Original Research Article

Geo-education in Egypt, ideas, challenges and vision

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INTRODUCTION

Geology as a science is considered as a basic science. By studying geology, we can learn more about the earth’s structure, the evolution of life and the way in which geology has been the controlling factor in determining the conditions in which we live. Also geology represents both scientific and educational as well as social and cultural values, where it shows representative and unique views of nature (landscape) and knowing natural resources such as; oil gas, gold. Environmental conservation is also related to geology and very important in land use planning to avoid misuse.

In the new modernization and different societies which we live nowadays, education plays an important role in integrating all children and granting them the means to make the best use of living in such a diversity by giving them social equity (Sleeter, 2001). UNESCO’s message is 'Learning to live together', while its mission is central to as one of the four bases of knowledge essential to complete personal and social development in the 21st century (Tibbitts, 2005).

In the last decade, a group of scientists and educators came together in a working group to discuss the need for a strong emphasis on geoscience education within the Directorate for Geoscience (GEO) at the National Science Foundation (NSF) in Egypt. This group outlined a set of geoscience education priorities and strategies for GEO that have served to define and guide the Directorate’s education and Diversity (E&D) effort to date. The landscape of Geoscience education and science education research in general has changed in response to changes in national priorities, advances in technology, progress in science education research and changing US demographics (Jacline et al., 2005). Actually we live in a society experiencing a huge revolution in technology and education; schools cannot fascinate and emotionally motivate their students and teachers, taking into consideration the bureaucracy of learning.

In 2000 a geologic survey of Sweden reported the need to monitor the importance of basic geological perspectives in the society while in 2007, some scientists undertook a research to use earth and geospatial information sciences to change traditional educating (class room teaching).
Sarmento (1998) found that educational system should be taken as the main concern for people's formation with development of critical and creative skills for modulation in today's world. According to Correia (2004), ICT's have the capability to make education more attractive, only if students are given the opportunity to be involved in significant and actual activities and/or respond to challenges and problem solving. The major objectives identified as beneficial to the future success of geoscience as a national enterprise include: promoting and publicizing the synergy between geoscience and national priorities; increasing the breadth, scope and quality of geoscience education at all levels. For these objectives to be achieved, the community should become more efficient in spreading information about teaching geosciences in formal settings (Jacona et al., 2005).

Many urgent challenges facing Egypt's education system are in the post-Mubarak era which was a dark era in Egypt's life. After January revolution in 2011, there was no sufficient budget to enhance education and no future plans were set aside to modify education for a suitable system to heal the education gap. There is a big gap between the educational and science systems. Also the miserable quality of the state's education system is helping in destroying the curve of students' awareness amidst shortages in teachers and teaching skills which remains a constraint to the good growth opportunities in the education system (Louisia, 2012). Many studies have pointed to the educational regime in Egypt but not with Geo-education as the main target.

Geoscience is an important science that should be known at all levels of education but due to the economic and social problems in Egypt, most Egyptians have no idea about how important this science is. In the under graduate level students have decided to spread the concept of geo-education by invading schools to interact with both science teachers and students (the stakeholder).

Geo-education as a new term is not known in Egypt, where they hardly know the term geology as it is not recognized as an important science. Thus, this research is the first to study Geo-education with special emphasis on geology in Egypt.

**METHODOLOGY**

Questionnaires are popular and fundamental tools for acquiring information on public knowledge. The key features of the methodology of this study include questionnaire design, administration, sampling techniques and data analysis (Bird, 2009).

Questionnaire surveys are efficient in that many variables can be measured without substantially increasing the time or cost. Survey data can be collected from many people. The questionnaire is a survey instrument containing the questions in a self administered survey (Weiss et al., 2006).

Survey research involves the collection of information from a sample of individuals through their responses to questions. The National Science Foundation (NSF) turned to survey research for 200 National individuals and education settings (Weiss et al., 2006). Weiss et al. (2006) also obtained data through classroom observation, administration of questionnaires to teachers and principals as well as interviewing teachers.

