer**.

As illustrated in the following examples, a few adjectives differ in meaning, depending upon whether they are used as predicate adjectives or attributive adjectives.

**e.g.** The treasurer was **present**.

- the **present** treasurer
- Robin Harris was **late**.
- the **late** Robin Harris
- My friend is **poor**.
- my **poor** friend

In the sentence **the treasurer was present**, the predicate adjective **present** indicates that the treasurer was not absent. However, in the phrase **the present treasurer**, the attributive adjective **present** indicates that the person referred to holds the position of treasurer at the present time.

In the sentence **Robin Harris was late**, the predicate adjective **late** indicates that Robin Harris did not arrive on time. However, in the phrase **the late Robin Harris**, the attributive adjective **late** indicates that Robin Harris is no longer alive.

In the sentence **my friend is poor**, the predicate adjective **poor** indicates that my friend has little money. However, in the phrase **my poor friend**, the attributive adjective **poor** indicates that my friend is in an unfortunate situation.

**c. Linking verbs**

In addition to the verb **to be**, certain other verbs can be followed by predicate adjectives. Such verbs are sometimes referred to as **linking verbs**, since they can link nouns or pronouns to modifying adjectives.

For instance, the following verbs can be used as linking verbs.
In the above examples, the linking verbs link noun subjects with predicate adjectives.

When a verb is used as a linking verb, it is intransitive, since it does not take an object. It should be noted that many of the verbs listed above can also be used transitively.

\[ \text{e.g.} \ \text{The child felt the blankets.} \]
\[ \text{We smelled the soup.} \]

In these examples, the verbs to feel and to smell are used transitively, taking the objects blankets and soup respectively.

### 4. Interpolated adjectives

As well as being used as attributive or predicate adjectives, general descriptive adjectives and adjectives indicating color can also be placed elsewhere in a sentence. When used in this way, adjectives can be said to be interpolated into a sentence.

In the following sentences, the interpolated adjectives are underlined.

\[ \text{e.g.} \ \text{The child, happy and excited, ran along the beach.} \]
\[ \text{Startled, the small yellow bird stopped singing.} \]
\[ \text{Tense, expectant and alert, we waited to see what would happen.} \]

Since the use of interpolated adjectives is somewhat uncommon, the use of interpolation can serve to emphasize the adjectives.

Interpolated adjectives are most often placed immediately after a noun, as shown in the first example; or before a noun or pronoun at the beginning of a sentence, as shown in the second and third examples.

As illustrated above, a noun can be modified simultaneously by both interpolated and attributive adjectives. For instance, in the second example, the noun bird is modified by both the interpolated adjective startled and the attributive adjectives the small yellow.

Care must be taken in the positioning of interpolated adjectives, since the reader or listener will usually assume that the adjectives modify the nearest noun or pronoun.
As can be seen from the examples, the punctuation of interpolated adjectives is similar to that of predicate adjectives. When more than one adjective is used, the last two adjectives are separated from one another by the word and, and previous adjectives are separated from one another by commas. However, unlike predicate adjectives, interpolated adjectives must also be separated from the rest of the sentence by commas. For instance, in the first example above, the interpolated adjectives happy and excited are separated from the rest of the sentence by a comma before the word happy, and a comma following the word excited. Likewise, in the second example, the interpolated adjective startled is separated from the rest of the sentence by a comma; and in the third example, the interpolated adjectives tense, expectant and alert are separated from the rest of the sentence by a comma following the word alert.

Interpolated adjectives are used more often in written English than in spoken English.

5. Adjectival phrases and clauses

Nouns and pronouns can be modified not only by adjectives, but also by adjectival phrases and clauses. In the following examples, the adjectival phrases and clauses are underlined.

e.g. The table near the door is made of oak.

The one on the desk is mine.

The chair, which was placed in front of the window, was an heirloom.

Those who decide to come will not be disappointed.

In the first example, the noun table is modified by the adjectival phrase near the door. In the second example, the pronoun one is modified by the adjectival phrase on the desk. In the third example, the noun chair is modified by the adjectival clause which was placed in front of the window. In the fourth example, the pronoun those is modified by the adjectival clause who decide to come.

It should be noted that phrases do not contain verbs, whereas clauses do contain verbs. Phrases and clauses will be discussed further in the chapters dealing with prepositions and conjunctions. As illustrated in the preceding examples, an adjectival phrase or clause usually immediately follows the noun or pronoun being modified.

6. Participles used as adjectives

As has already been mentioned, present and past participles of verbs can be used as adjectives.

a. Present participles

Present participles used as adjectives refer to actions being performed by the things being described. In the following examples the present participles used as adjectives are underlined.

The chair, which was placed in front of the window, was an heirloom.

Those who decide to come will not be disappointed.

In the first example, the noun table is modified by the adjectival phrase near the door. In the second example, the pronoun one is modified by the adjectival phrase on the desk. In the third example, the noun chair is modified by the adjectival clause which was placed in front of the window. In the fourth example, the pronoun those is modified by the adjectival clause who decide to come.

It should be noted that phrases do not contain verbs, whereas clauses do contain verbs. Phrases and clauses will be discussed further in the chapters dealing with prepositions and conjunctions. As illustrated in the preceding examples, an adjectival phrase or clause usually immediately follows the noun or pronoun being modified.
e.g. the falling star
   the barking dog
The first example indicates that
the star is performing the action of
falling. The second example indicates
that the dog is performing the action
of barking.

b. Past participles
Past participles used as adjectives
refer to actions which have been
performed on the things being
described. In the following examples,
the past participles used as adjectives
are underlined.
e.g. the scattered leaves
   the broken drum
The first example indicates that
something has scattered the leaves.
The second example indicates that
something has broken the drum.

c. Dangling participles
As well as being used as attributive
and predicate adjectives, past and
present participles can also be used
at the beginning of adjectival phrases
interpolated into a sentence. In the
following sentences, the interpolated
adjectival phrases are underlined.
e.g. Feeling hungry, the child ate an
   apple.
Disconcerted by the news, we
headed for the nearest farmhouse.
In the first example, the present
participle feeling begins the
adjectival phrase feeling hungry,
which modifies the noun child. In the
second example, the past participle
disconcerted begins the adjectival
phrase disconcerted by the news,
which modifies the pronoun we.
Since the listener or reader tends to
assume that an interpolated adjectival
phrase is meant to modify the nearest
noun or pronoun, care must be taken
to make sure that such a phrase is positioned close to the noun or
pronoun to be modified.
A participle that begins and interpolated
phrase that is not sufficiently close to
the noun or pronoun to be modified
is usually referred to as a dangling
participle. Dangling participles can
result in ambiguity, or in sentences
which do not make sense.
In the following sentences, the phrases
beginning with dangling participles
are underlined.
e.g. The photographer focused the
   camera, holding his breath.
   Running across the road, his hat
   blew off.
In the first example, the noun to be
modified is photographer. However,
the phrase holding his breath
is separated from the noun to be
modified by the noun camera. Thus,
the phrase holding his breath seems
to modify the noun camera. In the
second example, the noun or pronoun
to be modified is missing from the
sentence, and the phrase running
across the road seems to modify the
noun hat.
These example illustrate two basic types of dangling participle. In one type, the participle begins an adjectival phrase which is separated from the noun or pronoun to be modified by another noun or pronoun. In the other type, the participle begins an adjectival phrase that is meant to modify a noun or pronoun which in fact is not present in the sentence.

When an adjectival phrase is separated from the noun or pronoun to be modified by another noun or pronoun, the sentence can be corrected by positioning the adjectival phrase next to the noun or pronoun to be modified. This can often be accomplished by moving the phrase from one end of the sentence to the other.

For instance, in the sentences below, the nouns to be modified and the phrases containing dangling participles are underlined.

e.g. The photographer focused the camera, holding his breath.

  Working as quickly as possible, our car was repaired by a mechanic.

  Lost for over thirty years, she was overjoyed to find the diaries.

In these examples, holding his breath seems to modify the noun camera, working as quickly as possible seems to modify the noun car, and lost for over thirty years seems to modify the pronoun she.

These sentences can be corrected as follows.

e.g. Holding his breath, the photographer focused the camera.

Our car was repaired by a mechanic, working as quickly as possible.

She was overjoyed to find the diaries, lost for over thirty years.

In the corrected sentences, the adjectival phrases are correctly positioned near the nouns to be modified.

When an adjectival phrase is meant to modify a noun or pronoun which in fact is not present in the sentence, the sentence can be corrected by rewriting either the adjectival phrase or the rest of the sentence, so that the missing noun or pronoun is supplied.

For instance, in the sentences below, the phrases containing dangling participles are underlined.

e.g. Running across the road, his hat blew off.

  Sitting lost in thought, the book slipped from her hand.

  Determined not to be late, our watches were set ten minutes fast.

These sentences can be corrected as follows. In the corrected sentences, the noun or pronoun which was missing from the original sentence is underlined.

Two corrected versions are given for each of the preceding sentences.

e.g. As he ran across the road, his hat blew off.

  Running across the road, he lost his hat.

  As she sat lost in thought, the book slipped from her hand.

  Sitting lost in thought, she let the book slip from her hand.
Because we were determined not to be late, our watches were set ten minutes fast.

Determined not to be late, we set our watches ten minutes fast.

In the first corrected version of each of the preceding sentences, the adjectival phrase has been changed to an adjectival clause containing the pronoun which was missing from the original sentence. Thus, the interpolated phrase running across the road has been changed to the subordinate clause as he ran across the road, the interpolated phrase sitting lost in thought has been changed to the subordinate clause as she sat lost in thought, and the interpolated phrase determined not to be late has been changed to the subordinate clause because we were determined not to be late.

In the second corrected version of each of the sentences, the main clause of the sentence has been rewritten so that the pronoun which was missing from the original sentence is positioned next to the adjectival phrase which is meant to modify the pronoun. Thus, whereas in the incorrect sentences, the underlined adjectival phrases seem to modify the adjacent nouns hat, book and watches; in the corrected sentences, the adjectival phrases correctly modify the pronouns he, she and we.

Following the description of adjective order above let’s now summarizes the most important rules for ordering a series of adjectives:

Swan (2005, 11) mentions the most important rules for ordering a series of adjectives:

1 description before classification

an old linguistic idea
the latest educational syllabus
A yellow juice bottle
plastic swimming pool

2 opinion before description: a wonderful old house

Words which express opinions, attitudes and judgments usually come before words that simply describe. Examples are lovely, definite, pure, absolute, extreme, perfect, wonderful, silly.

A lovely hot drink
A wonderful old castle
beautiful green gardens
that silly thin boy
3 order of descriptive words
The order of descriptive words is not completely fixed. Words for origin and material usually come last. Words for size, age, shape and colour often come in that order.

<table>
<thead>
<tr>
<th>size</th>
<th>age</th>
<th>shape</th>
<th>colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>thin</td>
<td>old</td>
<td></td>
<td>white</td>
</tr>
<tr>
<td>big</td>
<td>new</td>
<td>round</td>
<td>grey</td>
</tr>
</tbody>
</table>

A thin old white caw
A big new grey British woolen sweater
A big round black leather suitcase
An enormous brown Italian glass mug
A little modern square brick building

4 numbers
Numbers usually go before adjectives.

six large eggs  the second big shock
First, next and last most often go before one, two, three etc.
the first three days (More common than the three first days)

5. Arabic Adjectives
1. Arabic adjectives agree with the noun they postmodify in gender, number, case and definiteness/indefiniteness.
Consider:
2. indefinite, nominative, masculine: a big man - (rajulun Taweelun)
   - indefinite, nominative, masculine: The tall man - (ar-rajul-u T-Taweel-u)
   - indefinite, nominative, feminine: a big queen - (malikatun 'adelatun)
   - definite, nominative, masculine: The tall man - (al-rajul-u T-Taweel-u)
   - indefinite, nominative, feminine: a big queen - (malikatun 'adelatun)

Here, it appears that the definite article is used with both the noun and adjective, or nunation is used with both.

