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Students Feedback for Faculty Education Development in Developing Countries: An Egyptian Sample

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Abstract

This paper presents an experimental sample for the student interaction with learners in the higher education. The university undergraduate study level is considered for a practical type of education where the selected sample of students has been accounted for the faculty of engineering. The electrical engineering specialty has been taken for a defined specified course at the final year of study while the same questionnaire is studied for a 10 years interval for analysis. The empirical results of statistical analysis are investigated, and the ultimate results are transformed in the percentage system to give the ability for comparison. Another course in the last time is inserted for investigation with the same questionnaire to find out the ways for the development of engineering education in Egypt. The comparison for the rate of change, the difference and the percentage change are determined. The deduced factors are treated for the education development, but all suggestions of students are discussed for the development target. All original input data of the sample are inserted in the Appendix while all evaluated data are clarified well in the analysis and discussion of the given research. The feedback of students is accounted and the comments as well as the suggestions are discussed. Valuable conclusions are derived.

Keywords

Educational Development, Electrical Engineering, Evaluation and Suggestion of Students, Course Evaluation by Students, Teaching and Learning Evaluations, Empirical Questionnaire Test

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1. Introduction

The development of a country starts principally at the education where the education in general builds the young people and modify the performance of the country people. So, we can say that the education development measures the country development although this education means all types and diverse levels of education. It should be noted that, the culture plays a significant role in this field as well as the traditions and sometimes religion can influence, too. It is known that, educational development is a growing and vibrant field, defined in some ways. All educational definitions have in common the enhancement of the work of colleges and universities, often with a focus on teaching and learning. Some networks prefer the term "educational development" (instead of, for example, "faculty development") because, according to Past President Deandra Little (2014), it better "encompasses the breadth of work we do," including levels (individual, program, and institutional) and key audiences (graduate students, faculty, postdoctoral scholars, administrators, organizations) served [1].

Faculty, graduate student, and postdoctoral scholar development refers to some programs which focus on the individual instructor or future faculty member. Specialists in

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this area provide consultation on teaching, including class organization, evaluation of students, in-class teaching methods, active learning strategies, emerging teaching and learning technologies, and all aspects of design and presentation [2]. They also advise instructors on other aspects of teacher/student interaction, such as advising, tutoring, discipline policies and administration [3]. This point may be the target of the given paper. An additional frequent focus of such programs is the instructor as a scholar and professional. These programs aid in career planning, professional development in scholarly skills such as grant writing, publishing, committee work, administrative work, supervisory skills, and a wide range of other activities expected of faculty. For graduate and professional students, these programs might take the shape of Preparing Future Faculty or Preparing Future Professionals, designed to prepare them for future career directions [1].

A third area on which these programs focus is the instructor as a person. This focus includes wellness management, interpersonal skills, stress and time management, assertiveness development and a host of other programs that address the individual's well-being. While not all faculty and graduate student/postdoc development programs include all these areas, most take a holistic view of faculty work, with the philosophy that assisting individual instructors in being as productive and effective as possible will strengthen the entire institution [3]. Organizational Development provides a third perspective on maximizing institutional effectiveness [4]. The focus of these programs is the organizational structure of the institution. The philosophy is that if one can build a structure that will be efficient and effective in supporting faculty and students, the teaching/learning process will thrive. Many researches are involved in large-scale institutional change efforts, involving high-level college and university priorities, such as grants designed to transform teaching and learning structures and practices. Similar activities include helping academic units plan and enhance their curricula, through processes such as assessment, curriculum mapping, and discussion of learning goals. Do intended outcomes match achieved outcomes? Do curricular plans need to be updated? What is the change process? [5].

Still other programs deal with personnel issues involving faculty. How are faculty evaluated and rewarded? How are they prepared for changes in the institution, including their own retirement? Where do faculty fit into the overall governance structure of the institution? What is the effect of unionization, departmentalization, and professionalization? [3]. A third area of organizational development focuses on developing leadership capacities in faculty and administrators. One activity such programs offer is administrative development for department chairs, deans and other decision makers. The reasoning is that these are the individuals who will be making the policies that affect how courses are taught, how faculty are hired and promoted, and how students are admitted and graduated [1]. Across all these emphases—institutional change, personnel, leadership—the key focus of organizational development is a structural lens to improve educational practices [6].