Phellos et al. (2011) posit that the use of structured questionnaires, interviews and observation instruments is an important skill for researchers as this type of survey is used in many types of researches. In 2008 Demircioglu (2008) examined the attitudes of students and teachers by using a questionnaire containing open-ended questions and an interview in the data-collection process.

The educational system in Egypt is divided into Government and Non-governmental; there are schools belonging to the government system and others to the non-governmental system. Therefore, the research was carried out in both systems to figure out which system is better. 9 schools, distributed in Cairo have been chosen (Table 1).

The methodology of the study is as follows; a pilot survey (by using questionnaires) to measure the awareness of students was carried out and interviews to teachers in addition to questionnaire administration to point out if the concept of geo-education needs to be spread.

**RESULTS AND DISCUSSION**

**Teachers**

Teachers are the main factors in the education system as their responsibilities in delivering the curriculum is a very critical rule. Most teachers have not received any significant formal training in science or science education, and even fewer teachers or no one studied undergraduate geology.

14 teachers responded to the questionnaire from each of the 9 schools. In each of the schools, there are 4 to 8 science teachers; only 3 of them are allowed to teach Geo-science. A total of 52% responded to the questionnaires. The questionnaire was designed to measure specific criteria such as knowing the basics of Geo-science, importance of this science, the way of teaching this science if present in the syllabus and finally the general knowledge of the teacher. The questionnaire contained 15 questions and was structured to measure the information known by the teacher and if they are up-to-date and aware of daily geologic events or not.

5 teachers were aware of and good knowledge of geology while 9 were not familiar with geoscience and did not have an idea about if geology is a science or not meaning that 35% of teachers are aware of teaching Geo-science and 65% of teachers know nothing. Some of them teach the
Table 1. show the schools selected

<table>
<thead>
<tr>
<th>Institution</th>
<th>School name</th>
<th>Location</th>
<th>Sample density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governmental Schools</td>
<td>Om Al-abtal</td>
<td>Preparatory</td>
<td>Al-Haram street, Giza</td>
</tr>
<tr>
<td>Governmental Schools</td>
<td>Om Al-abtal</td>
<td>Secondary</td>
<td>Al-Haram street, Giza</td>
</tr>
<tr>
<td>Governmental</td>
<td>El-Haram model school</td>
<td>Secondary</td>
<td>Remayah area</td>
</tr>
<tr>
<td>Governmental Schools</td>
<td>Al-Dahr for males</td>
<td>Preparatory</td>
<td>Ramsis street, Cairo</td>
</tr>
<tr>
<td>Governmental Schools</td>
<td>Al-Dahr for males</td>
<td>Preparatory, Ramsis street, Cairo</td>
<td>32</td>
</tr>
<tr>
<td>Non-Governmental</td>
<td>City school</td>
<td>Preparatory and secondary</td>
<td>6 October city</td>
</tr>
<tr>
<td>Non-Governmental</td>
<td>Horya school</td>
<td>Preparatory and secondary</td>
<td>Dokki street, Giza</td>
</tr>
<tr>
<td>Non-Governmental</td>
<td>Izis school</td>
<td>Preparatory</td>
<td>Shubra street, Cairo</td>
</tr>
<tr>
<td>Non-Governmental</td>
<td>Al Shimaa private school</td>
<td>Secondary</td>
<td>Shubra street, Cairo</td>
</tr>
</tbody>
</table>

Figure 1: The students are interacting in a team work for solving the continental drift puzzle-like exercise

geology syllabus not knowing that fossils, volcanoes and earthquakes are studied by this science. Others mentioned that: "we know chemistry and physics but geology is not a science." One of the teachers who is a geologic supervisor was honest to say that although she is a supervisor, she has no idea about geology and how to teach it. She further stated that she never gives real examples to the students as she does not understand this science in addition to the badly written syllabus which makes the science uninteresting and difficult to be easily understood.