The feminine singular form of an adjective is usually formed by adding the clitic a ta-marbuta (ة) to the masculine form.

As mentioned earlier, the adjective agrees with the noun in gender, number case and determination. This is however not the case when it comes to plural nouns which refer to non-persons. In this case the adjective is placed in its feminine singular form!

consider the following examples in nominative case, the first two phrases refer to non-persons and use the singular feminine form of the adjective, the second two refer to persons so they use the plural form agreeing with the gender of the noun (the masculine plural form of kabeer is kibar, the feminine plural form is kabeeratun.

Indefinite, non-person: big books - (kutubun kabeeratun)
Definite, non-person: The big books - (al-kutubu l-kabeeratu)

Indefinite, person, masculine: big men - (rijālun kibārun)
Definite, person, masculine: The
big men - (ar-rijālu l-kibāru) رجال الكبار
Indefinite, person, feminine:
big girls - (banātun kabeerātun) بنات كبيرات
Definite, person, feminine: The big girls - (al-banātu l-kabeerātu) الكبار البنات

Just like Spanish and German, Arabic has masculine and feminine adjective forms; we learned earlier how to form the feminine from masculine in nouns, same steps will be taken to form feminine adjectives too. Colors and most adjectives starting with “ا” “أ” for example take in most cases a different form, which is represented in this model word ₊ (cvccvv ؟ا??aa’), the steps to model our feminine irregular adjective is: extract the consonants from the masculine adjective and place them respectively in the place of the question marks, here are some examples:

Blue azraq (masculine) zrq (raw consonants) (cvccvv ؟ا??aa’) raw model zarqa’ زرقاء (after replacing the ؟؟ with the consonants)
Dumb abkam (masculine) bkm (raw consonants) (cvccvv ؟a??aa’) raw model bakmaa’ بكماء (after replacing the ؟؟ with the consonants)

**Dual Adjectives in Arabic**

To form a dual masculine adjective in Arabic we simply add “aan” “ان” to the end of the adjective, note that you can do that even with adjectives starting with “ا” “أ”.

Big kabeer (masculine singular)
Big kabeeraan (masculine dual)
Blue azraq (masculine singular)
Blue azraqaan (masculine dual)

To form a dual feminine adjective add “ataan” “تان” to the masculine adjective:
Big kabeer (masculine singular)
Big kabeerataan (feminine dual)

For adjectives starting with “ا” “أ” the dual feminine will take the ؟ا??awataan form, by replacing the question marks with our consonants:
Blue azraq (masculine singular)
Blue zarqawaan (feminine dual) (after replacing the ؟ of ؟ا??awataan with azraq consonants)

**Adjective order**

Syntactically, adjectives have no specific order in Arabic. However these adjectives semantically are ordered according to their importance in the sentence.

He is strong and honest ?nnahu hwa l-qaweyu l-?ameen

In praising, the order of adjectives starts with adjectives denoting ethics, and if there be more than one adjective modifying the noun in the sentence, then the order of such ethical adjectives relies on their importance. Consider the following example:

He is a worshiper, obedient, sincere and charitable. hwa <abed, moTee>, mpxleS, motasadeq هو عابد مطيع مخلص متصدق
Sadeq ?ameen-un mota

The adjective is of different forms in Arabic. It may stand as a single word, a quasi-sentence or a sentence. Details appear in the following lines:

**Numerous Adjectives used for a single qualified entity**

1. A qualified entity may have numerous adjectives, which may be a single quality, a quasi-sentence or a sentence. The adjective may stand as a single word, a quasi-sentence or a sentence. Details appear in the following lines:

   - faithful (a singular adjective)
   - of Pharaoh's family (a quasi-sentence adjective)
   - who [until then] had concealed his faith (a sentence adjective)

   The sentence adjective may have frontal position as in Q5:54

   - whom He loves (a sentence adjective)
   - humble (a singular adjective)
   - proud (a singular adjective)

   "God will in time bring forth [in your stead] people whom He loves and who love Him - humble towards the believers, proud towards all who deny the truth (Q5:54).

   The sentence adjective يُحبُهُمْ has heads the singular adjectives مَّنَّاعٍ and أَعِزَّةٍ. However, the measure and most common is the case stated in 40:28.

   - A qualified entity may have numerous singular adjectives. In such case, head and tail position will depend on the quality’s importance in the context. The least important may precede a higher quality and vice versa. An instance of the first is (Q68:10-12).

   - slanderer (need not walk) (a sentence adjective)
   - defamer (transmitter + walker) (a singular adjective)
   - the withholder of good (more harmful than the above) (a singular adjective)
   - aggressor (most harmful) (a singular adjective)
   - sinful (combines all harm) (a singular adjective)

   Furthermore, defer not to the contemptible swearer of oaths, (10) [or to] the slanderer that goes about with defaming tales, (11) [or] the withholder of good, [or] the sinful aggressor, (12).
The sequence of adjectives commences with the least to most harmful. They all conform in this respect beginning with the least harmful quality in its simple state and incrementing by and by to reach the top instance of the adjective. This is illustrated in (Q66:5):

[O wives of the Prophet!] Were he to divorce [any of] you, God might well give him in your stead spouses better than you - women who surrender themselves unto God, who have faith, devoutly obey His will, turn [unto Him] in repentance [whenever they have sinned] worship [Him alone] and go on and on [seeking His goodly acceptance] - be they women previously married or virgins. (Q66:5).

These faith-related adjectives listed above precede the physical adjectives listed below.

 Previously married
 Virgin

The first set of adjectives have precedence over the latter ones implying that moral adjectives are far significant than physical ones as perceived from the Prophetic tradition in this respect commending the faithful spouse. Moreover, the faith-related qualities are ordered incrementally starting with the least where surrendering to God is lesser than having faith in Him. This note is illustrated in (Q49:14).

A devout person is one constant and patient in worship; a faithful one may show some slackness as noted in (Q57:16) and thus the devout is higher in degree than a faithful person. The devout in case of some error may repent and have his record cleared as if he never erred. The status of a repentant, therefore, ranks better than the devout. Consequently, these lexical items are incrementally ranked in this context on the basis of their order with regards to creed.

The later couple of adjectives, “previously married, and virgins,” are ranked hierarchically as well. The previously married spouse is ranked below a virgin one. In the final analysis, adjectives related to creed and physical qualities are ordered in a hierarchy. Implicit in this sequence of adjectives is the proposition to the Prophet’s wives that if opted to part with them their rank would be lower than the least quality of a Muslim. Hence, the adjectives of the spouses suggested to the Prophet commence
with “those who surrender, have faith, devout, etc.”

An illustration of the second type of adjectives is (Q66:6):

يَا أَيُّهَا الَّذِينَ آمَنُوا قوا أنفسكم وآهِلكم نَارًا وقُودُهَا لاَّ يَعْصُونَ اللَّـهَ مَا أَمَرَهُمْ وَيَفْعَلُونَ مَا يُؤْمَرُونَ (التحريم: ٦)

O YOU who have attained to faith! Ward off from yourselves and those who are close to you that fire [of the hereafter] whose fuel is human beings and stones: [lording] over it are angelic powers awesome [and] severe, who do not disobey God in whatever He has commanded them, but [always] do what they are bidden to do. (Q66:6)

The sign contains three adjectives. The first and second adjectives are single items and the third is a sentence. Foregrounding the single adjective conforms to our preceding statement. However, placing the quality ‘powers awesome’ ahead of ‘severe’ gives precedence to the most numerous over the least or the general over the specific. The quality ‘powers awesome’ implies thickness and severity, whereas ‘severity’ does not always involve ‘awesome power’. Such precedence of the first adjective indicates a further degree of threatening, an adjective befitting the guardians of ‘Fire’.

To sum up, in describing the adjective position and order in English and Arabic, it appears doubtlessly that these position and order systems are asymmetrical in the two languages. Consequently, they represents an area of difficulty for Arab students of English. To set a clear-cut evidence for this conclusion, lets consider the pedagogical implications of English adjective order that face the Islamic university freshman students majoring in English.

6. Methodology

6.1 Introduction

This section aims to investigate the IUG freshman students majoring in English perception of the position and order of English adjectives. It attempts to shed light on the areas of difficulty that students encounter when using English adjectives. It also seeks to identify where most students commit errors concerning position and order of English adjectives.

6.2 Research design

The researcher used the descriptive analytical method to achieve the goal of the study. The descriptive analytical method is hoped to be suitable for this quasi-experimental study since it depends on pre and post test and the analysis of the collected data after conducting these tests. This approach can help readers understand the causes of errors committed by Arab students in position and order of English adjectives.
6.3 Tools of the study
The researcher believes that conducting pre and post tests could be very suitable and helpful tool to carry out the objectives of the study. So, the researcher adopted and adapted the pre test from different resources on the internet and from his experience in teaching English grammar, and translation for the IUG freshman students majoring in English.

6.4 The Participants
The participants of this study are 65 female freshman students majoring in English at IUG.

6.5 Validity and reliability
To ensure validity and reliability of the tool of the study, the researcher consulted some of his experienced colleagues in teaching English along with some university professors specialized in the field. Moreover, the researcher analyzed the results of the test statistically in order to get valid analysis of the collected data.

6.6 Procedures of the study
In order to apply the study, the researcher adopted the following procedures:
- Preparing participants to have the pre test explaining the problem to them.
- Conducting the pre test and collecting data from it to see to what extent students understand the correct position and order of adjectives.
- Analyzing the collected data then seeking for interpretation.

6.7 Results and Analysis
Frequencies, Means, Standard Deviations and Percentages for each item of the pre-test and their order (N=30)

<table>
<thead>
<tr>
<th>Question No</th>
<th>F</th>
<th>Mean</th>
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<td>3</td>
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<td>4</td>
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<td>0.49</td>
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<td>12</td>
<td>0.4</td>
<td>0.498</td>
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<table>
<thead>
<tr>
<th>Question No</th>
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<th>Mean</th>
<th>Std Deviation</th>
<th>Percentage</th>
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<tbody>
<tr>
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<td>53.33</td>
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<tr>
<td>3</td>
<td>17</td>
<td>0.567</td>
<td>0.504</td>
<td>56.67</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>0.3</td>
<td>0.466</td>
<td>30</td>
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<tr>
<td>5</td>
<td>13</td>
<td>0.433</td>
<td>0.504</td>
<td>43.33</td>
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<tr>
<td>6</td>
<td>19</td>
<td>0.633</td>
<td>0.49</td>
<td>63.33</td>
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<tr>
<td>7</td>
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<tr>
<td>8</td>
<td>18</td>
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<tr>
<td>9</td>
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<td>0.567</td>
<td>0.504</td>
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<td>10</td>
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<td>0.433</td>
<td>0.504</td>
<td>43.33</td>
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<tr>
<td>First</td>
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</tr>
<tr>
<td>Second</td>
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<td>45.67</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>7.2</td>
<td>1.919</td>
<td>48</td>
</tr>
</tbody>
</table>
The results of the pre test show that students did badly in both two domains. In the first question of the first domain, it is obvious that most students 80% chose the right choice (A).

A. Lion is a strong animal.
B. Lion is an animal strong.
This may refer to the students’ clear knowledge and daily use of the normal position of adjectives.

Concerning the second domain, the students proved lack of knowledge of the correct order of a series of English adjectives. Therefore the errors committed are interlingual. This may be due to the interference of their first language (Arabic), since Arabic does not have clear criteria of adjective order as it is found in English as clarified above.