A research evaluated two reforms that modified the procedures of recruitment and promotion in Italian academia to balance the preeminent role of the recruiting school and to counter nepotism [7]. We theoretically derive the decision rule of the evaluation committees and test it against data including information from all selections to associate and full professorship that were initiated by the Italian schools of economics between 2004 and 2011 [7]. Empirical results suggest that both reforms fell short of their goals [7].Also, another paper evaluated the effects of a high school curriculum reform on students' probability to enroll at university and to choose a Science, Technology, Engineering or Mathematics (STEM) major [aa]. The reform increased the difficulty of graduating from high school by increasing the instruction time in core subjects and by raising the graduation requirements. Based on administrative data covering all students, the analysis is carried out by applying a difference-in-differences model [8]. The results showed that the reform increased university enrollment rates for both genders. Regarding to choosing a Science, Technology, Engineering or Mathematics as college major, we find a robust positive effect on males [8].

2. Problem Formulation

Development education in youth work aims to support young people to increase their awareness and understanding of the interdependent and unequal world in which we live, through a process of interactive learning, debate, action and reflection. It challenges perceptions of the world and encourages young people to act for a more just and equal society at a national and an international level. This can be considered as a base for the development required as a gain from education [9]. Consequentially, development education (DE) in youth work aims to support young people to increase their awareness and understanding of the interdependent and unequal world in which we live, through a process of interactive learning, debate, action and reflection. The DE challenges perceptions of the world and encourages young people to act for a more just and equal society at a personal, local, national and global level. The scientists agreed with the basic titles for the development of education to contain some principle items as a target for the real development. These may be tailored as:

1. Justice
2. Global development
3. Starting from young people's experiences
4. Human rights
5. Global citizenship
6. Listening to young people
7. Exploring the connections between young people in Ireland and the Majority World
8. Understanding the causes and consequences of global poverty and inequality
9. Learning from and sharing with people in the Majority World
10. Understanding how our actions affect people in the Majority World
11. Justice rather than charity
12. Learning through participation and action
13. Challenging stereotypes and prejudice
14. Respecting unfamiliar cultures and challenging the dominance of one culture over another
15. Having Fun
16. Learning how countries depend on each other
17. Solidarity with people who are poor, marginalized or discriminated against
18. Concern for the environment
19. Celebrating the diversity of people in our world
20. Enabling young people to imagine a better world
21. Acting for a more just and fair world

The problem of education development in developing countries faces a great resistance for implementation besides the heavy requirements for the application of this development. Otherwise the development depends on the external requirements from the government and others although there are many titles can help in the development without this effort [10-12]. This paper emphasis on the silent side of the problem by selecting a difficult example as a model to be treated and analyzed. The selection for a course at the final year of graduation in faculty of engineering in one of the developing countries. Egypt is the selected model country for the developing countries where a complete statistical analysis is presented [13-14].

3. Empirical Study

Since the country development begins at the education, the present work will be directed to the education. Otherwise, there are many levels of education starting at KG1 up to the postgraduate so that a specific section of education should be chosen. Then, the undergraduate level can be inserted but we have many specialties in our universities [14-15]. Thus, the most active education type for Egypt in the recent time is the engineering where the building of factories and different fields for investment can be essential. Therefore, the engineering education will be inserted for study while an experimental study has been based on some of the main categories given above such as the effect of the scholar dependency, the listening to young people at important level and the interaction of students with learners in practical faculties. The selected experimental investigation for the electrical education department should be for the last year of graduation because we need for the experience of students studying for 5 years.

3.1. Sample Data

It should be mentioned that, the choice of more than one title is permissible because the answer may be two titles or more. So, we can find sometimes the summation for a certain questionnaire more than the number of students while the student can stop answering for any question. This is important to illustrate the base of next statistical analysis so that the ultimate results to be according to the actual opinion of students. Then, a single questionnaire should be implemented to get the same interaction of students to evaluate a course.

