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# THE IMPACT OF THE GREEN LEARNING ON THE STUDENTS PERFORMANCE

Boumedyen Shannaq\*1, Fouad Jameel Ibrahim2, Richmond Adebiaye2

<sup>1</sup> Department of Information Systems, CEMIS College, University of Nizwa, Sultanate of Oman

<sup>2</sup>University of Maryland University College

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## **Corresponding Author:**

Boumedyen Shannaq Department of Information Systems, CEMIS College, University of Nizwa, Sultanate of Oman.

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### ABSTRACT

Students are the future of any country, and there are many information technology tools employed for improving the knowledge of students. The Green Education as new information technology tools highlights the importance of green information technology tools in improving current systems. This case study aims to investigate a novel ideas for future strategic planning that could help and add new values in developing country. Such initiative tends to prepare and develop students to meet future challenges. The study selects a University's database which contains information about instructional learning. The study filters the database based on the instructors' information on non-electronic teaching style (papers,communication) and instructors who included Green instructional system in their curriculum to highlight the pros of using green education .Data mining and statistical methods have been used as scientific tools to implement the experiments and justify the proposed idea. We believe this green education approach will surely lead to a more competitive debate, enhance the confidence level in educational systems in many countries and improve its overall capability.

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## INTRODUCTION

There are many proposals describing the 'Green Education 'and could be found in [1][2][3][4][5][6][7], The basic idea of the 'Green Education ' is to create a safety environment as well as to improve the productivity of the higher education systems, concerning the expenses, performance, and the perfect outcomes .Although many studies have focused on single aspects of green education in higher education, not many have widened the scope to account for a comprehensive understanding of the practices involved in a campus-wide green effort or the processes involved in achieving this goal. In order to approach green education in higher education settings in a comprehensive fashion, nearly every major aspect of campus curriculum, design, planning, maintenance, and operations needs to be addressed, as played out through the activities of administrators, faculty, staff and students[8][9][10]. Environmental criteria such as energy, emissions, waste, water, and transportation must be considered alongside human dimensions such as learning, behaviour, attitude, and activism [11]. Social issues and economic considerations are also integral to green education initiatives [12]. There are also many local, states, and federal laws, regulations, and policies that address green education which must be adhered to [13]. There are so many factors to consider when planning green education initiatives that it becomes a complicated process to develop, adopt, and implement green education initiatives. A variety of studies have described the context of green education in higher education as well as the

associated practices that campuses implement. However, few studies have focused on the process of change in higher education that allows for the transition to green. Although we may know what green education looks like on college and university campuses, it is not clear that higher education leaders know how to get there. The need for institutions of higher education to transition to green has been well demonstrated, both from a moral perspective as well as from a pragmatic standpoint [9[14].Thus, it is critical that higher education leaders learn to effectively implement comprehensive green education initiatives. This study sought to build a deeper understanding of how a university implemented a comprehensive green education initiative. The officials can work make each organization to school environmentally friendly and teach the children that taking care of our resources is an important task. Getting a green program started in the schools is the first step to improving the future.

## I. DATA DESCRIPTION

The proposed experiment demonstrate and compare how E-teaching and manual teaching could affect the Performance and health of students as well Instructors. EXPERIMENT PROCESS

Nine (9) variables were used as basis for experiment in this process as described and indicated below. Included in this experiment are sample data collected from about one

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hundred and twenty five instructors from a chosen University.