### Frequencies, Means, Standard Deviations and Percentages for each item of the Post Test and their order (N=30)

<table>
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<td>3</td>
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<td>0.6</td>
<td>0.498</td>
<td>60</td>
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<td>4</td>
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<table>
<thead>
<tr>
<th>Question No</th>
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<th>Mean</th>
<th>Std Deviation</th>
<th>Percentage</th>
</tr>
</thead>
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<td>0.533</td>
<td>0.507</td>
<td>53.33</td>
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<tr>
<td>3</td>
<td>20</td>
<td>0.667</td>
<td>0.479</td>
<td>66.67</td>
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<td>4</td>
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<td>0.433</td>
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<td>0.667</td>
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<td>0.7</td>
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<td>9</td>
<td>20</td>
<td>0.667</td>
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<tr>
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<td>Second</td>
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The post test table shows that the students’ results are better. However, the results are still weak. Explaining the rules to the students and providing them with sufficient exercise can not enhance the performance of the students very highly. This may refer to the complex rules of English adjective order and also to the fact the Arabic adjective position and order differ completely from that of English.
Means, Standard Deviations and T value

<table>
<thead>
<tr>
<th>Domain</th>
<th>N</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>T Value</th>
<th>.Sig value</th>
<th>.sig level</th>
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</tr>
<tr>
<td>Fist</td>
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<tr>
<td>Second</td>
<td>Pre Test</td>
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<td>4.567</td>
<td>1.478</td>
<td>6.158</td>
<td>0.000</td>
</tr>
<tr>
<td>Second</td>
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<td>5.7</td>
<td>1.622</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>Pre Test</td>
<td>30</td>
<td>7.2</td>
<td>1.919</td>
<td>8.305</td>
<td>0.000</td>
</tr>
<tr>
<td>Sum</td>
<td>Post Test</td>
<td>30</td>
<td>8.967</td>
<td>1.671</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table shows that calculated T value is greater than tabular T value in the overall value of the test. This indicates that there are statistically significant differences at ($\alpha \leq 0.05$) in favor of the post test.

7. Summary remarks and recommendation
It appears clearly that the position and order of English adjectives are problematic for the IUG freshman students, due to the difference in this structure in both languages. This causes students to commit serious errors resulting from negative interference. Therefore teaching adjectives should be done contextually and by using authentic materials that attract the attention of students. Second, since the position and order of English adjectives is essential for constructing descriptive sentences, teachers should teach their learners such a subject inductively and not deductively so that learners can use adjectives easily and appropriately. Third, tutors should introduce the position and order of adjectives by using suitable activities that can facilitate understanding. These are like; memo cards activities, work sheets with incomplete sentences, Contradictory adjectives with pictures. Flashcards. Guess and act activity, Word Relay Match Five activity, etc. Fourth, tutors should train their students on translating sentences containing a number of adjectives from Arabic to English and vice versa. Finally, tutors should use a list of new adjectives at the end of each text. They should stimulate students to write these adjectives correctly and to compose sentences using these adjectives so as to ensure they recognize their usage.
Appendix I
Pre-Test Form

Dear student:

Please answer the following questions related to English adjectives:

**Position of adjectives**

1. Is a strong animal.
   A. Lion is a strong animal.
   B. Lion is an animal strong.

2. Anyone strong can defeat you.
   A. Strong anyone can defeat you.
   B. Anyone strong can defeat you.

3. Something horrible may happen.
   A. Horrible something may happen.
   B. Something horrible may happen.

4. The Princess Royal visited our school.
   A. The Royal Princess visited our school.
   B. The Princess Royal visited our school.

5. I want to see the concerned people.
   A. I want to see the people concerned.
   B. I want to see the concerned people.

**The Order of Adjectives in a Series**

1. gopher ran quickly to the hole.
   A. An angry, little, brown
   B. A brown, angry, little

2. sports car was parked in front of the restaurant.
   A. An Italian, beautiful, new
   B. A beautiful, new, Italian

3. barber pole was next to the front door of the barber shop.
   A. A big, red and white, striped
   B. A big, striped, red and white

4. boy was chopping wood in the backyard.
   A. A strong, little, young
   B. A little, strong, young
5. She wore her ________ pumps حذاء بسيط.
   A. high-heeled جلد عالي, black, suede جلد
   B. high-heeled, suede, black

6. You can’t take your ________ knife with you on an airplane.
   A. Swiss Army, red
   B. red, Swiss Army

7. We put an ________ tree in the corner of their office.
   A. ugly, tiny, artificial
   B. artificial, tiny, ugly

8. She offered me tea in a ________ cup.
   A. ceramic, small, chipped
   B. small, chipped, ceramic

9. The elf (الجني الطيب) lived in a ________ house in the forest.
   A. charming, little, mushroom
   B. charming, mushroom, little

10. My uncle bought a ________ TV.
    A. high-definition, brand-new, plasma
    B. brand-new, high-definition, plasma
Appendix II
Suggested Activities for Adjective Order
Adjective Order

2- Write sentences to describe the pictures; use the given words.

Example

This is a surprised small birthday present.

1. This, be American, old hardworking, man
........................................................................................................

2. She, have, lovely, small, blue, paper, bird
........................................................................................................

3. It, bem fresh boiled, hard, rather big, egg
........................................................................................................

4. That, be, huge, black, frightening, spider
........................................................................................................

i.e, intelligent, chubby, five-month old, child
........................................................................................................

.................
3- Are these adjectives in the natural order? Write T for natural or F for unnatural

1- a big red book  ( )
2- a red big book  ( )
3- a French green book  ( )
4- a beautiful green Italian scarf  ( )
5- a little green man  ( )
6- the first three days  ( )
7- the three first days  ( )
8- a funny little man  ( )
9- a brown leather jacket  ( )
10- a German small town  ( )

References:
Kemmerer, D. et al., Knowledge of the semantic constraints on adjective order can be selectively impaired, Journal of Neurolinguistics (2008), doi:10.1016/j.jneuroling.2008.07.001
An investigation into the differences between English and Arabic position and order of adjectives: A contrastive study with pedagogical implications

Walid Mohammed Amer

Arabic references:
The Holy Qur’ān

المستخلص:
إن كثيراً من الدراسات قد كتبت في موقع وترتيب الصفات في اللغة الإنجليزية مع ذلك لا توجد حسب معلوماتي أي دراسة تفصيلية تتحدث عن موقع وترتيب الصفات بطريقة تحليلية تقابلية في الانجليزية والعربية لذا فإن هذه الدراسة تركز على الاختلاف بين موقع وترتيب الصفات في كل من العربية والإنجليزية.
والاعتقاد السائد أن الطلبة العرب يقابلون صعوبة كبيرة ويقعون في أخطاء كثيرة في هذا المجال بسب الاختلاف في موقع وترتيب الصفات في اللغتين.
وللتأكد من صحة هذا الاعتقاد فقد طبقت الدراسة على الطالبات الجدد المتخصصات في اللغة الإنجليزية في الجامعة الإسلامية، وقد تبين ان هؤلاء الطلاب يواجهون صعوبة في تركيب الجمل التي تحتوي على عدة صفات لوصف واحد.
ومن أهم الأسباب للوقوع في الاخطاء التي وجدت في هذا المجال تلك التي تتمثل في الجانب اللغوي الخاص بالتناخل السلبي في موقع الصفات وترتيبها بين الجملة الانجليزية والعربية. وتنتهى الدراسة بوضع بعض التوصيات للتغلب على هذه الاخطاء وتلك الصعوبات.
Marine Algae as Biomonitor for Heavy Metals
Pollution at the Red Sea Coast: A review

Abuagla Y. Ahmed*

Abstract
The waters of the Red Sea and Gulf of Aden are famous for their natural beauty and outstanding biological diversity. This area has gained global importance providing habitats to a significant number of unique species of marine biota. The region is rich in natural resources such as fishery and tourism industry. However, human activities such as; urbanization, coastal development, industries including power and desalination plants and refineries are threatening the marine and coastal ecosystems of the area. The potential ecological effects of rising levels of heavy metals concentrations in the Red Sea environment are of great concern due to their highly bioaccumulative nature and higher toxicity.

In this review, the results of recent studies on heavy metal accumulation in marine algae have been presented. Metal speciation in biota, and some factors affecting their bioavailability are reviewed, as well as more information on the use of different species of marine algae as cosmopolitan bioindicators for heavy metal pollution in aquatic environment at the Red Sea coast are gathered.

*Department of Chemistry, Faculty of Education, Red Sea University
Introduction
Marine pollution of the Red Sea, caused by the enormous increment of pollutants particularly oil and trace metals and the increase of sewage and industrial effluent discharged into the coastal area, which has seriously endangered the Red Sea ecosystem, has drawn the attention in the last two decades of both national and international agencies as well as public awareness (Heba et al., 2004). Metals are considered important toxic pollutants and there is extensive literature concerning their accumulation in ecosystems. Metals are continuously released into the biosphere by volcanoes, natural weathering of rocks and numerous anthropogenic activities, such as mining, combustion of fuels, industrial and urban sewage and agricultural practices. On a global scale, there is now abundant evidence that anthropogenic activities have polluted the environment with heavy metals from the poles to the tropics and from the mountains to the depths of the oceans. (Manahan, 1994).

An important approach to assessment of risk from environmental and occupational exposures is biomonitoring which provides an estimate of the total dose absorbed and gives indirect access to determination of target site concentrations. (Gupta and Singh, 2011).

Heavy metals are persistent pollutants that can be biomagnified in the food chains, becoming increasingly dangerous to human and wildlife. This has led to the development of monitoring schemes aimed at directly measuring levels of contaminants in various organisms, and biomonitoring schemes that use indicator species to estimate the levels in other parts of the ecosystem. Therefore, assessing pollutants in different components of the ecosystem has become an important task in preventing risk to natural life and public health. Heavy metals enter into the environment mainly via three routes: (i) deposition of atmospheric particulates, (ii) disposal of metal enriched sewage sludge and sewage effluents and (iii) by-products from metal mining process (Abid et al., 2009). Some metals, including some heavy metals, are needed by living organisms for various metabolic processes. The requirements of different organisms for essential metals vary substantially but optimal concentration ranges are narrow and frequently under careful homeostatic control (Manahan, 1994). These metals become toxic when their concentration levels exceed (Venugopal et al., 1975).

Heavy metals can not be eliminated from water bodies since they do not undergo breakdown and they persist in sediments, from where they slowly release the water. The release of these heavy metals from sediments poses serious hazards to aquatic organisms, including algae (Perez and Sumugat, 1996). Seaweeds have
a high capacity to bind trace metals which are generally considered the best bioindicators of aquatic bodies for nutrients as well as heavy metals. (Jothinayagi and Anbazhagan, 2009)

The concentrations of heavy metals are presented in two marine environmental matrices: marine coastal sediments and marine organisms. (Sirelkhatim et al., 2003).

The determination of heavy metals levels in marine organisms is usually preferred, rather than the measuring of the metal concentration in sea water and sediment samples. Metal concentrations in sea water are very low and show wide fluctuation.

Heavy metals concentrations in sediments samples can be changed by organic matter content, grain size, composition, pH and oxidation-reduction potential (Mohamed, 2005) and salinity (Gupta and Singh, 2011). Carbonate rich materials, the major component of the Red Sea sediments, are known to have dilution effect on sediment metal concentration, as they are poor in their mineral contents (Sirelkhatim et al., 2003).

**Heavy Metals in Marine Environment**

The term heavy metal is often used to cover a diverse range of elements which constitute an important class of pollutants. Such pollutants have received the attention of researchers all over the world, only due to their harmful effects on living organisms (Manahan, 1994).

Chronic contamination by heavy metals in marine environments is a severe problem particularly in estuaries. Heavy metals may alter the structure of the cell membranes by stimulating the lipid peroxidation process with consequent complex sequences of biochemical reactions (Metwally and Fouad, 2008).