3.2. Questionnaire Template

This template must be unified to get the equal results from the students where all facilities are given, and it is applied after the final examination and the answering system depends on the secret style. This secret phenomenon is taken to give the freedom completely for all students to say any thing either with the learner or against. It should be this type of questionnaires is considered for the first time in the faculty so that the student must be sure that he is protected. The names of students were unknown in the test implementation although rarely we find one or more students wrote their name. This is a positive factor for the weather of freedom during the test and after. The questionnaire template is given to the students in Arabic, but the translation into English has been given in Table 1.

Table 1. The original questionnaires platform for the students.

No	Question	a	b	c	d
1	Attendance all Lectures	Yes	No	Sometimes	
2	Preparing before	Yes	No	Sometimes	
3	Like the lecture style	Yes	No		
4	Lecture timing	Suitable	Not		
5	Lecture Duration	long	Short	Suitable	
6	Sheet works	After lecture	After 2 Weeks	More after	
7	Problems Difficulty	100%	75%	50%	Less
8	Content Level	high	middle	low	
9	Course timing	Suitable	Not		
10	disadvantages	A lot	normal	non	
11	understanding	100%	75%	50%	Less
12	Lecture Revision	Same day	Day later	week	More
13	Reference	Lecture Only	Books	Internet	Catalogues
14	Book Sources	Faculty Library	others	Personal	
15	Solving sheets	All problems	half	Less	non
16	Solving by yourself	All problems	half	Less	non
17	Problem idea	good	suitable	difficult	easy
18	Contents	little	suitable	A lot	
19	Benefits	useful	some	Non	

It is seen from Table 1 that; the questions have diverse style and different so that the analysis may be difficult. This difficulty can be useful to get the main conclusions that may be important for the development of the course and consequentially the education [2].

3.3. The First Course (Primary)

The tested course for the present research must be a course of the last year for the undergraduate level because the student will evaluate it. In this case the students would have a wide experience as a student to be able to give a satisfactory answer or valuable comments. So, the faculty must be suitable for the creation style of learning although there are a lot of colleges having a pleasant weather to be chosen. Therefore, the faculty of engineering will be inserted to be tested at the B. Sc. final year of study where the electrical department is taken. The course should be practical creation with a great level of understanding so that the selected course would be specified and defined as:

Course Name: Design of Electric Stations

No. of Students: 55

One Term Course

Time of Lecture per week: 2 + 2 h & Section 2 h

Supervisor: Prof Dr Eng.

Year: Final year of B Sc (4^{th} Year)

3.3.1. Students Comments

Since the questionnaire system permits both the answers or not as well as the adding of remarks and suggestions or not, the results may be classified into two categories. The first category is comments and suggestions while the second will be the answers. So, the number of students giving the comments may be different from that giving the suggestions while the same variation in answering. Therefore, the authors gathered all and then tailored into two items as written next.

(i). Disadvantages of the Course

The free critic allowable for the students to write all remarks and the experience of such students lead us to find the conclusion of remarks in the following titles:

1. Impossibility of writing during the lecture
2. The subjects out of the course are not identified
3. There is no reference
4. The rarely attendance of assistances in sections
5. The subjects are not in series
6. The time is short
7. The interruption during explanation
8. The high speed of explanation
9. The large volume of subjects
10. The reduction of equations in lectures
11. The level of understanding is difficult

(ii). Suggestions of Students

On the other side, some students either the same of critic or not determined a lot of suggestions of future teaching where the overall of suggestions may be indicated as:

1. A lot of solved Examples in the lecture should be presented
2. Visiting stations must be a part of the course

3. A long time may be considered to writing for each part in the lecture
4. References should be defined before the course
5. The derivation of equations must be explained in detail
6. Expanding the chapters of the station design is required
7. Increasing the subjects to be explained
8. The connection between practical and theoretical fields
9. Students must prepare reports for the parts of the course
10. Increasing the time of lectures
11. The discussion of problems in the sheets (problems) would be for all students (not individually)
12. Solved example for each sheet in the lecture
13. Developing the course to be the design of stations only
14. Developing the method of illustrations
15. Importance and attention for the section works
16. The application of computers in the course is needed

3.3.2. Questionnaire Answers

The main frame for the statistical analysis of the present work may be based on the answers of the questions because the suggestions and comments above are addition to the answers from the student point of view. So, the questionnaire answers represent the nucleus of the subject if we need to develop the education, the engineering education as a step for the general development of the education in Egypt.