| NumofResearch, Numofabsent, NumofInfection, N | lumofStudentcomp | lains,StudentsAVG | StudentsEvaluation | on,HoDEvaluatio | on,Numofprinted | papers,Cours | etool |
|---|------------------|-------------------|--------------------|-----------------|-----------------|--------------|-------|
| 1,3,4,1,81,80,80,127,11111                    |                  |                   |                    |                 |                 |              |       |
| 0,7,11,4,66,70,75,2218,22222                  |                  |                   |                    |                 |                 |              |       |
| 0,9,14,7,60,65,60,3911,22222                  |                  |                   |                    |                 |                 |              |       |
| 2,4,2,0,85,89,90,155,11111                    |                  |                   |                    |                 |                 |              |       |
| 0,8,17,5,69,65,70,4218,22222                  |                  |                   |                    |                 |                 |              |       |
| 0,5,11,3,70,75,75,2675,22222                  |                  |                   |                    |                 |                 |              |       |
| 1,6,9,4,71,70,70,3388,22222                   |                  |                   |                    |                 |                 |              |       |
| 3,4,2,0,90,90,95,79,11111                     |                  |                   |                    |                 |                 |              |       |
| 2,4,1,0,82,85,80,119,11111                    |                  |                   |                    |                 |                 |              |       |
| 0,6,9,2,60,60,60,4021,22222                   |                  |                   |                    |                 |                 |              |       |
| 1,3,0,0,79,80,80,190,11111                    |                  |                   |                    |                 |                 |              |       |
| 2,4,0,0,80,90,85,268,11111                    |                  |                   |                    |                 |                 |              |       |
| 1,7,9,1,82,75,80,2681,22222                   |                  |                   |                    |                 |                 |              |       |
| 2,5,11,2,85,70,80,4387,22222                  |                  |                   |                    |                 |                 |              |       |
| 0,3,4,1,78,90,90,321,11111                    |                  |                   |                    |                 |                 |              |       |
| 0,4,3,0,85,90,80,452,11111                    |                  |                   |                    |                 |                 |              |       |
| 3,6,2,0,80,90,90,231,11111                    |                  |                   |                    |                 |                 |              |       |
| 1,7,6,3,70,60,70,3680,22222                   |                  |                   |                    |                 |                 |              |       |
| 0,5,9,2,60,60,60,2490,22222                   |                  |                   |                    |                 |                 |              |       |
| 0,6,12,5,59,60,60,3642,22222                  |                  |                   |                    |                 |                 |              |       |

Fig.1 A sample of database

Fig. 1 shows an example of the collected database The data set was in .csv format, then the data was converted to another format as described in Fig. 2:

|               |             |                |               |             |                |               | III I I I I I I I I I I I I I I I I I | 4.          |
|---------------|-------------|----------------|---------------|-------------|----------------|---------------|---------------------------------------|-------------|
| NumofResearch | Numofabsent | Numofinfection | NumofStudentc | StudentsAVG | StudentsEvalua | HoDEvaluation | Numofprintedpa                        | Coursetools |
| 1             | 3           | 4              | 1             | 81          | 80             | 80            | 127                                   | 11111       |
| 0             | 7           | 11             | 4             | 66          | 70             | 75            | 2218                                  | 22222       |
| 0             | 9           | 14             | 7             | 60          | 65             | 60            | 3911                                  | 22222       |
| 2             | 4           | 2              | 0             | 85          | 89             | 90            | 155                                   | 11111       |
| 0             | 8           | 17             | 5             | 69          | 65             | 70            | 4218                                  | 22222       |
| 0             | 5           | 11             | 3             | 70          | 75             | 75            | 2675                                  | 22222       |
| 1             | 6           | 9              | 4             | 71          | 70             | 70            | 3388                                  | 22222       |
| 3             | 4           | 2              | 0             | 90          | 90             | 95            | 79                                    | 11111       |
| 2             | 4           | 1              | 0             | 82          | 85             | 80            | 119                                   | 11111       |
| 0             | 6           | 9              | 2             | 60          | 60             | 60            | 4021                                  | 22222       |
| 1             | 3           | 0              | 0             | 79          | 80             | 80            | 190                                   | 11111       |
| 2             | 4           | 0              | 0             | 80          | 90             | 85            | 268                                   | 11111       |
| 1             | 7           | 9              | 1             | 82          | 75             | 80            | 2681                                  | 22222       |
| 2             | 5           | 11             | 2             | 85          | 70             | 80            | 4387                                  | 22222       |
| 0             | 3           | 4              | 1             | 78          | 90             | 90            | 321                                   | 11111       |
| 0             | 4           | 3              | 0             | 85          | 90             | 80            | 452                                   | 11111       |
| 3             | 6           | 2              | 0             | 80          | 90             | 90            | 231                                   | 11111       |
| 1             | 7           | 6              | 3             | 70          | 60             | 70            | 3680                                  | 22222       |
| 0             | 5           | 9              | 2             | 60          | 60             | 60            | 2490                                  | 22222       |
| 0             | 6           | 12             | 5             | 59          | 60             | 60            | 3642                                  | 22222       |
| 2             | 3           | 0              | 0             | 90          | 90             | 90            | 412                                   | 11111       |

Fig. 2 The new database generated from Fig. 1

The values of e-tools and hardcopies were substituted as follow:

11111 = e-tools and 22222 = hardcopies.