Contamination pattern of any marine environment includes a wide variety of compounds. Among the myriad of organic and inorganic substances released into aquatic ecosystems, heavy metals have received considerable attention due to their different toxicity and potential bioaccumulation in different aquatic species (Venugopal et al., 1975).

Some metals are available for uptake into organisms from solution only as free ions, whereas others are transported over biological membranes as inorganic complexes. In experiments with Cu and Cd their toxicity (and their bioavailability) is correlated with the concentration of free metal concentration (Manahan, 1994).

Metals in minerals and rocks are generally harmless and only become potentially toxic when they dissolve in water. They enter the environment naturally by weathering of rocks, leaching of soils, and volcanic activity. Most of these metals are transported by water in a dissolved or particulate phase and most of it reaches the sea via rivers or land run off. In addition, rainwater carries
significant Cd, Cu, Zn and especially Pb from the atmosphere to the sea. Sediments act as a reservoir for many pollutants. Knowledge of the concentrations and distribution of trace metals in sediments can therefore play a key role in detecting sources of contaminants in aquatic system (Heba et al., 2004).

**Marine Organisms as Monitors for Heavy Metals Pollution**

The United Nations Environment Program (UNEP) has defined monitoring as a repetitive observation (for defined purposes) of one or more chemical or biological elements according to a prearranged schedule over time and space, using comparable and standardized methods.

Biological monitoring or biomonitoring can be defined as the systematic use of biological responses to evaluate changes in the environment, with the intent of establishing a quality control program (Torres et al., 2008).

There are various reasons for establishing monitoring systems which are: (a) to provide information about the substances being emitted to the environment, their quantities and sources; (b) to determine the distribution and transformation of chemicals in the environment; (c) to determine changes in environmental conditions with time; (d) to provide a sound basis for the development of standards, regulations, and other legal requirements relating to the protection of human health and the environment; (e) to determine how well regulatory measures are being met; (f) to provide information about the relationship between exposure to chemicals and biological effects; and (g) to test and refine models on transport and transformation of chemicals in the environment and on exposure estimation (Becher and Bjerseth, 1987).

The elucidation of the comparative pollution of aquatic areas by trace metals is theoretically possible by the analysis of water, sediments, or members of the indigenous biota. The cost of water analysis is expensive and the analysis itself is laborious; multiple sampling must be undertaken to eliminate variations in metal concentration with time, season, freshwater run-off, currents, tides and other factors. The use of sediments is also subject to some error, according to local variations in sedimentation rates of particulate material and in the amounts of organic material present; in addition it gives little direct information on the amounts of metal entering the biomass of a given area (Philips, 1977). However, biological variables such as lipid content, age, and sexual condition, and environmental conditions such as temperature, season, and salinity of water may affect the reproducibility and accuracy of the determination of pollution conditions in a given location (Becher and Bjerseth, 1987).
Marine Algae as Bioindicators of Heavy Metals in Marine Environment

Measuring of heavy metals in aquatic organisms may be a bioindicator of their impact on organism and ecosystem health but a true evaluation of the damage inflicted by heavy metals should come from comprehensive biomarker studies. Biomarkers are more telling than bioindicator measurements of heavy metal contamination because they deal with chemical and physiological changes on the organism level and assess contamination based on a direct measure of change in the organism (Lee et al., 2005).

Typically, biomarkers are defined as quantitative measures of changes in the biological system that can be related to exposure to the toxic effects of environmental chemicals (WHO, 1993). Metal accumulation by marine organisms is influenced by a number of intrinsic factors such as (size, age, sex, feeding behavior and growth rate) and extrinsic factors as metal concentrations and speciation in surrounding waters, salinity, hardness and temperature where evaluation of metal concentrations in biological systems must take into account certain other factors, such as redox conditions (dissolved oxygen concentration), ionic strength, organic complexation, concentrations of metal and ligand species that compete for uptake sites, pH, general physiologic behavior, life cycle and life history (Manahan, 1994 and Venugopal et al., 1975). The use of organisms like algae to identify areas of trace metal contamination is attractive as these organisms concentrate metals from the ambient water and it reflects the concentration of metals in sea water. Although dead algae have been utilized successfully in heavy metal adsorption, living algae may be more advantageous due to metabolic uptake and continuous growth.

Marine macroalgae, accumulate trace metals from solution and for this reason, have been used extensively as biomonomitors of metal contamination of sea water (Jothinayagi and Anbazhagan, 2009). Phytoplankton have also been investigated with regard to their heavy metal content in polluted marine environments (Manahan, 1994).

Very limited number of studies has been published about the accumulation of heavy metals in the Red Sea coast (Al-Homaidan, 2006).

This paper reviews available studies on the heavy metal pollution of the Red Sea. It summarizes the heavy metal levels in various marine algae in the Red Sea.

Levels of Heavy Metals in Red Sea Algae

The Red Sea is well known as home to many marine tropical and invertebrates, which are in many instances more
colorful than their counterparts in other areas of the world.

The heavy metal levels in various kinds of marine algae in Red Sea coast have been investigated by several researchers. These algae are available in every season all over the Red Sea coastal area and are easy to sample and identify (Ahmed, 2007). These various kinds of marine algae in Red Sea coast (EL-Naggar, 1995) are summarized in Table (1).

**Table (1) Common species of marine algae across the Red Sea coast**

<table>
<thead>
<tr>
<th>Chlorophycophyta (Green algae)</th>
<th>Phaeophycophyta (Brown algae)</th>
<th>Rhodophycophyta (Red algae)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Enteromorpha</em> Dictyotadivaricata Lamour.</td>
<td><em>Phaeophycophyta</em> Padinaboryana Thivy</td>
<td><em>Rhodophycophyta</em> Actanthophoranajadiformis (Delile) Papenfuss</td>
</tr>
<tr>
<td><em>Ulvala ctuca</em> L.</td>
<td><em>Phaeophycophyta</em> Digeneasimplex (Wulfen) C.Ag.</td>
<td></td>
</tr>
<tr>
<td><em>Coulerpaserrulata</em> (Forsk.) Borg</td>
<td><em>Rhodophycophyta</em> Laurenciaobtusa (Huds Lamour)</td>
<td></td>
</tr>
<tr>
<td><em>Halimedaopuntia</em> (L.) Lamour.</td>
<td><em>Chlorophycophyta</em> Hormophysatriquetra (J.Ag.) Kutz</td>
<td></td>
</tr>
<tr>
<td><em>Cladophoraheteronema</em> (C. Ag.) Kutz</td>
<td><em>Chlorophycophyta</em> Turbinariatriquetra (J.Ag.) Ag</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Rhodophycophyta</em> Sargassumsubrepanadum (Forsk.) C.Ag.</td>
<td></td>
</tr>
</tbody>
</table>

Some results for heavy metal levels in marine algae from the Red Sea investigated by several researchers are summarized in Tables 2 through 5. El-Naggar and Al-Amoudi, (1989) investigate the metal concentration of heavy metals in marine algae samples collected from the Saudi Arabia coast of the Red Sea. According to the findings of that study, the heavy metal content exhibits remarkable differences according to the species. The study confirms that marine algae may be useful as monitoring organisms (Table 2).
Table (2): Mean levels of heavy metals (ppm) in the algal divisions from the Red Sea of Saudi Arabia

<table>
<thead>
<tr>
<th>Elements</th>
<th>Ag</th>
<th>Al</th>
<th>As</th>
<th>Cd</th>
<th>Co</th>
<th>Hg</th>
<th>Mo</th>
<th>Ni</th>
<th>Pb</th>
<th>Ti</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algal division</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chorophycophyta</td>
<td>0.045</td>
<td>48.220</td>
<td>5.588</td>
<td>0.102</td>
<td>0.345</td>
<td>9.432</td>
<td>0.318</td>
<td>1.388</td>
<td>3.038</td>
<td>0.504</td>
<td></td>
</tr>
<tr>
<td>Phaeophycophyta</td>
<td>0.025</td>
<td>65.240</td>
<td>6.403</td>
<td>0.078</td>
<td>0.299</td>
<td>6.378</td>
<td>0.243</td>
<td>0.665</td>
<td>1.163</td>
<td>1.080</td>
<td></td>
</tr>
<tr>
<td>Rhodophycophyta</td>
<td>0.023</td>
<td>43.125</td>
<td>5.230</td>
<td>0.088</td>
<td>0.263</td>
<td>6.745</td>
<td>0.184</td>
<td>0.965</td>
<td>3.560</td>
<td>0.768</td>
<td></td>
</tr>
</tbody>
</table>

Basic information on the concentration levels of heavy trace elements (Cr, Mn, Ni, Cu, Zn, Cd, and Pb) in marine algae along the Sudanese coast of the Red Sea at different locations has been obtained. The concentrations are measured in common species of marine algae. The high bioaccumulation abilities of algae for selected metals have been confirmed.

The investigation showed that algae species are well suited for monitoring heavy metals as trace content in coastal area and provide information about bioavailability which can be obtained in algae species. The results indicate that marine algae can be used as biomonitors in monitoring programs at Red Sea coast (Ahmed, 2007),
Table 3: Average concentration of algae heavy metals in groups at various locations in Sudanese Red Sea coast

<table>
<thead>
<tr>
<th>Location</th>
<th>algae</th>
<th>Cr</th>
<th>Mn</th>
<th>Ni</th>
<th>Cu</th>
<th>Zn</th>
<th>Cd</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haloot</td>
<td>Green</td>
<td>10.56</td>
<td>148.97</td>
<td>7.20</td>
<td>7.48</td>
<td>9.60</td>
<td>0.10</td>
<td>1.90</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>11.36</td>
<td>128.95</td>
<td>4.19</td>
<td>7.79</td>
<td>10.31</td>
<td>0.11</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>10.97</td>
<td>161.39</td>
<td>6.25</td>
<td>7.67</td>
<td>9.99</td>
<td>0.08</td>
<td>1.19</td>
</tr>
<tr>
<td>Flamingo</td>
<td>Green</td>
<td>9.70</td>
<td>25.60</td>
<td>4.08</td>
<td>5.79</td>
<td>10.54</td>
<td>0.07</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>8.20</td>
<td>91.12</td>
<td>4.17</td>
<td>6.65</td>
<td>14.65</td>
<td>0.06</td>
<td>1.22</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>11.22</td>
<td>62.47</td>
<td>4.73</td>
<td>5.81</td>
<td>20.89</td>
<td>0.08</td>
<td>1.35</td>
</tr>
<tr>
<td>Abuhashesh</td>
<td>Green</td>
<td>8.97</td>
<td>16.60</td>
<td>4.50</td>
<td>3.02</td>
<td>6.57</td>
<td>0.06</td>
<td>1.57</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>7.97</td>
<td>27.17</td>
<td>5.07</td>
<td>2.69</td>
<td>12.25</td>
<td>0.05</td>
<td>1.09</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dama Dama</td>
<td>Green</td>
<td>9.70</td>
<td>27.00</td>
<td>5.54</td>
<td>3.47</td>
<td>7.58</td>
<td>0.07</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>8.72</td>
<td>45.45</td>
<td>5.07</td>
<td>2.73</td>
<td>9.97</td>
<td>0.06</td>
<td>1.19</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>11.22</td>
<td>62.08</td>
<td>6.58</td>
<td>5.18</td>
<td>9.83</td>
<td>0.08</td>
<td>1.73</td>
</tr>
<tr>
<td>Klanieb</td>
<td>Green</td>
<td>8.78</td>
<td>97.32</td>
<td>6.08</td>
<td>3.47</td>
<td>5.93</td>
<td>0.07</td>
<td>1.62</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>10.33</td>
<td>172.53</td>
<td>4.95</td>
<td>5.53</td>
<td>6.90</td>
<td>0.08</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>11.98</td>
<td>127.94</td>
<td>4.84</td>
<td>4.33</td>
<td>5.89</td>
<td>0.09</td>
<td>1.63</td>
</tr>
<tr>
<td>Sawakin (1)</td>
<td>Green</td>
<td>13.30</td>
<td>22.00</td>
<td>5.18</td>
<td>3.30</td>
<td>7.63</td>
<td>0.10</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>9.65</td>
<td>54.37</td>
<td>4.73</td>
<td>4.40</td>
<td>15.38</td>
<td>0.07</td>
<td>1.53</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sawakin (2)</td>
<td>Green</td>
<td>15.20</td>
<td>32.86</td>
<td>6.30</td>
<td>4.68</td>
<td>9.35</td>
<td>0.17</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>12.98</td>
<td>53.87</td>
<td>6.08</td>
<td>8.33</td>
<td>19.13</td>
<td>0.09</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>13.95</td>
<td>52.87</td>
<td>7.43</td>
<td>11.63</td>
<td>22.65</td>
<td>0.13</td>
<td>2.18</td>
</tr>
<tr>
<td>Haidob</td>
<td>Green</td>
<td>11.74</td>
<td>59.54</td>
<td>6.25</td>
<td>3.92</td>
<td>5.37</td>
<td>0.90</td>
<td>1.71</td>
</tr>
<tr>
<td></td>
<td>Brown</td>
<td>9.25</td>
<td>102.19</td>
<td>5.06</td>
<td>4.13</td>
<td>6.49</td>
<td>0.07</td>
<td>1.81</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>12.98</td>
<td>105.11</td>
<td>7.09</td>
<td>4.13</td>
<td>5.37</td>
<td>0.10</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Sirelkhatim et. al. (2003) studied some trace elements in marine biota (including algae) and sediments from the Sudanese Red Sea coast to serve as base line data for future monitoring purposes. The study suggested that marine algae are suitable for utilization as bioindicators for trace elements, Table (4)
Table (4): Trace element concentration (ppm) in some marine algae from the Sudanese Red Sea coast