Since the students are the leaders in the process, the statistical results for their answers are listed in Table A1 in Appendix. The original data of Table A1 are transformed into percentage mathematical system because we will measure them with other answers later. The percentage system will permit the comparison analysis because the number of students is a variable parameter. The results in percentage system are tabulated in Table 2 where the non-answered persons are given in percentage too. The symbols a, b, c and d in Table 2 are defined in Table 1 above for each question, individually.

Table 2. The answers of students (%).

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	70.9	16.36	12.72		
2	Preparing before	12.72	74.54	12.72		
3	Like the lecture style	74.54	16.36			9.09
4	Lecture timing	89.09	9.09			1.61
5	Lecture Duration	27.27	14.45	58.18		
6	Sheet works	36.36	47.27	12.72		3.63
7	Problems Difficulty	7.27	49.09	32.72	7.27	3.63
8	Content Level	70.90	27.27	00		1.61
9	Course timing	69.09	70.90			1.61
10	disadvantages	70.90	58.18	16.36		3.63
11	understanding	1.61	56.36	36.36	5.45	
12	Lecture Revision	34.54	70.90	25.45	9.09	1.61
13	Reference	47.27	76.16	16.16	3.63	1.61
14	Book Sources	89.09	16.36	5.45		1.61
15	Solving sheets	41.61	49.09	14.45	1.61	1.61
16	Solving by yourself	27.27	52.72	10.9	7.27	1.61
17	Problem idea	43.63	27.27	5.45	00	3.63
18	Contents	9.09	70.90	70.90		
19	Benefits	90.9	9.09	00		

It must be noted that, the course content is registered in Table A2 where some comments go to the content.

3.4. The First Course (After 10 Years)

The same course of the final B. Sc. year but the number of students becomes 60 so that the percentage mathematical system is essential. Also, the original data of the course may be tailored as:

No. of Students: 60

Course: Design of Electric Stations

One Term Course

Time of Lecture per week: 2 + 2 h & Section 2 h

Supervisor: Prof Dr Eng. (The same person)

Year: Final year of B Sc (4^{th} Year)

3.4.1. The Questionnaire Answers

The original results according to the number of students are listed in Table A3 in Appendix while the equivalent results in percentage system are tabulated in Table 3.

Table 3. The answers of students after 10 years (%).

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	65.00	36.67			
2	Preparing before	23.33	70.00	6.33		
3	Like the lecture style	76.67	20.00			3.33
4	Lecture timing	93.33	6.33			
5	Lecture Duration	11.67	13.33	75.00		
6	Sheet works	45.00	31.67	20.00		3.33
7	Problems Difficulty	10.00	55.00	33.33	3.33	
8	Content Level	56.67	40.00	3.33		
9	Course timing	50.00	46.67			3.33
10	disadvantages	15.00	66.67	16.33		1.67
11	understanding	11.67	53.33	23.33	13.33	
12	Lecture Revision	35.00	23.33	16.67	23.33	1.67
13	Reference	51.67	55.00	6.66	3.33	1.67
14	Book Sources	76.67	13.33	10.00		3.33
15	Solving sheets	30.00	50.00	20.00	00	
16	Solving by yourself	20.00	61.67	16.33	00	
17	Problem idea	46.67	33.33	21.67	1.67	
18	Contents	6.66	56.67	21.67		
19	Benefits	86.67	13.33	00		

3.4.2. Comments of Students

Since the questionnaire system permits both the answers or not as well as the adding of remarks and suggestions or not, the results may be classified into two categories as indicated before. The first category is comments and suggestions while the second will be the answers. So, the number of students giving the comments may be different from that giving the suggestions while the same variation in answering. Therefore, the authors gathered all and then tailored into two items as written next.

