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Evaluation of Geographic Information Systems (GIS) Role in Developing the Cartographical Skills of Geography Section Students in the Faculties of Education and Arts

Dissertation

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Summary of the research

Introduction:

Geographic information system (GIS) is one of the general techniques which is based on using computers . It has the ability of displaying geographic information in different ways, carrying out statistical processes and establishing related spatial and descriptive data bases.

The geographic information system is considered greatly useful to sciences in general and geographic applications in particular. As related to geography, it has bilateral usefulness. The first one is methodological relating to enriching the thinking and methodology of geographic sciences. The second one is executive relating to planning, improvement and development. Thus, geographers were the first people who responded quickly and in accordance with geographic information system and they knew its advantages and drawbacks. They found its tools easy to use and therefore used these tools largely in the last period.

Cartographical plays on important role in the success of the geographic information system as a result of what it presents in the different stages to achieve the geographic information system. This is because the techniques used in representing spatial information are what cartographical takes care of and people should be familiar with these techniques in the area of geographic information system.

The cartographical process is one of the main functions of the geographic information system as the establishment of the geographic information system was related to it.

It can be deduced that the geographic information system programs are able to carry out different cartographical tasks. This is done through dealing with information bases in an automatic way that is characterized by precision and speed which is different from the traditional way that needs a great effort and which is not as precise when compared with cartographical process technique using the geographic information system.

So, the user of the geographic information system has to be acquainted with cartographical skills required to complete the drawing in an appropriate way.

Because of the importance of the geographic information system, (Kemp et al: Č Ě Ě č) and (National Council For Geographic

Education: č ċ)ċĐ emphasized the necessity of including the geographic information system in the geography curricula in the university stage as the geographic information system provides the students with job opportunities after graduation which help them in their future.

The Egyptian universities paid attention to this importance as the faculties of arts included the geographic information system with the academic courses. If we have a look at the faculty of Art , Ani Shams university , we find that the student studies the geographic information system and remote sensing in the first academic term of the second year. In the third year, the students branch into two sections : (Ǭ A general section in which the student doesn't study any geographic information system courses , (ǭ the geographic information system section in which the student studies computer statistical analysis, programming bases, remote sensing , the geographic information system (Ǭ, during the first academic term. In the second academic term, the student studies the geographic information system (ǭ course. In the fourth year, the students carry out a project via the geographic information system.

As to the faculty of Arts in Beni Suef, there is a geographic information system unit in which some course included in the present schedule are taught via the geographic information system. In the first year, the maps and space course (Ǭ, (ǭ and rural urbanism are taught. In the second year, population geography (Ǭ and maps (ǭ courses are taught. In the third year, distribution maps (Ǭ, (ǭ and geomorphology courses are taught. In the fourth year, the regional planning course is taught and a geographic information system section was established starting from the academic year č ċ /ċĔċ Č ċ

As for the faculty of arts , Fayoum university , the regulation includes computer applications and geographic information system courses that the general section , fourth year students study in their first academic term . The technical methods, remote sensing and its geographic applications courses are studied by third year maps section students in the second academic term . The maps section students

study computer application , geographic information system , aerial photographs , and cartographical project in their fourth year . The internal regulation of the faculty of education includes the geographic information system course ( ) which is studied by third year students starting from the academic year and the geographic information system course ( ) which is studied by fourth year students during the academic year according to the new regulation of the faculty. Therefore, there is a necessity of evaluating the status quo in order to identify the role of geographic information system programs in developing cartographical skills of students of faculties of education and arts .

The problem of the research :

The problem of the present research is represented in the insufficiency of traditional way of teaching maps as it takes a great effort and doesn't show the spatial relationships between phenomena in a clear way . This led to the low level of students in the cartographical skills which consequently led to the use of geographic information system programs in faculties of education and arts in teaching maps as maps occupy an important position in geographic information system .

The researcher tries to specify the role of geographic information system programs in developing cartographical skills of geography section students in faculties of education and arts .

The research tries to answer the following questions :

- What are the cartographical skills required by geography section students in faculties of education and arts ?
- To what extent are cartographical skills included in geographic information system courses of geography section students in faculties of education and arts ?
- How far do geography section students in faculties of education and arts possess cartographical skills ?
- What is the role of geographic information system programs in developing cartographical skills of geography section students in faculties of education and arts ?
- What is the suggested image of including cartographical skills in geographic information system courses in the preparation

programs of geography section students in faculties of education and arts ?