<table>
<thead>
<tr>
<th>Element algae</th>
<th>Sr</th>
<th>Zn</th>
<th>Ni</th>
<th>Ce</th>
<th>La</th>
<th>Mn</th>
<th>Ti</th>
<th>Nb</th>
<th>Ga</th>
<th>Cr</th>
<th>V</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbinaria</td>
<td>1440</td>
<td>19.6</td>
<td>3.0</td>
<td>62.8</td>
<td>8.5</td>
<td>51.8</td>
<td>27.2</td>
<td>2.6</td>
<td>1.7</td>
<td>2.3</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Sargassum</td>
<td>1594</td>
<td>18.1</td>
<td>8.1</td>
<td>14.9</td>
<td>0</td>
<td>55.2</td>
<td>400</td>
<td>2.4</td>
<td>2.2</td>
<td>24.8</td>
<td>104.7</td>
<td>9.5</td>
</tr>
<tr>
<td>Entomorpha</td>
<td>4591</td>
<td>39.9</td>
<td>21.2</td>
<td>41.1</td>
<td>2.4</td>
<td>173.7</td>
<td>1815</td>
<td>3.3</td>
<td>4.2</td>
<td>75.0</td>
<td>26.0</td>
<td>21.9</td>
</tr>
</tbody>
</table>

Trace element concentration was measured (Mohamed, 2005) in brown marine algae collected from Gizen (Saudi Arabia) and Hurghada (Egypt), Red Sea coast (Table 5), the study considers marine algae to be a source of heavy metals as well as suitable biomonitors of heavy metal pollution in the Red Sea.

Table (5): Heavy metals concentrations (g g\(^{-1}\) weight) in brown algae species collected from Gizen (Saudi Arabia) and Hurghada (Egypt), in the Red Sea area

<table>
<thead>
<tr>
<th>Metals</th>
<th>Turbinaria Decurrence</th>
<th>Sargassum dentifolium</th>
<th>Sargassum latifolium</th>
<th>Padina pavonia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gizan</td>
<td>Hurghada</td>
<td>Published results</td>
<td>Gizan</td>
</tr>
<tr>
<td>Fe</td>
<td>4530.0</td>
<td>86.6</td>
<td>65</td>
<td>1778.5</td>
</tr>
<tr>
<td>Zn</td>
<td>65.37</td>
<td>9.65</td>
<td>6.66</td>
<td>49.43</td>
</tr>
<tr>
<td>Co</td>
<td>38.43</td>
<td>1.05</td>
<td>Nd</td>
<td>28.39</td>
</tr>
<tr>
<td>Pb</td>
<td>168.57</td>
<td>3.09</td>
<td>Nd</td>
<td>129.64</td>
</tr>
<tr>
<td>Cd</td>
<td>0.964</td>
<td>1.15</td>
<td>Nd</td>
<td>0.214</td>
</tr>
<tr>
<td>Cu</td>
<td>12.96</td>
<td>4.03</td>
<td>2.5</td>
<td>9.36</td>
</tr>
</tbody>
</table>

Conclusion and Trends

Algae are able to absorb pollutants from the aquatic environment and biotransform organic compounds and immobilize inorganic elements to make them less toxic.

Algae have been suggested and used as potential bioindicators of aquatic pollution and they point to important biomarkers. Since algae has important antioxidant system, they can be used as powerful biomarker tools for pollution exposure (Torres et al., 2008).

Various species of marine algae are distributed along Red Sea coast and have been recognized as a useful tool for the monitoring of heavy metals pollution. Algae accumulate comparatively higher concentrations of metals because of their sedentary
nature, both from water and sediment. The extent of bioaccumulation thus can play a key role in determining water and sediment quality criteria. Further work would be required to compile a definitive review document. It is necessary to identify sources of the heavy metals, organic compounds and organohalogenes in the Red Sea region. Investigation and production of compounds in conjunction with considerations of source can then be used to estimate environmental loads (both spatially and temporally). Transport and transformations of the compounds should be assessed. Initial modeling studies using physical and chemical constants can provide good, albeit and broad estimates of biogeochemical behavior. Major “outputs” should be investigated to afford estimation of losses from the environment. The information compiled from the above recommendations can then direct strategies for initial environmental surveys to investigate contamination of heavy metals in Red Sea coast.
References:
12. Metwally, M.A.A. and Fouad, I.M., (2008), Biochemical Changes Induced by Heavy Metal Pollution in Marine Fishes at Khomse Coast, Libya Global Veterinaria 2 (6), pp. 308-311.
13. Mohamed, S. F., (2005), Biomonitoring of Heavy Metals in Some Brown Algal Species in the Red Sea area (Saudi Arabia and Egypt), Arab Gulf

المستخلص:
إنّ مياه البحر الأحمر وخليج عدن مشهوران بجمالهما الطبيعي وتنوعهما الحيوي وقد استثمرت هذه المنطقة أهمية عالمية لوجود أنواع فريدة من الأحياء البحرية. هذه المنطقة غنية بالمصادر الطبيعية مثل الشعب المرجانية التي تمثل عناصرًا مهمة من عناصر البيئة إلا أن النشاط الإنساني مثل التعمير والتطوير الساحلي ووحدات التكرير لمياه البحر ومصافي البتروكيماوي أصبحت تهدد النظام البيئي البحرّي والساحلي للمنطقة. إنّ التأثيرات البيئية المحتملة الناتجة من تضافر مستويات المعادن الثقيلة في بيئة البحر الأحمر أصبحت تشكل قلقًا كبيرًا بسبيدها العالية.
في هذا الاستعراض، تم عرض بعض الدراسات الأخيرة عن التراكم المكاني للعناصر الثقيلة في النسج الطحالب البحرية وبعض العوامل التي تؤثر على كثافة الطحالب، بالإضافة إلى جمع بعض المعلومات عن استخدام الأنواع المختلفة للطحالب البحرية ككشفين عالميين للتلوث المكاني بالعناصر الثقيلة في البيئة المائية لساحل البحر الأحمر.
Investigating the situation of teaching/learning Listening Comprehension

(A case study: secondary level schools- Port Sudan)

Amin Mohamed Ahmed

Abstract:

This study aims at investigating the teaching of listening skill at secondary stage schools in Port Sudan town, what actually done by the teachers when they taught this very significant skill and how students interacted with it. At the end of the research, the study tried to get rid of the problems that encountered students in learning to listen to English. The researcher used the descriptive analytical method since it fits the aim and nature of the study. To carry out this methodology, the researcher used tools such as questionnaires and observation checklists. The research resulted in a number of problems that confronted both teachers and students in teaching/learning listening skill. These problems were classified by the researcher into three main categories, i.e., the material, to be listened to, the presentation which includes both speaker and listener and the physical setting which includes both noise and visual element. A certain strategy for dealing with these classes of difficulties was recommended by the researcher at the end of the research.
Introduction

Listening is defined as a collection of micro-skills, including phonics, vocabulary, grammar, etc. In this respect, some language teaching theorists and researchers have constructed a number of taxonomies delineating the micro-skills needed for effective listening (e.g., De Haven, 1988; Field, 1997; Lund, 1995; Lundsteen, 1989; Peterson, 1991; Richards, 1983; Rivers, 1981; Rubin, 1990, Wipf, 1984). Richards’ (1983) taxonomy, for example, lists thirty-three micro-skills that students need to master for effective conversational listening and eighteen micro-skills for academic listening. Listening is also defined as an active process in which the student constructs meaning from an aural text. The definition of listening, which is in the researcher’s opinion provides a sound theoretical base. To develop listening in EFL, students must involve both skills and meaning. The following extracts are in support of the investigator’s view:

In developing classroom activities and materials for teaching listening comprehension, a clear understanding is needed for the nature of top-down and bottom-up approaches to listening and how these processes relate to different kinds of listening purposes (Richards: 1990: 65).

FL listening is not just “a bottom up” skill in which the meaning can be derived from perception or comprehension of the sum of all discrete sounds, syllables, words, or phrases (Ur: 1984:4).

Research Questions

(1) What are the aims of teaching listening skill?
(2) To what extent is listening skill understood by students at secondary schools in Port Sudan town?
(3) How is listening taught at secondary schools in Port Sudan town?
(4) What problems are faced by the teachers and students in teaching and learning listening comprehension?

Research hypotheses

- The aim of teaching English in Sudan is to help students acquire the foreign language they easily contact with others in the outside world.
- The main reason for suffering from difficulties in understanding spoken language is the ignorance of listening skill in itself as a separate skill and the little practice of listening.
- Teachers do not prepare students to understand the natural spontaneous speech of native speakers.
- The problems come out from the lack of materials in curriculum focusing especially on listening skill, some of the students hate
Investigating the situation of teaching/learning Listening Comprehension
(A case study: secondary level schools-Port Sudan)

Amin Mohamed Ahmed

Aims of study
The study aims at investigating the deficiency of listening comprehension among students of secondary schools in Port Sudan town. The research will try to find out and categorize the problems that hold back precise listening comprehension. After that, it tries to assess and evaluate the complete process of teaching and learning listening comprehension.

Significance of the study
The importance of this study (investigation) is that it tries to set a comprehensive strategy for one of the basic skills of English which, though now recognized, is still lagging behind the other skills in methodology and practical application in the English classroom. This will help textbook writers to provide adequate material for developing the listening skill. It will also help teachers to use the appropriate techniques in classrooms.