(i). Comments

There are a lot of comments where the students require to be solved but the main contents of the course are given in Table A4 in Appendix. The students are paying to put the point of defect faced them and indicate:

1. The course needs more time
2. The protection devices must consume a long time.
3. The sheets need long time to solve
4. The time is not enough so that more time may be added and expanding the explanation for more illustration
5. Students require a special time to write in the lecture after each part
6. The course needs engineer student (not B Sc student)
7. As students understand the subject in the lecture, no one can forget (contrary with any other course)
8. The contents need two years to be explained
9. The sheet of load curves is good, but it takes very long time to solve
10. Load curves are not understanding
11. Lectures must be 2 individuals in time not in sequence
12. The sequence of the two lectures should be separated instead while others needs them in sequent without separation for better understanding
13. The lectures are good, but the defect is us (students)
14. The course is important for either engineers or students, and the presentation of lecture is nice, but it is understanding for pretrained students in stations. Others cannot do except 10% because it needs stations visiting.
15. A student commented: the concentration of explanation in a small part in details is better
16. Complete solved problems should be given in lectures to be a model for sheets.

(ii). Suggestions

The students are welling to modify the course for next learning / teaching so that they illustrate some points as:

1. The sheets would be solved in lectures or section by the professor
2. The course is very useful, but it needs to relate to the field through field visiting
3. More books for the layout & outdoor must be identified
4. Adding the essential information to the course
5. Examples in lectures must be solved
6. Explaining the single line diagram in a book is more useful
7. More illustration and explanation may be required
8. Details of layout may be inserted
9. Many solved examples would be preferred

10. The indoor chapter may be cancelled
11. Design of lighting could be inserted in the course
12. Students request more and more lecture for the subject away from the course (as Seminar)
13. Outdoor may be omitted
14. Adding practical part and visiting the stations as a part of the course
15. Adding the circuit breakers chapter and indoor stations in detail
16. More sections can be considered
17. Adding new subjects
18. Students hope to apply the style of the lecture to all from the preparatory year
19. The transmission and towers must be studied before this course
20. Load curves should be neglected from the course
21. Solving problems between chapters in the lectures
22. General knowledge about protection devices must be explained before
23. Students request references (books) in the design of stations

3.5. The Second Course

Another Sample for the courses after 10 years is studying for the final year too where it has a book. This book of the Table is available in the Faculty Library where it is written in Arabic language except the equations. This course sample is defined as:

No. of Students: 48

Course: Protection of Electric Systems

One Term Course

Time of Lecture per week: 2 + 2 h & Section 2 h

Supervisor: Prof Dr Eng.

Year: Final year of B Sc (4th Year)

3.5.1. Comments of Students

There are some comments on the course as:

1. The students must be trained for exam by trained exam before the final one
2. The theoretical part in exam was very difficult
3. The exam must be in the main frame of lectures not another thing
4. The final examination was difficult and unexpected
5. The level of course is very high not high
6. No body solves the sheets
7. Assistance is required to solve the problem under supervision of Dr
8. There is no sections and no assistance
9. Your book in the faculty library is in Arabic while lectures in English
10. The course is more suitable for the second year not the fourth while others see that it must be teaching in the 3rd year
11. The explanation is not understanding although the course is very useful
12. References should be indicated for students
13. Equations must be given in details
14. The books in the Faculty library are not suitable for the course

3.5.2. Suggestions

The students give more suggestions for the development requirements which varied between very important to the simple view. They may be written next as:

1. The modern and advanced devices of protection should be inserted.
2. Problems of the sheets should be solved in the lecture
3. The chapter of measuring transformers must be cancelled
4. The course is useful and so its time should be increased
5. The revision of past lecture with students at the beginning of each lecture will be a clever way for understanding
6. More details would be added and spread explained
7. The protection of motors must be added
8. The setting of all devices and relays could be inserted with applications inside the course

3.5.3. The Questionnaire Answers

The statistical analysis of the present questionnaire may be based on the answers of the questions because the suggestions and comments are addition to the answers according to the student point of view. So, the questionnaire answers represent the principle base of the subject if we need to develop the education, through engineering education. Accordingly, the development of education in Egypt can be achieved when all development requirements are done. It should be mentioned that we consider the students as the leaders in the process, and consequentially, the statistical results for their answers are listed in Table A5 in Appendix for the original data. The results in percentage system are

tabulated in Table 4 where the non-answered persons are given in percentage too. The contents of course may be shown in Table A6 in the Appendix.

Table 4. The statistical results of the students for the 48 students (%).