- What is the effectiveness of suggested image in developing cartographical skills of geography section students in the faculty education .

Aims of the research :

The research aimed at :

- Preparing a cartographical skills list required by geography section students in faculties of education and arts .
- Evaluating the role of geographic information system in developing cartographical skills of geography section students in faculties of education and arts .
- Establishing a suggested image to include cartographical skills in geographic information system courses in preparation programs of geography section students in faculties of education and arts .
- measuring the effectiveness of suggested image in developing cartographical skills of the study sample .

Significance of the research :

The research may be significant in :

- Identifying cartographical skills required by geography section students in faculties of education and arts .
- Developing preparation programs of geography section students in faculties of education and arts to be compatible with international technological developments ?
- Identifying the importance of geographic information system as an indispensable tool in developing the skills and abilities of geography department graduates of faculties of education and arts .
- Presenting suggestions for including cartographical skills in geographic information system courses in preparation programs of geography section students in faculties of education and arts .

Delimitations of the research :

The present research was limited to the following :

Ğ A sample of fourth year students in faculties of education and arts at Cairo and Fayoum universities . The rationale for selective is that they have the GIS courses included in their internal regulations.

ğ Geographic information system programs (Erdas Imagine + Arc Gis) .

Ð Cartographical skills required by geography section students in faculties of education and arts .

Instrumentations of the research :

The tools of the present research were represented in :

Ğ Cartographical skills list required by geography section students in faculties of education and arts (prepared by the researche) .

ğ A cartographical skills test (prepared by the researcher) .

Ð A cartographical skills observation checklist . (prepared by the researcher)

The research methodology :

The present research used the following two approaches :

Ğ The descriptive approach for surveying previous studies and preparing the theoretical frame work and tools of the research .

ğ The experimental approach for measuring the effectiveness of geographic information system in developing cartographical skills of the study sample .

The research Hypotheses:

The study aimed at testing the following hypothese:

There is a statistically significant difference between means of scores of experimental group in pre - post test of a cartographical skills in favor of post test .

Procedures of the research :

First : specifying the nature of geographic information system .

Second : In order to answer the first question , the researcher did the following :

Ğ Surveying previous studies and research related to geographic information system and cartographical skills .

ğ Preparing a Cartographical skills list and displaying it to a group of jury members in the field of curricula and instruction and geography to decide if it is applicable .

Third: In order to answer the second question , the researcher did the following :

-Analyzing the content of the geographic information system courses assigned to geography section students in faculties of education and arts .

Ď Fourth : In order to answer the third question , the researcher did the following :

Ğ Preparing a cartographical skills test in the light of the cartographical skills list that was previously judged and displaying it to a group of jury members in the field of curricula and instruction and in the field of geography to decide if it is applicable .

ğ Choosing the sample of the research randomly from the faculties of education and arts 'students.

Ď Applying the cartographical skills test on the sample of the research .

Fifth: In order to answer the fourth question, the researcher did the following :

- Recording and interpreting the results statistically.

Sixth: In order to answer the fifth question, the researcher did the following:

- Presenting the suggested image for including cartographical skills in geographic information system courses in preparation programs of geography section students in faculties of education and arts.

Seventh : In order to answer the sixth question, the researcher did the following:

Ğ Designed practical guide for the cartographical skills included in the suggested image .

ğ Selecting students of the experimental group .

Ď Teaching the suggested image to experimental group .

ď Administering cartographical skills test and observation checklist to the experimental group post to the experiment .

Đ Recording analyzing and interpreting results .

đ Presenting recommendations and suggestions for further research in light of the study results .

The results of the research:

In the light of the previous procedures of the research, the following results have been reached :

Ğ The results of the evaluative study confirmed the low level of geography section students in faculties of education and arts in cartographical skills. The researcher justified this in the following:

a- The inexistence of many cartographical skills in the geographic information system courses as these courses only have some of these skills . These skills should be taught with each other as they are complementary giving the students the opportunity to learn them as one unit . If some of these skills are missing , the students won't be able to apply them in the different situations.

b- The weak connection between the theoretical side of the geographic information system and the practical side of cartographical skills as the students study these two sides separately. This was clear as to students in the faculty of education as they study the theoretical side of geographic information system in their third academic year and the practical side in the fourth academic year. The researcher tried to overcome this through the suggested frame of the geographic information system which makes the theoretical side of the cartographical skills compatible with the practical side and which finally achieves the target of these courses.