Research Problem
At the present time, there is agreement among foreign language methodologists that teaching a foreign language should aim at developing the four basic skills of the target language namely, listening, speaking, reading and writing. In the past foreign language teaching stressed the written aspect of the language i.e., reading and writing. It was only in the mid 1950 that the oral aspect received its due emphasis when the slogan “language for communication” was raised. Unfortunately, the term “communication” was misunderstood and misinterpreted to mean stressing the speaking skill. In this case, practicing listening was considered only as a means for teaching speaking. This may explain why Wilga Rivers (1972) describes listening comprehension as a “long neglected area” (p.136). Chenfeld (1978) also devotes a whole chapter in Teaching Language Arts Creatively entitled: “listening”: A forgotten Language Art? “(pp. 89-137). In this chapter, he explains that “it was believed that listening was an automatic reflex, closely related to intelligence, and could not be taught as a skill in itself” (p.90). So, it was only recently that listening began to attract the attention as an independent skill that should be developed as an end in it self. Yet, the present situation may be summed up as listening is probably the least stressed skill in the language classroom. Reasons for this may lie in the lack of emphasis on teaching listening comprehension in the language textbooks in general, as well as in the lack of available material specifically developed for and focused on the teaching of listening comprehension skill and
until recently, however, little is offered in terms of methodology or practical application for helping the EFL student develop these important aural skills.

If, however, the researcher examines carefully the listening abilities of the students in the secondary schools in Port Sudan town, he will realize that they are not as competent as he needs. The situation usually becomes obvious when they make their first contact with native speakers. Often they feel lost and complaining about the speed of delivery of the native speakers or their accents. This alone should convince him of the need to teach this skill.

The problem of this research lies in the attempt to set a strategy for developing the listening skill in English as a foreign language (EFL) in the secondary schools in Port Sudan town.

**The procedure**

To tackle the problem of this investigation, two steps will be taken:

1. Conducting a field study in the present situation of listening skill teaching using tools such as two different types of questionnaire and two different kinds of observation checklist in the secondary level schools in Port Sudan town.
2. On the basis of the results of the field study, the principles of the recommended strategy will be suggested.

**Methodology and tools**

The researcher adopted the descriptive methodology because it fits the nature of the study. To look into the genuine situation that existed in the secondary level schools in Port Sudan town when teaching listening, the researcher used two different types of investigation. These involve two different kinds of questionnaire. The questionnaires were distributed to teachers of English at secondary schools. The first questionnaire was distributed to forty teachers of English at the secondary level schools in Port Sudan town whereas the second questionnaire was distributed to twenty teachers of English at the same level.

As regards the observation checklists, they were used in classes. The first was intended to check students’ reaction when they were exposed to different sorts of listening in twenty classes. The other checklist to see what teachers of English at secondary level schools actually did when they wanted to teach a listening lesson in twenty classes too. The total number of the students was one thousand students.

**Detailed analysis of questionnaire**

(1) To approach the proper position which prevailed in listening lessons in secondary level schools in Port Sudan town, the researcher tried in the following to consider and analyse the replies that teachers gave to the various questions in the
first questionnaire which comprises ten different questions aiming at extracting information from the teachers of English about the teaching of this significant skill. The researcher categorized the answers to all of the questions into categories. The similar answers in each question form a category. This category was given a suitable name according to what is included in it. Each question has a different number of categories. The number of the teachers who selected a particular category is indicated clearly in front of it.

1. **What are the aims of teaching listening?**
   - Pronunciation 70%
   - Integration 10%
   - Comprehension 8%
   - Communication 7%
   - Consolidation 5%

2. **What types of spoken English will your students need to understand?**
   - Live English 45%
   - Contrived English 35%
   - Communicative activities 20%

3. **How do you link listening work with your main course?**
   - Textbook materials 55%
   - Creation of new materials 20%
   - Language aspects 15%
   - Integration of the skills 10%

4. **What would you say the sub-skills of listening are?**
   - Aspects of language 55%
   - Attitude toward listening 42%
   - Transcription 03%

5. **What are the general principles of teaching listening?**
   - Aim 40%
   - Interest of materials 30%
   - Presentation and practice 25%
   - Sufficient time for answer 05%

6. **What types of listening exercises do the coursebooks provide to help students practice the listening skills they need?**
   - Textbook exercises 80%
   - No exercises 20%

7. **What are the potential problems that encounter secondary school pupils in listening?**
   - Presentation (speaker + listener) 70%
   - The message to be listened to 20%
   - The physical setting 10%

8. **Can you state some ways of solving these problems?**
   - The message 25%
   - The presentation (speaker+listener) 55%
   - The physical setting 20%

9. **What percentage of the teaching time do you suggest should be given to listening?**
   - 25% of the teaching time would suffice 40%
b. 27% of the teaching time should be devoted to listening 20%
c. 50% of the teaching time should be given to listening 17%
d. 30% of the teaching time should be appropriated to listening 12%
e. 20% of the teaching time is sufficient for listening 5%
f. 33⅓% of the teaching time should be allowed for listening 2%
g. 5% of the teaching time should be certified for listening 2%
h. 80% of the teaching time should be specified for listening 1%
i. 10% of the teaching time should be taken up by listening 1%

(10) Is it important to teach listening? Give reasons.
The categories of the answers to the last question are five in number. They are:
  a. Base 40%
  b. Pronunciation 30%
  c. Comprehension 15%
  d. Structure development 10%
  e. Communication 05%

Summary of the results of questionnaire (1)
1. Most of the teachers put the aims of teaching listening in the category of pronunciation.
2. The majority of the teachers chose live English as a type of spoken English students need to understand.
3. Most teachers preferred that linking listening work with the main course through textbook materials.
4. More than half of the teachers put the sub skills of listening in the class of aspects of language.
5. The general principles of teaching listening were put in the category of aim by most of the teachers.
6. Textbook exercises were chosen as a type of listening exercises coursebooks provide to help students practice listening.
7. Most of the teachers selected the problems that related to presentation as the potential problems which confronted the pupils in learning to listen.
8. Solutions to the problems related to presentation were given by more than half of the teachers.
9. 40% of the teachers suggested that 25% of the teaching time should be devoted to listening.
10. Most of the teachers picked out the reasons that connected to the base category to justify the significance of teaching listening.

From the previous questionnaire, the researcher noticed that teachers of secondary level schools, to whom the questionnaire was distributed, gave different and varied perspectives about listening skill but their points of view were of paramount importance to the course of the study.

Detailed analysis of the questionnaire (2)
The researcher set another questionnaire for the purposes of obtaining extra information from the teachers of English at the secondary level schools in Port Sudan town about teaching the listening skill. It is regarded as a supportive questionnaire.
to the first questionnaire which aimed at getting subjective opinions from the teachers of English at the secondary level schools on the process of teaching the listening skill. It is also intended to cover the aspects of the process of teaching listening that the previous questionnaire did not look at.

In this questionnaire which was composed of two selection order questions, the researcher requested teachers of English to arrange in order of importance from the greatest importance to the least importance. In the first question, there are some aims of teaching the listening skill at the secondary level schools.

**Question (1). The aims are**

1. To train students to pronounce words correctly.
2. To develop the speaking skill.
3. To make students understand what they hear.
4. To interact effectively with each other and with the teacher in the classroom and with other people outside the classroom.
5. To learn how to guess the meaning of the unknown words.
6. To enable students to differentiate between similar sounds.
7. To increase students’ vocabulary.
8. To help students develop the other language skills.

<table>
<thead>
<tr>
<th>Aim No</th>
<th>Position %</th>
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<tr>
<td>1</td>
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<td>- - 10 35 15 10 10 20</td>
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<td>8</td>
<td>- - 15 5 20 35 10 15</td>
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</table>

**Fig (1)**

From this figure, the researcher observed that the least favoured aims are 6,7 and 8 while the most favoured ones are 2,3,1 and 5.
Question (2)

From the list below choose the suitable type(s) of spoken English that secondary level school students in Port Sudan town need to understand by putting a tick ( √ ) in front of them and a cross ( x ) in front of the others. Then put those you have ticked in order of importance from the greatest to the least.

a) Type of discourse)

1. Discussions.
2. Descriptions.
3. Talks.
4. Dialogues.
5. Stories.
6. Advertisements.
7. Interviews.
8. Pop songs.
9. Lectures.
10. Directions.
11. Folk songs.
13. Instructions.
14. Telephone conversations.

In relation to the first part of this question which deals with the suitable types of spoken English that secondary school learners need to understand, teachers gave these opinions:

- Dialogues, discussions and stories were chosen by all teachers.
- Interviews 55%
- Talks, descriptions and telephone conversations 30%
- Instructions, directions, lectures, advertisements, pop songs, folk songs and news broadcasts 15%

Concerning the arrangement of the suitable types of spoken English that secondary school learners need to understand, teachers, to whom the researcher distributed the questionnaire, differed considerably in their opinions. From figure (2), the researcher noticed the following:

- Discussions and dialogues were placed number one.
- Talks, lectures, directions and instructions were put number two.
- Stories, advertisements and directions were considered number three.
- Stories, interviews, instructions and telephone conversations were put number four.
- Discussions, dialogues, interviews, pop songs, folk songs and news broadcasts were placed number five.
- Discussions, descriptions, dialogues and advertisements were considered number six.
- Descriptions and talks were put number seven.
- Discussions, dialogues and lectures were considered number eight.
- Stories, news broadcasts and telephone conversations were chosen number nine.
- Folk songs were selected as number ten.
- Talks and interviews were picked out as number eleven.
- Stories were deemed number twelve. Telephone conversations were placed number thirteen.
- Discussions and dialogues were considered number fourteen.

(b) From the list below choose the
suitable type(s) of language that secondary school students, who were under investigation, need to understand by putting a tick (✓) in front of them and a cross (x) in front of the others. Then put those you have ticked in order of importance from the greatest to the least.

<table>
<thead>
<tr>
<th>Type of language</th>
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From the above figure, the investigator noticed that the most favoured types of language are formal and British English, whereas the least favoured type of language is American English.
Analysis of observation checklist (1)
To draw a complete and clear picture of what was happening in the classes when teaching listening, the researcher designed two formats of observation checklists: the first was to identify students’ reactions when they were exposed to different types of listening through short taped listening materials. These various kinds of listening involved informational listening, critical listening, appreciative listening and so on.

The other observation checklist looked into the role of the teachers when teaching their pupils a listening lesson. This can be achieved through different kinds of materials. These materials involved taped materials namely, dialogues, passages, conversations and materials taken from textbooks. Teachers’ role or function was investigated through three stages, that is to say, before they came to the classrooms, when they were inside their classrooms, and after a listening lesson.

Now the researcher is going to analyse...
the first observation checklist that dealt with students’ responses when they were confronted by different types of listening materials. The end-product of the students’ responses to the several sorts of listening was as follows:

1. Pupils who were able to react to and recall details of an oral message (informational listening).
   - Never 60%
   - Sometimes 30%
   - Most of the time 07%
   - Always 03%

2. Pupils who were able to react to and recall and respond to the sequence of a message (informational listening).
   - Never 52%
   - Sometimes 37%
   - Most of the time 10%
   - Always 01%

3. Pupils who were able to follow a set of oral directions (informational listening).
   - Never 55%
   - Sometimes 35%
   - Most of the time 07%
   - Always 03%

4. Pupils who were able to distinguish main from subordinate ideas (informational listening).
   - Never 45%
   - Sometimes 40%
   - Most of the time 10%
   - Always 05%

5. Pupils who were able to take notes from an oral communication (informational listening).
   - Never 45%
   - Sometimes 37%
   - Most of the time 07%
   - Always 06%

6. Pupils who were able to take action based on information heard (informational listening).
   - Never 55%
   - Sometimes 35%
   - Most of the time 09%
   - Always 01%

It is obvious that the majority of the students were never able to react actively to this sort of listening. Some of them sometimes reacted to it while a few most of the time succeeded in interacting with it. Those who always reacted actively to this type of listening constituted the minority.