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	56.25	43.75	00		
2	Preparing before	22.92	77.08	00		
3	Like the lecture style	77.08	14.58			6.33
4	Lecture timing	87.50	12.50			
5	Lecture Duration	4.16	27.08	68.75		
6	Sheet works	35.58	29.16	25.00		6.25
7	Problems Difficulty	16.67	52.08	29.16	4.16	2.08
8	Content Level	43.75	56.25	00		
9	Course timing	54.17	45.83			
10	disadvantages	18.75	62.5	16.67		2.08
11	understanding	2.08	43.75	47.92	4.16	2.08
12	Lecture Revision	20.38	25.00	37.50	16.67	
13	Reference	43.75	62.5	2.08	2.08	4.16
14	Book Sources	79.17	14.58	10.42		4.16
15	Solving sheets	6.25	35.58	45.83	4.16	4.16
16	Solving by yourself	14.58	29.16	35.58	12.50	4.16
17	Problem idea	25.00	33.33	33.33	6.25	2.08
18	Contents	6.33	62.5	25.00		4.16
19	Benefits	81.25	16.67	00		2.08

4. Statistical Analysis

The statistical processing for the data in general generates some indicators to evaluate a subject or item because the development of a subject will depend on the several factors that may be appeared statistically. So, the main target of this paper is directed towards the development of education in developing countries generally although we treat only a simple sample of the faculty education in only one country as Egypt. This is possible because Egypt is one of the developing countries. It is a suitable model for the developing countries since Egypt is a developing country. Then, the studied sample of education for the developing countries represents the faculty education where it goes towards the practical and experimental education. The deduced above values are given in the percentage system so that more analysis can be added and continued for more investigation.

Therefore, the comparison for the time effect on the developing of a course sample can be easy done although the evaluation depends on the students' experiences. It is important to illustrate that, the first course (past course) will be the origin in all mathematical processing.

4.1. Statistical Factors

The detection of the crucial factors to regulate the results may be accounted for this sample where the time interval between tests means an appropriate time to study the qualification and improvement of the course. The first factor to see the modification and development level is the readings ratio (R_{Ratio}), which must be a function of the last reading (R_{Last}) and past reading ($R_{previous}$), to be estimated according to the formula:

$$R_{\text{Ratio}} = \frac{R_{\text{Last}}}{R_{\text{previous}}} \quad (1)$$

The results for the course (Design of Electric Stations) can be shown as listed in Table 5 where the percentage system is accounted. It should be mentioned that the teacher for both tests is the same.

Table 5. The ratio of development after 10 years.

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	0.92	2.24	00		
2	Preparing before	1.83	0.94	0.5		
3	Like the lecture style	1.03	1.22			0.37
4	Lecture timing	1.05	0.70			00
5	Lecture Duration	0.43	0.52	1.27		
6	Sheet works	1.24	0.67	1.57		0.92
7	Problems Difficulty	1.38	1.13	1.02	0.46	00
8	Content Level	0.8	1.5	#		00
9	Course timing	0.72	0.66			2.67
10	disadvantages	0.21	1.15	0.998		0.46
11	understanding	7.25	0.95	0.64	2.45	
12	Lecture Revision	1.01	0.33	0.66	2.57	1.04

No	Question	a	b	c	d	Not answered
13	Reference	1.09	0.72	0.41	0.92	1.04
14	Book Sources	0.86	0.81	1.83		1.66
15	Solving sheets	0.72	1.02	1.38	00	#
16	Solving by yourself	0.73	1.17	1.5	00	00
17	Problem idea	1.07	1.22	3.98	#	00
18	Contents	0.73	0.8	0.31		
19	Benefits	0.95	1.47	00		

The second factor may be the difference factor (Δ) which leads the mathematical expression as:

$$(\Delta) = R_{\text{previous}} - R_{\text{Last}} \tag{2}$$

Using this equation, we have the data listed in Table 6 where the data based on the percentage system.

Table 6. The difference (Δ) between readings after 10 years.

