# THE DEVELOPMENT AND FUTURE OF THE PRE-UNIVERSITY STATISTICAL EDUCATION IN EGYPT: A CASE STUDY

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*This paper is an attempt to study the development and future of the pre-university statistical education in Egypt, where it seems that the findings of the present study is applicable to many developing countries. The study starts with summing up the present state of art in statistical education in Egypt and having a global view in the area. Paradigm shifts in science, mathematics and mathematics education were examined and their implications on statistical education were identified and classified into long, intermediate and short terms. The future of the pre-university statistical education in Egypt was described in terms of almost the scenarios, progressive, reformatory and conservative ones.*

## INTRODUCTION

Apart from the Egyptian ancient civilization, Egypt is one of the developing countries, with a distinguish geo-political position and an active role over the world. It has passed through different eras of progressiveness and backwardness. Yet, very recently has been ruled by its own citizens. However, the modern Egyptian educational system was the first one among the Arab States, may be the Middle East countries, and- possibly- developing countries, or at least most of them.

Egypt can provide a typical example to the development of education, including statistical education, among developing countries.

As this paper is dealing with statistical education at the pre-university stages of education in Egypt, it will include the following sections.

1. The state of art in statistical education at the level of pre-university education in Egypt.
2. A global view to the development of pre-university statistical education in Egypt.
3. Paradigm shifts in relevant areas.
4. The implications of the above mentioned paradigm shifts on statistical education .
5. The future of statistical education in Egypt.

## THE STATE OF THE ART IN STATISTICAL EDUCATION AT THE LEVEL OF PRE-UNIVERSITY EDUCATION IN EGYPT

Pre-university statistical education in Egypt has not almost changed since 1998 or since a long time before (Mina, 1998). The present state of art at the pre-university level in the country could be summed up as follows:

1. Statistics is taught in the primary and preparatory stages, but not in secondary education with an exception as a part of an optional subject.
2. Major topics of study in the subject in primary education are: Collecting data, tabulation, and graphic representation by bar-line graphs, broken-line graphs and circular sectors, while the core topics of the subject in the preparatory stage are concerned with measures of central tendency for some values and frequency distributions (Al-Hawary *et al.*, 1989/1990).
3. The contents of the statistical part of the optional subject by the end of secondary education are: Probability, random variables and probability distribution, the normal distribution, correlation and regression (Al-Khowly and Abdel-Ghanny, 1997/1995).
4. A reference should be made in the present context that since 1998 the new literacy programmes include “reading” graphs (bar-line graphs and broken-line graphs), getting some information from them and comparing between some values of them, but without drawing them (Mansour *et al*., 1996).

## A GLOBAL VIEW TO THE DEVELOPMENT OF PRE-UNIVERSITY STATISTICAL EDUCATION IN EGYPT

Some of the mentioned points below sum up some of what Mina reached in 1998 (Mina, 1998):

1. Teaching statistics has started rather recently in the country, particularly by the beginning of the seventies of the twentieth century in primary education and by after ten years in preparatory education.
2. Syllabuses of statistics in different educational stages have been subject to fluctuation according to changes in the structure of the education system in Egypt as well as "developing" teaching the subject by introducing it or some of the included topics in earlier stages. As a matter of fact, the period 1969/70- 1974/75 was the worst one where the whole subject was cancelled from secondary education and some topics of statistics moved to higher grades in the other stages.
3. The introduction of "modern mathematics" in secondary education starting from 1970/71 and the following relevant developments have resulted in essential changes in statistical education. These being the introduction of probability and attempting to connect the study of statistics with the theory of probability. Further, basic concepts of probabilities were introduced in 2003 in the preparatory stage in Egypt in order to cope with TIMSS exams.
4. Units of statistics in primary education meet partly real life data problems, whereas the units on statistics in preparatory education are typically "cook-book" statistics. However, the dependency of the whole system on rote learning destroys almost the achievement of any high level objectives of teaching the subject.
5. Calculators are not allowed to be used in primary education except in the last year, while graphical calculators are neither used nor known. Although almost all schools in the country are equipped with computers, their use in teaching / learning is almost nil.

## PARADIGM SHIFTS IN RELEVANT AREAS

Statistical education can be seen as a sub-system of wider systems, including mathematics education, mathematics and science at large. So, paradigm shifts in these areas are supposed to affect statistical education. Therefore, a word on each of these shifts, from the general to the specific, is necessary.

*Paradigm shift in science* from "simplification" to "*complexity*" (Mina, 2000). By complexity (Mina, 2002), we mean the new changes taking place in science and its methodologies which are characterized by unity of knowledge (trans-disciplinarity), non-neutralism, the change in the relation between logic and thought, uncertainty, nonlinearity, cohesion of knowledge and its applications … etc.

*Paradigm shift in mathematics* is from seeing mathematics as the study of formal systems to seeing mathematics *as a living body* (Mina). *This shift has been reflected in primary school mathematics programmes* "from seeing mathematics as a large collection of concepts and skills to be mastered in some strict partial order to seeing mathematics as something people do"(Romberg, 1994, p. 3655), and *in secondary education* from the "formal" teaching of mathematics to *introducing mathematics as a human activity in order to provide a basic preparation of learners for the full participation as functional members of society* (Travers, 1994, p. 3661).

## THE IMPLICATIONS OF THE ABOVE MENTIONED PARADIGM SHIFTS ON STATISTICAL EDUCATION

These implications can be summed up as follows (Mina, 2002):

1. *In long term*, statistics is most likely to be introduced in the framework of integrated units. The major approach of teaching these units is the "applied" one, basically to deal with practical problems, with paying great attention for developing creativity through suggesting many different solutions.
2. *For intermediate term*:
   a) The study of "conditional prediction" rather than "prediction" as such. Therefore, much more attention will be paid to studying cases of possible scenarios and alternatives.

b) Paying much more attention to studying interactions among variables at the cost of linear and experimental models.

3. *For short term*:
   a) Concentrating on conceptual frameworks of statistical analyses and the use of technology at different levels of sophistication in computation.
   b) Statistics is to be studied in connection with the study of probability, and – if not already existed, studying "probability", at different levels starting from primary education, may be from kindergarten.

## THE FUTURE OF STATISICAL EDUCATION IN EGYPT

Although there is a gap between developing and developed countries in applying different developments in education – and other areas as well, and that the education system in Egypt is rather "traditional", it seems that the above short term suggestions could be applicable in Egypt, may be not fully in the intended way, but – however – not in a long time.

For long term, keeping the systemic view, there might be some alternatives (scenarios). In a former study (Mina, 2001, pp. 178-179), the writer has identified three alternatives for mathematics curriculum; Namely; progressive, reformatory and conservative. The same framework is still applicable, may be with somewhat extending the time limit. By checking the previous section, it seems that findings in long and intermediate terms correspond "integration" and "complexity". So, the writer mentioned different positions in these two aspects in different scenarios to describe possible alternatives in statistical education in Egypt.

*Integration*

1. Almost the study is in integrated contexts.
2. Almost all the syllabus is in the form of disciplines with attention given to the application of mathematics / statistics.
3. The syllabus is in the form of separated disciplines.

*Complexity*

a) Emphasis is given to "commons" among different systems, to state assumptions behind different formulas and the existence of different possible alternative solutions.
b) Attention is occasionally given to the points mentioned under the progressive scenario.
c) Formulas are almost supposed to be correct and certain. Marginal- if any – in relation to the points raised in the progressive scenario.

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