7. Pupils who were able to perceive relations among ideas (critical listening).
   - Never 72%
   - Sometimes 23%
   - Most of the time 03%
   - Always 02%

8. Pupils who were able to distinguish fact from opinion (critical listening).
   - Never 72%
   - Sometimes 25%
   - Most of the time 02%
   - Always 01%

9. Pupils who were able to identify a speaker’s point of view and feelings (critical listening).
   - Never 49%
   - Sometimes 38%
   - Most of the time 07%
   - Always 06%

10. Pupils who were able to identify
the non-verbal and vocal expressions that communicate feelings and ideas (critical listening).

Never 50%
Sometimes 30%
Most of the time 15%
Always 05%

From the analysis above, the researcher observed that most of the students never responded actively to this kind of listening. Very few of them always were able to interact effectively with this sort of listening.

11. Students who were able to formulate opinions and judgments, support judgment with reasons (critical judgmental listening).

Never 70%
Sometimes 15%
Most of the time 12%
Always 03%

12. Students who were able to evaluate stories heard (critical judgmental listening).

Never 40%
Sometimes 25%
Most of the time 20%
Always 15%

13. Students who were able to weigh the quality of an oral message (judgmental listening).

Never 47%
Sometimes 42%
Most of the time 10%
Always 01%

14. Pupils who were able to identify some messages as propaganda and evaluate these as harmless or harmful (judgmental listening).

Never 55%
Sometimes 33%
Most of the time 10%
Always 02%

15. Students who were able to take pleasure in the content of stories, poems and dramatizations when heard (appreciative listening).

Never 40%
Sometimes 35%
Most of the time 20%
Always 05%

16. Pupils who were able to enjoy the sounds of language (appreciative listening).

Never 57%
Sometimes 25%
Most of the time 15%
Always 03%

17. Students who were able to enjoy the moods expressed and the pictures conjured up through striking language usage (appreciative listening).

Never 60%
Sometimes 25%
Most of the time 12%
Always 03%

The researcher noticed that the majority of the students never able to enjoy the moods expressed and the pictures conjured up through striking language usage whereas the minority always able to enjoy this form of listening language usage.

From the analysis of this sort of listening and other kinds, the researcher noticed that students were unable to cope with these kinds of
listening well. They showed great weakness in this respect which entails specific and effective treatment to put them on the right track for listening comprehension.

**Detailed analysis of observation checklist** (2)

Concerning the second observation checklist that dealt with the teachers’ role when teaching a listening lesson to their students, the researcher would like to make a clear and full picture of **What Actually Done by the teachers**. This can be achieved through different materials. These materials included taped materials, i.e. dialogues, passages, conversations and materials taken from textbooks. By analyzing the observation checklist, the investigator came to these conclusions:

1. Type of language used by the teachers to practice listening.
   - Authentic 5%
   - Inauthentic 75%
   - Both types 20%

2. Control exercised over the linguistic aspects & the topic of the message: Linguistic aspects of the language 35% (such as sounds, vocabulary and structure)
   - Topic of the message 65%

3. Division or portions of the material used by the teachers. Division of the material into:
   - Complete sections 15%
   - Incomplete sections 40%
   - No division into sections at all 45%

4. Topics selection according to the variables that affect our teaching of the listening skill (such as the age, sophistication of the pupils, etc.)
   - Teachers who employed topics that fit in with the students’ age and sophistication 30%
   - Teachers who did not use topics that are appropriate to the pupils’ age and sophistication 70%

5. Grading of the listening material that is used by the teachers according to the level of the pupils:
   - In terms of difficulty 35%
   - Is not in accordance with the level of the students in terms of difficulty 65%

6. Length of the passages to be presented by the teachers:
   - Passages of more than hundred words 55%
   - Passages of less than hundred words 45%

7. The break down of long extracts by the teachers:
   - Into meaningful and manageable length 45%
   - Into meaningful but not manageable length 55%

8. Speed of delivery of the teachers:
   - Normal speed of delivery 40%
   - Speed that is slower than normal 60%

9. Number of pauses in a listening material that is used by the teachers.
   - Served listening materials that include sufficient pauses 35%
   - Listening materials with insufficient pauses 65%
10. The number of times of listening to the material.
    Teachers who allowed their students to listen to the material only once 75%
    Teachers who allowed their students to listen to the material twice 20%
    Teachers who allowed their students to listen to the material several times 05%

11. Type of the listening material to be listened to.
    Listening materials that allow students to be exposed to various voice qualities 30%
    Listening materials which don’t allow students to be exposed to various voice qualities 70%

12. Adoption of the visual dimension.
    Most of the time used the visual dimension 15%
    Sometimes used the visual element 25%
    No visual element at all 60%

13. Teachers intervention while listening.
    Teachers who always intervene while listening 50%
    Teachers who occasionally intervene while listening 35%
    Teachers who don’t intervene at all 15%

14. Teacher’s job is to provide students with useful exercises to help them understand the material presented.
    Always gave certain tasks after listening to check students’ comprehension 35%
    Sometimes gave tasks after listening to check their students’ understanding 40%
    Never accompany their listening with tasks that test whether their students have fathomed out the listening material or not 25%

15. Flexibility with the students’ answers.
    Satisfied with a response that is sensible in the context 45%
    Insisted on a unique correct response 55%

16. Raising students’ motivation to listen to the foreign language.
    Whenever possible, even without paying attention all the time (passive listening) 40%
    Rarely encourage their students to listen to the foreign language 45%
    No encouragement at all 15%

17. Form of words used by the teachers to make their intentions clear.
    Use of pretentious language 60%
    Use of technical jargon 35%
    Employment of language that students can understand 05%

18. The preparatory stage of a listening lesson.
    Gave this stage its due attention and prepared themselves and the students for it 35%
    Did nothing in this stage 65%

19. While-listening stage.
    Gave students some exercises, tasks,
and activities during listening  
45%
Did not give students any support while they are listening 55%
20. Post-listening stage.
Exploited the passage after students have listened to it. 40%
Did not employ the passage after students have listened to it in any way 60%

The results of the analysis

The analysis of observation checklist (2) resulted in the following:
• Inauthentic language was used by most of the teachers.
• Control was not exercised over the linguistic aspects of the language by the majority.
• No division of the listening material into sections was practiced by most of the teachers.
• Most of the teachers did not use topics that are appropriate to the pupils’ age and sophistication.
• The minority of the teachers graded the listening material according to the pupils’ level in terms of difficulty.
• Passages of more than hundred words were frequently used by the teachers.
• Most of the teachers did not give tasks after listening to check the pupils’ understanding.
• Insisting on a unique correct answer was adopted by most of the teachers.
• The majority of the teachers did not encourage students to listen to the foreign language.
• Teachers used very rarely language that students can understand.
• Most of the teachers did not give the pre-listening stage its deserved attention and did not prepare themselves and their students for it.
• Most of the teachers did not give their pupils any help while they are listening.
• Most of the teachers did not employ the listening material after students have listened to it in any way.
• Breaking down of long extracts into meaningful and manageable length was not adopted by most of the teachers.
• The majority of the teachers used speed that is slower than normal.
• Listening materials with insufficient pauses were used by most of the teachers.
• The majority of the teachers allowed their students to listen only once to the listening material.
• Most of the teachers did not allow the pupils to be exposed to the various voice qualities.
• Most of the teachers did not accompany the listening material with a visual element.
• Most of the teachers always intervene while listening.
Summary of the actual problems that encounter secondary school students in learning to listen to English

The evidence that shows why listening is difficult to Sudanese learners of English, who were under investigation, comes mainly from three sources: the message to be listened to (the material), the presentation and the physical setting.

The message (the material)
This include redundancy, colloquialisms, idealized language, its vocabulary, and its unpredictable phrases.

The presentation (the speaker and the listener) The speaker
This involves the different accent used, intonation and stress which characterize natural speech and spoken prose as in reading aloud written texts, and redundant utterances.

The listener
This comprises his lack of control over the speed at which speakers speak, his inability to get things repeated, his limited vocabulary, his failure to recognize cohesive devices, his problems of interpretation, his inability to concentrate, his mishearing the sounds, his inability to cope with redundancy and noise, his inability to predict, his fatigue, his misunderstanding of different accents, his insufficient practice opportunities and his attitude towards listening.

The physical setting
Noise
Noise, including both background noises on the recording and environmental noises, take minds off the content of the listening passage. Unclear sound resulting from poor quality equipment interfered with listeners’ comprehension.

Visual dimension
Listening material on tape lacks visual and aural environmental clues. Not seeing the speaker’s body language and facial expressions makes it more difficult for secondary school listeners, who were studied, to understand the speaker’s meaning.

Recommendations
(A strategy for Teaching the Listening Skill)
The researcher can decide that the difficulties that resulted from the application (processing) of the tools used in the study can be classified into three main categories, namely, the message to be listened to or the material, the presentation which involves both speaker and listener, and finally, the physical setting which comprises noise and visual dimension. Not all the problems resulted can be overcome.
Certain features of the message and the speaker, for instance, are inevitable. But this does not mean that teachers can do nothing about them. Teachers can at least provide the students with suitable listening materials, background and linguistic knowledge, enabling skills, pleasant classroom conditions, and useful exercises to help them discover effective listening strategies.

The researcher’s recommendations take the form of a strategy for developing the listening skill in secondary level schools in Port Sudan town. This strategy will deal with four principal aspects, i.e., message (material), presentation (speaker and listener), physical setting (noise and visual element). It had better set this question before proceeding the strategy. **What Can Teachers do to help pupils master the difficulties?**

1- **The message (the material): contrived language versus live language.**

Two types of listening material should be used in teaching listening comprehension, contrived language and live language. Contrived language is the language items especially designed, adapted or produced for teaching purpose while authentic language is any thing written or spoken by native speakers for or to native speakers. Some examples are: films – TV programs – interviews – unscripted conversation – radio excerpts – advertisement – songs – etc. Understanding live language is in the ultimate aim of teaching listening. Yet, contrived language is important as a means to that end.

Through contrived language material, which is in language teaching terms, is one that has been written especially for language students. Examples of this are dialogues, conversations and passages included in the course book when students read aloud. These are devoid of features that characterize authentic language such as repetitions, false starts, pauses and rephrasing. Control is exercised over the linguistic aspects, sounds, vocabulary, and structure as well as the content. This control is essential in the early stages.

The contrived language material should be authentic, i.e., consisting of utterances with a high probability of occurrence, since, using artificial language combinations is a waste of time and energy and can only confuse the student when he/she is later confronted with natural speech. For contrived language to be authentic, it should have redundancy which is a characteristic of natural speech. Artificially constructed material often causes difficulty because of reducing the amount of redundancy. This redundancy is important since it helps the person to follow the message at the normal speed although some parts of it may pass unheard. In authentic speech, there are two types of redundancy,
redundancy of content and linguistic redundancy. It is the lack of content redundancy that makes following a close knit discourse requires a concentrated effort on the part of the listener. So, the researcher suggests that listening comprehension passages should have a certain amount of repetitious material which may take the form, for example, of explanation or description in slightly different version.

Another characteristic of authentic speech (natural language) is that it is different from the written language. So, a printed text should not be used un-adapted in listening comprehension.

The solution is that either to take material from sources other than the class textbook or to adapt the text. Also studying the syntactic differences between spontaneous informal speech and the carefully prepared language before setting material for listening comprehension. Thus, the contrived language should be as authentic and as natural as the live language. The difference should lie only in the degree of control exercised over the material. After students have received much practice in listening to contrived language material, they should move forward to practicing listening to live language which is the ultimate goal of teaching listening. As soon as students can take it, pupils must try live-situation recordings.