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	5.9	-20.31	12.72		
2	Preparing before	-10.61	4.54	6.39		
3	Like the lecture style	-2.13	-3.64			5.76
4	Lecture timing	-4.24	2.76			1.61
5	Lecture Duration	15.6	1.12	-16.82		
6	Sheet works	-8.64	-2.88	-7.28		0.3
7	Problems Difficulty	-2.73	-5.91	-0.61	3.94	3.63
8	Content Level	14.23	-12.73	-3.33		1.61
9	Course timing	19.09	24.23			-1.72
10	disadvantages	55.9	-8.49	0.03		1.96
11	understanding	-10.06	3.03	13.03	-7.88	
12	Lecture Revision	-0.46	47.57	8.78	-14.24	-0.06
13	Reference	-4.4	21.16	9.5	0.3	-0.06
14	Book Sources	12.42	3.03	-4.55		-1.72
15	Solving sheets	11.61	-0.91	-5.55	1.61	1.61
16	Solving by yourself	7.27	-8.95	-5.43	7.27	1.61
17	Problem idea	-3.04	-6.06	-16.22	-1.67	3.63
18	Contents	2.43	14.23	49.23		
19	Benefits	4.23	-4.24	00		

The last factor for this part of the analysis will be the percentage deviation (δ) of a reading after 10 years because this value means the real development in this value. This aimed value could be expressed in the simple mathematical formula as:

$$\delta\% = 100 \times \frac{(R_{\text{Previous}} - R_{\text{Last}})}{R_{\text{Previous}}} \tag{3}$$

This equation may be applied for the deduced above readings of the two tests of the same course where the end results are shown in Table 7.

Table 7. The percentage deviation (δ) (%).

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	8.32	-124.14	100		
2	Preparing before	-83.41	6.09	50.23		
3	Like the lecture style	-2.86	-22.24			63.37
4	Lecture timing	-4.76	30.36			100
5	Lecture Duration	57.20	7.75	-28.91		
6	Sheet works	-23.76	-6.09	-57.23		8.26
7	Problems Difficulty	-37.55	-12.04	-1.86	54.19	100
8	Content Level	20.07	-46.68	#		100
9	Course timing	27.63	34.17			-106.83
10	disadvantages	78.84	-14.59	0.18		53.99
11	understanding	-624.84	5.38	35.84	-144.59	
12	Lecture Revision	-1.33	67.09	34.5	-156.66	-3.72
13	Reference	-9.31	27.78	58.79	8.26	-3.72
14	Book Sources	13.94	18.52	-83.49		-106.83
15	Solving sheets	27.9	-1.85	-38.4	100	100

No	Question	a	b	c	d	Not answered
16	Solving by yourself	26.66	-16.98	-49.81	100	100
17	Problem idea	-6.97	-22.22	-297.61	#	100
18	Contents	26.73	20.07	69.43		
19	Benefits	4.65	-46.64	00		

The deduced above readings in Table 5, Table 6 and Table 7 are the real indications for the growth of the education model through the time interval considered. This growth may require more classification for the growth fields so that we will classify the readings in 5-categories. These categories for the decision of students may be tailored as:

1. The evaluation of the lecturer
2. The evaluation of the section workshop
3. The evaluation of the available references
4. The evaluation of the course contents
5. The great attention of students to study

We are going to begin with the first category (The evaluation of the lecturer) where the items to present the positive value for the measurement will be indicated in Table 8.

Table 8. The evaluation of the lecturer.

Item	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
1-1	70.9	65	56.25	5.9	0.92	8.32
3-1	74.54	76.67	77.08	-2.13	1.03	-2.86
5-1	27.27	11.67	4.16	15.6	0.43	57.2
11-1	1.61	11.67	2.08	-10.1	7.25	-625
12-1	34.54	35	20.38	-0.46	1.01	-1.33
13-1	47.27	51.67	43.75	-4.4	1.09	-9.31

Similarly, the evaluation of the second part of the course which means the sections to solve problems. In this case, the corresponding items in the main questionnaire of Table 1 may be indicated as given the first column of Table 9 where the determined values are written in Table 9.

Table 9. The evaluation of the section workshop.

Item	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
6-1	36.36	45	35.58	-8.64	1.24	-23.8
7-(3+4)	39.99	36.66	33.32	3.33	1.48	52.33
15-1	41.61	30	6.25	11.61	0.72	27.9
16-1	27.27	20	14.58	7.27	0.73	26.66
17-1	43.63	46.67	25	-3.04	1.07	-6.97

Sequentially, the third part of evaluation can be listed in Table 10 where all values are registered according to the decision of all students. It should be honestly said that there is a lake in the available references since the course is explaining the design of stations. On the way, we can find some references but through the internet or the catalogues of companies and factories.