c- Some people see that there are some skills particularly those related to space visuals that must be taugh separately from geographic information system . But the researcher included them within the cartographical skills that can be developed through geographic information system because they are considered one of the important means for getting geographic information in geographic information system . this was emphasized by (Mohammad Al Khozami Aziz : ċ ċ) ċIt ďwas also emphasized in (the first regional conference for geographic information system : ċ ċ) ċThey are one of the strongest spatial data bases and also the fastest to be used . They also have a great benefit in the field of updating old maps and producing maps directly without using complicated designs.

d- Lack of necessary requirements for teaching these skills through geographic information system as geographic information

system units suffer from lack of computers programs , specialists who teach or spatial and descriptive data . Moreover , many computers found in these units or labs are out of work and not enough for the number of the students .

e- The use of traditional teaching during teaching for these skills and the lack of practical training which makes the learner a passive recipient of the skill and unable to acquire it completely .

f- The incapable evaluation instrumentations during teaching cartographical skills to decide how far the students have acquired these skills and support points of strength in students and improve points of weakness. This lead to efficient students in these skills . The researcher tried to overcome this problem by preparing a group of tests that were given to them after studying a group of cartographical skills . Moreover , the final test which is conducted at the end of their study is done in a routine method which makes the students with no motives for learning these skills . Sometimes the students are asked to do a research instead of taking the test .All this affect the students' learning of these skills and make them passive learners .

g- The lack of time given to teaching geographic information system courses particularly for the general section students at the faculty of arts .These students study only one course for geographic information system whereas maps section students study the same course along with studying some of these skills in remote sensing course . As for the faculty of education , students study two geographic information system courses : geographic information system (Ǫ and geographic information system (ǫ. In order to overcome this problem , the researcher prepared a time schedule for teaching cartographical skills to enable the students to learn these skills .

h- The lack text – book related to cartographic skills in order to give the students a good chance for practicing the skills so, the researcher suggeste a cartographic skills practical guide to overcome this problem .

ğ The results of the experimental study confirmed that the students mastered the cartographical skills and proved that there is a statistically significant difference between means of ranks of scores in each of the pre application and post application of the cartographical skills test of geography section students in the faculty of education favouring the post application at (, ċ Ð level of significance . This indicates that if all necessary requirements for teaching cartographical skills are available through geographic information system programs , this will lead to the development of these skills . In addition it is vital to provide suitable opportunities for the students to practise these skills via providing suitable labs which are equipped with all required facilities .It is also fundamental to give the students enough time to practise cartographical skills in these labs . It is essential as well to provide the students with material to refer to as needed .
In order to develop cartographical skills via geographic information system programs , the researcher thinks it is preferable to accompany the teaching of these skills asking the students to conduct an application research enabling them to apply these skills in the practical fields as well as helping to master these skills greatly .

Recommendations of the research :

Ğ Preparing geographic information system units in faculties of education and arts for teaching geographic information system courses

ğ Providing the necessary requirements for geographic information system in order to enable the students to practise cartographical skills , reach the mastery level and make use of these skills in dealing with the different problems and making right decisions about them .

Ð Reorganizing geography courses to benefit from geographic information system technology in the different aspects of the course .

ď Training geography teachers on teaching using geographic information system enhance the educational process .

Ð Including geographic information system concepts into social studies syllabi in different educational stages .

đ Reorganizing geography syllabi in order to include exercises and activities that help students use geographic information system .

Ē Staff members should ask students to perform tasks using cartographical skills and train them continuously under their guidance .

ē Including cartographical skills required by students in the geographic information system courses to achieve a great benefit from them .

Ě Paying attention to cartographical skills and trying to enhance them in students .

Č-ĉ The necessity of evaluating students during and after teaching in order to identify points of strength and support them and improve those points of weakness .

Suggestions of the research :

Ğ The effect of using geographic information system in developing spatial thinking and problem solving of geography section students at the faculty of education .

ğ The effectiveness of geographic information system in developing critical thinking and decision making of geography section students at faculties of education and arts .

Ď A suggested program based on geographic information system for developing geographic research skills and spatial ability of geography section students at the faculty of education .

đ Developing the geography curriculum at the secondary stage in the light of geographic information system .

Đ The effectiveness of geographic information system in developing geographic concepts and environment problems solving of first year secondary students .

đ A suggested program for training teachers on developing cartographical skills of secondary stage students .