Students

280 students were selected randomly from the 9 schools with ages varying from 13 to 15 years. The questions were grouped into two groups. The first group of questions is for the secondary-school students to measure; knowing geoscience, studying geo-science in the syllabus, wanting to know more about this science and finally career opportunities for geoscientists. The second group of questions was for preparatory-school students’ to measure; knowing geoscience and studying geo-science in the syllabus.

The results revealed that students who didn’t study Geo-science before as a separate subject may study few parts within the syllabus.

Applied method

There is a part of the secondary school syllabus that talks about the continental drift. 30 students were chosen to take-over the new method of teaching. They attended a lecture talking about Geo-science as an introduction then an explanation of the continental drift through videos, charts and a handmade module which composed of cartoon plate-like continents that are stuck to it as puzzle parts and could be moved to illustrate the continents’ movement (Figures 1 and 2). The last mentioned methods are not
used in the regular way of teaching in the educational system (either governmental or non-governmental). After lecturing the students, questionnaire were administered to measure the level of success of this method and satisfaction of students.

**Pedagogical approached results**

Results obtained from the administration of the students’ questionnaire are shown in Figures 3 to 5. It is clear that the awareness of students in both preparatory and secondary educational levels in government schools are better than non-governmental schools. This indicates that regardless of the weakness of government-owned school system, their students have the ability to achieve good and promising advanced levels in geo-education but with good guidance. While the non-government-owned schools, despite their good system cannot achieve convenient results in geo-education levels. On beginning to invade schools to spread the concept of geo-education, it is better
to start with government-owned schools.

Figure 6 shows the results of students-administered questionnaire after the lecture. The result shows that the students are greatly interested in the way of teaching, where it could be applied not only to geo-education but can also be applied in other subjects. The results also revealed that students have a great awareness of many information.

Actually the results were out of expectations as we expected that the awareness of non-governmental schools will be higher than their governmental counterparts.
Figure 6: The interaction percentage of the students in the lecture given as an introductory material before the continental drift exercise

Through this survey, it was also found that we can start easily from the governmental system which can be easily modified.

CONCLUSIONS, RECOMMENDATIONS AND FUTURE AIMS

Actually geo-science is not a compulsory course in the Egyptian educational system thus making it a problem for teachers dealing with the course. Additionally, students who choose to take the geo-course are not allowed to be geoscientists graduating from the faculty of science or engineering. This is because, according to the Egyptian educational system, only literature-students are allowed to choose the geo-course. Furthermore, according to the educational system and syllabus problem as mentioned before, teachers are dealing with geoscience as a marginal course with no value, and it is clear that students disregard it which makes Geo-science have no value in our community.

Some recommendations to figure out these problems are thus:

• We recommend offering a diploma in Geo-Science for all the teachers who will/are teaching geology, by offering a joint degree between Earth department and the Institute of Education in Cairo University.
• Geo-science should be taken as a separate course in preparatory schools.
• Geo-science should be a compulsory course in secondary schools for all students.
• The syllabus should be designed to be more interesting and comprehensive (with the help of young geologists).
• We also recommend establishing an association for Geo-education in Egypt, which will be managed by young professionals from Earth-science departments to regulate the current recommendations.

Our aim is to make adequate general education and competence within geo-oriented subjects in the society by creating an understanding between geologists’, decision-makers and the public. More and better geological education and improved geological information for students and teachers are essential for there must be a raising of the level of general knowledge concerning subjects by creating interests. Knowledge is essential in creating the conditions for social planning; these aims could be achieved when the Egyptian ministry knows the importance and role of geology and when geology is given importance amongst subjects and in the curriculum.

By discussing with old aged people (post graduate students) who never studied geo-science to measure their level and capability to understand and know Geo-science. This will facilitate spreading the concept and the term of Geoscience.

ACKNOWLEDGEMENTS

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