Table 1 describes selected instances used in the database and

| describes purpose of each insta | nce.                                |
|---------------------------------|-------------------------------------|
| Variable name                   | Description                         |
| NumofResearch                   | How many research's (papers         |
|                                 | ,conferences) have been             |
|                                 | conducted by the instructors        |
| Numofabsent                     | How many day was each               |
|                                 | instructors absent                  |
| NumofInfection                  | How many time the instructor        |
|                                 | was visited the medical clinic ( we |
|                                 | only extract all instructors with   |
|                                 | Infectious diseases)                |
| NumofStudentcomplains           | How many times the students         |
|                                 | have been written complains for a   |
|                                 | specific instructor                 |
| StudentsAVG                     | The average marks of all students   |
|                                 | teaches by instructor               |
| Numofprintedpapers              | How many hardcopy's were            |
|                                 | printed by the instructors          |
| StudentsEvaluation              | The average evaluation mark         |
|                                 | giving by the student for each      |
|                                 | instructor                          |
| HoDEvaluation                   | The evaluation mark giving by the   |
|                                 | HoD                                 |
| Coursetools                     | Whether the instructor was use a    |
|                                 | manual system or an electronic      |
|                                 | system                              |
| m 11 4 1 1 1 1 1 1 1 1          |                                     |

Table. 1 the selected Instances and their description

The information was recorded for two semesters for a one-year session. Bachelor degree students' records were sampled with data provided by each instructor teaching specific class. These are records already kept by each instructor.

## **EVALUATION OF RECORDED DATA**

We want to evaluate how the "green education" (electronics system) adopted in the University in learning process could affect students' performance as well as the other factors such as health of the instructors

etc... The effect of various factors on instructors will hypothetically be concluded as depending on the type of learning systems and course tools adopted by each instructor - manual systems included papers/hard copies in learning and examination process or electronic systems which used no papers at all. The process of the experiment start with assigning specific method decide if the students' performance and other factors affected by type of learning resources and course tools adopted? The priori contrast was used to determining that differences exist amongst the means. Fig. 3 illustrate the obtained statistical calculation.

|                          |       |     |         | Descripti      | ves        |                    |             |         |         |
|--------------------------|-------|-----|---------|----------------|------------|--------------------|-------------|---------|---------|
|                          |       |     |         |                |            | 95% Confider<br>Me |             |         |         |
|                          |       | N   | Mean    | Std. Deviation | Std. Error | Lower Bound        | Upper Bound | Minimum | Maximun |
| Num of Research          | 11111 | 64  | 1.34    | .695           | .087       | 1.17               | 1.52        | 0       |         |
|                          | 22222 | 61  | .89     | .839           | .107       | .67                | 1.10        | 0       |         |
|                          | Total | 125 | 1.12    | .799           | .071       | .98                | 1.26        | 0       |         |
| Num of absent            | 11111 | 64  | 3.52    | .873           | .109       | 3.30               | 3.73        | 3       |         |
|                          | 22222 | 61  | 5.34    | 1.931          | .247       | 4.85               | 5.84        | 3       |         |
|                          | Total | 125 | 4.41    | 1.742          | .156       | 4.10               | 4.72        | 3       |         |
| Num of Infection         | 11111 | 64  | 2.47    | 2.749          | .344       | 1.78               | 3.16        | 0       | - 1     |
|                          | 22222 | 61  | 7.31    | 5.374          | .688       | 5.94               | 8.69        | 0       | 1       |
|                          | Total | 125 | 4.83    | 4.870          | .436       | 3.97               | 5.69        | 0       | 1       |
| Num of Student complains | 11111 | 64  | .59     | .868           | .108       | .38                | .81         | 0       |         |
|                          | 22222 | 61  | 2.23    | 2.186          | .280       | 1.67               | 2.79        | 0       |         |
|                          | Total | 125 | 1.39    | 1.836          | .164       | 1.07               | 1.72        | 0       |         |
| Students AVG             | 11111 | 64  | 80.61   | 3.048          | .381       | 79.85              | 81.37       | 69      | 9       |
|                          | 22222 | 61  | 74.41   | 9.287          | 1.189      | 72.03              | 76.79       | 59      | 9       |
|                          | Total | 125 | 77.58   | 7.492          | .670       | 76.26              | 78.91       | 59      | 9       |
| Num of printed papers    | 11111 | 64  | 291.80  | 644.136        | 80.517     | 130.90             | 452.70      | 79      | 421     |
|                          | 22222 | 61  | 2084.39 | 1706.187       | 218.455    | 1647.42            | 2521.37     | 79      | 438     |
|                          | Total | 125 | 1166.58 | 1558.444       | 139.391    | 890.69             | 1442.48     | 79      | 438     |
| Students Evaluation      | 11111 | 64  | 83.27   | 5.490          | .686       | 81.89              | 84.64       | 65      | 9       |
|                          | 22222 | 61  | 74.69   | 9.620          | 1.232      | 72.22              | 77.15       | 60      | 9       |
|                          | Total | 125 | 79.08   | 8.867          | .793       | 77.51              | 80.65       | 60      | 9       |
| HoD Evaluation           | 11111 | 64  | 82.11   | 4.612          | .577       | 80.96              | 83.26       | 70      | 9       |
|                          | 22222 | 61  | 75.82   | 9.318          | 1.193      | 73.43              | 78.21       | 60      | 9       |
|                          | Total | 125 | 79.04   | 7.923          | .709       | 77.64              | 80.44       | 60      |         |