Live language situations are important, since they not only expose the students to very natural language with its infinite variety of structures, new vocabulary, idiomatic expressions, colloquialisms, and changes in register (as opposed to typical classroom register), but it also adds a lot in terms of meaningful cultural exchanges.

Finally, since contrived language, essential as it is the beginning, is unable to prepare the students to cope with real life language situations, recorded live language material is precisely what is needed to bridge the gap between the language heard in EFL classrooms and the real language that is spoken by native speakers in informal situations.
Live & Contrived Language

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<tr>
<th>Type of language</th>
<th>Live</th>
<th>Contrived</th>
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<tbody>
<tr>
<td>Definition</td>
<td>Are said to be those which are designed for native speakers: real texts designed not for language students, but for speakers of the language in question.</td>
<td>Are those have been written especially for language students.</td>
</tr>
<tr>
<td>Examples</td>
<td>English language newspapers–radio programs for English speakers, a British advertisement, etc</td>
<td>Conversations, dialogues and passages included in course-books and read aloud</td>
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1.1 Topics

Used in listening comprehension should vary with the age and sophistication of the students and therefore match their knowledge of vocabulary and experience or interest. These topics may include personal experiences, family, friends, pets, and funny incidents. Interviews may deal with food and eating habits, drinks, recreation in spare time, and holidays. Dialogues may be based on how to take or leave messages, make appointments, get information via the telephone. Radio or TV programs may include news bulletins (with wide areas of vocabulary), weather reports, plays, songs, and film scenarios. The material may also be in the form of speeches, discussions or lectures or literary or cultural subjects, current events, and controversial issues.

1.2 Difficulty

At the beginning, the material should be familiar to the students. Here, neither new vocabulary nor new structures should be introduced, but the main effort is to present quite new situations within the language features already known by the students. At this stage, unfamiliar material will present the inexperienced student with a high information content in each sound sequence, thus affecting his/her memory and making him/her unable to retain the relevant elements from the preceding sequences.

Yes, keeping the listening material at this elementary stage will not allow the teachers or students to know how far they can stretch their minds or ears. So, at a higher stage, the students should not be left without a challenge. This challenge is to see just how easily quite new lexis and phrases can be guessed, provided the context gives a strong enough lead. By this advanced stage, the student should have mastered the basic phonological and structural patterns of the language. So, recognition of these patterns is almost automatic,
thus allowing the student assimilate easily the new elements when embedded in easily recognizable material. The new elements introduced in the listening comprehension passage, should be not more than three or four words or one structure, and their introduction, should always be intentional and never accidental. At this stage, choosing the listening material should be based on two main criteria:

a. How much can the context help in following the gist?

b. How far can quite new vocabulary be intelligently guessed from what has gone before?

1.3 Length of passage

The main principle in that the listening material should move from short to longer passages. This sounds logical since the learner at the beginning will pay so much attention to recognizing the sound sequences that less capacity is left for retaining what he has heard and understood. As the student’s familiarity with the language increases through having more and more practice, he becomes able to follow and retain longer and longer sequences. So, at the beginning, listening comprehension passages should be kept short. Only three or four sentences be given at a time or only two short sentences should be presented. Sometimes one sentence may be enough for beginner, to be increased gradually. At an advanced level, the student is able to follow and retain longer and longer sentences. Thus longer passages are presented with the aim of developing the student’s memory span. It should be mentioned here that the passage should form a meaningful unit. So, very long extracts should be broken down into acceptable and manageable lengths.

1.4 Length of sentence

In listening comprehension, the length of the segments emitted in each breath group is significant. This significance lies in the fact that the amount of information is directly proportional to the number of the words. So, the longer the segment the greater is the strain on the auditory memory. Therefore, the length of sentences should vary according to the level of the students. Their abilities to concentrate will be impaired if too great strain is placed on the memory. With segments of from eight to ten words, less in the early stages, the mind of foreign learners can recirculate the material during the pause, relating it to what preceded and anticipating to some extent what will follow. So, at the beginning, students should be presented with very short sentences (basic pattern). Gradually longer sentences are required.

2. Presentation (the speaker and the listener)

2.1 Speed

It is always emphasized by foreign languagemethodologiststhatstudents
should be exposed to the normal speed of the foreign language from the beginning of learning listening comprehension. The normal speed is a speed of delivery which would not appear to a native speaker to be unduly labored—a speech which retains normal word groupings, elisions, liaisons, consonant assimilation, natural rhythm and intonation.

Artificially slow speed must be avoided in teaching listening since the utterances are inevitably distorted and the auditory images stored by the student will not be immediately useful when he hears a natural formal of speech. This means that we reject any material that is originally produced specifically for foreign use. Even if teachers complain that students will not understand the normal speech, the researcher assures that, they will if the language material is presented in graded stages. Sometimes it may be desirable that the listening material be presented in a little slower speed than ordinary fluent speech. This may be the case with the first recording or reading of a passage that would be read twice or with the opening sentences which usually set the scene in a story.

In such cases, the researcher suggests that the normal intonation should be preserved, and, by analogy, it should be similar to a native speaker telling a story to a group of small children, and not giving a dictation. Finally, it is preferable that the listening material should be recorded. This will ensure that the identical passage be played again and again without being influenced by the teacher’s impression or the students’ attitudes.

### 2.2 Pauses

Pauses serve an important function in following and understanding speech. They allow the student to rehearse what he/she has heard, thus strengthening the memory trace. These pauses, are characteristic of natural speech in the form of recitations, hemming and hawing, restating, and cliché phrases. These help extend the pauses in normal speech. The lack of sufficient pauses will cause material to be lost through making the immediate memory unable to recirculate what is retaining. Therefore, listening material should be made to include sufficient pauses. This may take the form of lengthening the pauses between segments. Finally, it is reasonable to expect that pauses may be longer for the beginners to enable them to recirculate the information emitted. Of course, lengthening the pauses should not affect the normal speed of delivery within the segments.

### 2.3 Repetition of material

There is no set limit for the number of times the students should be exposed to the listening signal (material). The criterion is the students, understanding of the material. For the beginners when the emphasis
is placed on recognition, the same material may be repeated several times. This allows students to have further practice in listening and selecting and to have an opportunity to verify their answers.

Gradually, as students progress, they should be encouraged to listen to the material less and less times. Later, with more advanced students, efforts should be exerted by the teacher to train them to listen to the material only once. This is the ultimate aim that should be achieved to help the students get involved in real-life situations.

2.4 Different Voices
Teaching listening comprehension aims at helping students to be able eventually to understand different people in different situations. Every individual has his own idiolect which is different from that of other people. The quality of the female voice is different from that of males. Both are still different from the child’s voice. To achieve this aim, material should be graded to allow students to be exposed gradually to various voice qualities.

At first, beginners may be exposed to two different voice qualities, preferably male and female. Sticking to the same two voice qualities for sometime is important since it helps inculcate the basic phonological patterns of the language with additional burdens being placed on the student as a result of introducing new voices.

Gradually, other voices may be introduced in different situations. The purpose here is to train students to recognize not only the basic intonation patterns of the language, but also those carrying extrinsic information which may be vital to his/her functioning of the language.

At an advanced stage, students should have the opportunity to hear a variety of voices of differing quality, and educational backgrounds. Children’s voices should also be recorded and presented to students. To achieve this variation, radio recordings which illustrate typical everyday situations are valuable for accustoming students to different voices.

2.5 Regional Dialects
After students have covered the four points discussed so far, it is time to expose them to the main dialects of the language. In the case of English, if the students have all the time been practicing one of the two main dialects (British or American), the other dialects should be dealt with to train students to recognize the dialectal variations. At this more advanced level, such training may be started by using recordings of simple utterances in the new dialect. It should be stressed that it is recognition, not production, of various dialects that is being aimed at here.

3. Physical Setting
3.1 Noise
In real-life situations we rarely listen
to ideal messages, i.e., messages without the accompaniment of irrelevant sounds (noise). This noise is related either to inadequacies on the part of the speaker or to physical difficulties in the situation. This leads to missing some of the message by the listener. A basic aim of teaching listening comprehension is to enable students eventually to cope with these “noise” features. When teaching beginners, students should listen to noise-free language material. By using taped or recorded material, the speaker’s idiosyncrasies can be avoided. The language-laboratory is very important at this stage to keep out the physical noise for it excludes distractions and assist concentration. As students progress the “noise” element should be introduced and increased gradually in the listening material. So, instead of using the laboratory head-phones and tape recorders may be needed through the air. Later, a form of light background noise may be introduced such as music or knocking. Also, students may listen to material with a tiny bit wiped off the tape, or the volume may be rapidly turned down and then up again. At a more advanced stage, student should be exposed to more realistic situation. The student should be trained to behave with the same confidence (as the native speaker) to make reasonable interpretation even though he has not clearly heard all the information. The native speaker does this because of his ability, supported by the redundancy features existing in the linguistic code itself, to reconstruct the message as he thinks it should be.

3.2 The Visual element

The visual element serves a number of functions in language teaching in general and listening in particular. Through visual aids (pictures or films), students can acquire the cultural background of the target language (TL). This background is important for mastering the language. Other functions of the accompanying visual material, are that it effectively reduce the amount of concentration or understanding and remembering what is said, assists in learning what is said, and certainly helps to prevent the danger of listening without comprehension. Also, an accompanying film helps students to watch the expression and gestures of the speakers as further delimitations of the message this is significant since no full comprehension of aural communication is complete without taking these kinesics and paralinguistic aspects into consideration. With beginners, where vocabulary is limited to concrete objects and actions, the listening material should be accompanied by visual material. In case of pictures, each must have only one possible interpretation. Gradually, students should be trained...
to listen with less and less visual help. At a more advanced stage where material is characterized by a higher degree of complexity and abstraction, students should be encouraged to depend more and more on their ears in understanding the message with the least visual help.

**Conclusion**

Some teachers think that listening is the easiest skill to teach, whereas most students think it is the most difficult to improve. This contradiction reveals that there are some things about teaching listening need to be explored. Perhaps those who say it is “the easiest to teach” mean that it does not require much painstaking lesson preparation and all they need to do is play the tapes and test the students’ comprehension. But is there nothing more to teaching listening than testing? Teachers must find out all they can do about how listening can be improved and what activities are useful to this end and then use this knowledge and these activities in their own classrooms.

**References**

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المستخلص:
تهدف هذه الدراسة إلى البحث في تدريس مهارة الاستماع في مدارس المرحلة الثانوية في مدينة بورتسودان. ما الذي يفعله حقيقة المعلمين عندما يدرسون هذه المهارة المهمة جدا وكيف يتفاعل الطلاب مع تدريسها. في نهاية البحث، حاولت الدراسة التخلص من المشكلات التي واجهت الطلاب في تعلمهم لمهارة الاستماع في اللغة الإنجليزية. تبنى الباحث منهج الدراسة الوصفي التحليلي لأنه يلائم وتناسب مع هدف وطبيعة الدراسة. توضع هذه التحليلية موضع التنفيذ حيث استخدم الباحث أدوات مثل الاستبانات واستمارات الملاحظة. نتج من الدراسة عدد من المشاكل وواجهت المدرسين والطلاب على حد سواء عند تدريس مهارة الاستماع وتعلمها. هذه المشاكل صنفت بوساطة الباحث إلى ثلاثة أصناف رئيسة أي الرسالة (المادة) التي يستمع إليها والعرض الذي يشمل كل من التلميذ والمحيط (الوضع الطبيعي الذي يشتمل الأصناف المنتجة في مكان الاستماع والظروف المرئي. أوصى الباحث في نهاية البحث باتباع استراتيجية محددة لتعامل مع هذه المشكلات من الصعوبات.
Amin Mohamed Ahmed

Investigating the situation of teaching/learning Listening Comprehension

(A case study: secondary level schools-Port Sudan)