Fig. 3 The statistical calculation of the selected instances.

First we concentrate our experiment to explore the relationships over three main variables:

VARIABLES=NumofInfection ,StudentsAVGCoursetools . To analyse this relationships over the three variables we used various statistical measures ."Fig. 4 shows the results

|                     |         | Num of<br>Infection | Students AVG | Course tools |
|---------------------|---------|---------------------|--------------|--------------|
| N                   | Valid   | 125                 | 125          | 125          |
|                     | Missing | 1 0                 | 120          | 0            |
| Mean                |         | 4.83                | 77.58        | 16533.17     |
| Std. Error of Mean  | 1       | .436                | .670         | 498.755      |
| Median              |         | 4.00                | 80.00        | 11111.00     |
| Mode                |         | 0a                  | 81           | 11111        |
| Std. Deviation      |         | 4.870               | 7.492        | 5576.250     |
| Variance            |         | 23.722              | 56.132       | 31094559.30  |
| Skewness            |         | .900                | -1.150       | .049         |
| Std. Error of Skew  | vness   | .217                | .217         | .217         |
| Kurtosis            |         | 194                 | .617         | -2.030       |
| Std. Error of Kurto | sis     | .430                | .430         | .430         |
| Range               |         | 17                  | 31           | 11111        |
| Minimum             |         | 0                   | 59           | 11111        |
| Maximum             |         | 17                  | 90           | 22222        |
| Sum                 |         | 604                 | 9698         | 2066646      |

Fig. 4 The statistical calculation for the three selected instances

The cluster method centroid and cosine measure were adapted to identified the dependencies between the 9 variables based on the similarities between 125 cases i.e. for 125 instructors ,The results of calculation is illustrated in Fig. 5:

|                          |          |        |           |                   | Matrix File Inpu | t                 |            |            |              |
|--------------------------|----------|--------|-----------|-------------------|------------------|-------------------|------------|------------|--------------|
|                          | Num of   | Num of | Num of    | Num of<br>Student |                  | Num of<br>printed | Students   | HoD        |              |
| Case                     | Research | absent | Infection | complains         | Students AVG     | papers            | Evaluation | Evaluation | Course tools |
| Num of Research          | 1.000    | .670   | .306      | .185              | .854             | 256               | .858       | .855       | .720         |
| Num of absent            | .670     | 1.000  | .869      | .806              | .901             | .810              | .898       | .903       | .944         |
| Num of Infection         | .306     | .869   | 1.000     | .939              | .657             | .927              | .636       | .652       | .782         |
| Num of Student complains | .185     | .806   | .939      | 1.000             | .542             | .879              | .532       | .541       | .688         |
| Students AVG             | .854     | .901   | .657      | .542              | 1.000            | .544              | .998       | .999       | .931         |
| Num of printed papers    | .256     | .810   | .927      | .879              | .544             | 1.000             | .522       | .539       | .71          |
| Students Evaluation      | .858     | .898   | .636      | .532              | .998             | .522              | 1.000      | .999       | .92          |
| HoD Evaluation           | .855     | .903   | .652      | .541              | .999             | .539              | .999       | 1.000      | .93          |
| Course tools             | .720     | .944   | .782      | .688              | .931             | .716              | .925       | .931       | 1.00         |

Fig. 5 The results of the proximity matrix

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## **PROXIMITY MATRIX**

From[15]:

$$sim(i,j) = \cos(\vec{i},\vec{j}) = \frac{\vec{i}\cdot\vec{j}}{\|\vec{i}\|_2 * \|\vec{j}\|_2}$$

Below are analyzed codes used for the experiment: For (double I = 0;i<dataset.length; I ++) {DoP += (datasetA[i] \* datasetB[i] ) }ReturnDoP

Then the Math.Sqrt function was used to the next calculation as follow:

 $Math.Sqrt(DoP(vector_i, vector_{i+1}))$ .

Fig. 6 describes the relationships and dependency between the cases

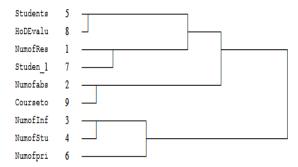


Fig. 6 A sample of relationships and dependency between the cases from The proximity matrix

| Abbreviated | Extended              |
|-------------|-----------------------|
| Name        | Name                  |
|             |                       |
| Courseto    | Coursetools           |
| HoDEvalu    | HoDEvaluation         |
| Numofabs    | Numofabsent           |
| NumofInf    | NumofInfection        |
| Numofpri    | Numofprintedpapers    |
| NumofRes    | NumofResearch         |
| NumofStu    | NumofStudentcomplains |
| Studen_1    | StudentsEvaluation    |
| Students    | StudentsAVG           |

Fig. 7 A sample the abbreviated names used in Fig. 6

The above figure finds that The evaluation of the HoD is more likely dependent on the Students AVG class 5 and class  $8\,$  etc.. for others

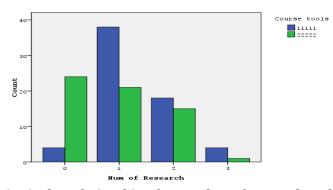


Fig. 8 The relationships for Number of research and using green technology

Fig. 8 is generated from the clustered results from Fig. 6. This shows that Instructors who use the green technology(E-tools) have more research publications than instructors who used non-electronics or manual system, thus such results confirm the benefits of using the 'green education'.(11111 = E-tools in blue and 22222 = hardcopies in Green). The first two columns in Fig. 8,

shows that Manual system is superior to E-system, this result shows no research have been done in both categories.

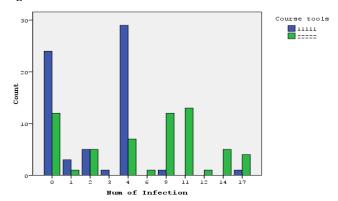


Fig. 9 The relationships for Number of infections and using green technology

Fig. 9 shows also the advantages of using 'green education', to health issues (illness and infection), this shows significant reductions in health issues in relations to instructors who used e-tools.

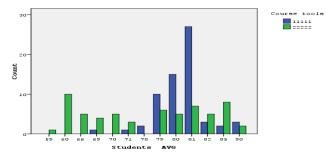


Fig. 10 The relationships for The students performance AVG and using green technology

Fig. 10 demonstrates performance of students' improvement when instructors use the e-tools in their classes, i.e. 'green education'.

## CONCLUSION

The obtained results led to the conclusion that the 'Green education' must be implemented and supported by the nations and governments, to build a safety environment as well as to create the creativity .there are no doubt that the 'Green Education' will improve the performance of the instructors, teachers, and students . We believe this green education approach will surely lead to a more competitive debate, enhance the confidence level in educational systems in many countries and improve its overall capability.

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