Table 10. The evaluation of the available references.

Item	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
13-2	76.16	5.5	62.5	21.16	0.72	27.78
14-1	89.09	76.67	79.17	12.42	0.86	13.94

On the other hand, the evaluation of the course contents and the place in the educational plane can be derived individually from the decision of students because this point present the way for the necessary development of education in this title and similar. Table 11 tabulates the estimated values for the course evaluation. The three statistical factors are calculated for each element in each item and they reflect the behavior of each element individually. Also, these factors are accurate due to the trust answers of students for the original questionnaire if they answered right and understanding the required.

Table 11. The evaluation of the course.

Item	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
8-1	70.9	65.67	43.75	14.23	0.8	20.07
9-1	69.09	50	54.17	19.09	0.72	27.63

Item	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
10-3	16.36	16.33	16.67	0.03	0.998	0.18
18-3	70.9	21.67	25	49.23	0.31	69.43
19-1	90.9	86.67	81.25	4.23	0.95	4.65

Finally, the students themselves decided the self interest to be educated in the university where the corresponding titles to define the actual interest of students in learning. The results are delivered in Table 12 while all values are accounted in the percentage system.

Table 12. The evaluation of the student interest (attention).

Item	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
2-1	12.72	23.33	22.92	-10.6	1.83	-83.4
3-1	74.54	76.67	77.08	-2.13	1.03	-2.86
4-1	89.09	93.33	87.5	-4.24	1.05	-4.76
6-1	36.36	45	35.58	-8.64	1.24	-23.8
12-1	34.54	35	20.38	-0.46	1.01	-1.33
15-1	41.61	30	6.25	11.61	0.72	27.9
16-1	27.27	20	14.58	7.27	0.73	26.66

4.2. Average Value

The average value expresses the normal meaning for the total view of a lot of numbers where all initial value can be transformed into only one value. So, a clear view can be illustrated within a single number. This average number (value) will be useful for the statistical analysis for the subject having a lot of input data. Then, the average value for each parameter in the above deduced values for all cases of study can be collected together in Table 13 while all above values are summarized into this Table 13.

Table 13. Summary of the computed average values (%) for the five categories under test.

Category	Course 1st	Course 2nd	Protection Model	(Δ)	Ratio	(δ)%
Lecture	42.68833	41.94667	33.95	0.741667	0.9826	0.0173
Section	37.772	35.666	22.946	2.106	0.944	0.0557
Reference	82.625	41.085	70.835	41.54	0.497	50.275
Course	63.63	48.068	44.168	15.562	0.7556	24.2446
Students	45.16143	46.19	37.75571	-1.02857	1.0227	-0.0227

5. Discussion

The present paper studies the ways to education development without funding since the modification of courses and the feedback of students can reach the maintenance of teaching and raising the level of study. So, the given questionnaire is an entrance for this development specially in the practical and academic studies. It is seen that the feedback of students has an excellent value for the development of a course either through the lecture presentation or the course contents for any course in university level. This is possible not only for the faculty under test but also for any university inside Egypt. Similarly, the development of a course by the same system can be achieved in any developing country because Egypt is a model for such countries [11].

5.1. Comments

The comments of students may be classified into several points where each point may collect a lot of comments. Thus, the comments will be tailored into the next style:

1. The computerized presentation of the lecture solved the points 1, 2, 3, 7, 8, 9, 10 and 11 in the disadvantages of the item 3.3.1. 1. and the points 4, 6, 7, 14 and 16 of the item 3. 3. 1. 2. of the first course survey as given above.
2. The software copy of presentation and the book in hands (free charge) solved the points 3 of disadvantages and point 4 in the suggestions of the first questionnaire.
3. For the second questionnaire, the points 1, 2, 3, 4, 5, 8, 9, 10, 11 and 18 of the item 3. 4. 2. 1., are solved by the software presentation with soft copy for each student. Also, the items of suggestions 3.4.2.2. is solved at the points 3, 4, 6, 7, 8, 19, 20, 22 and 23 where all main remarks are resolved with the help of computerized presentation.
4. The other remarks depend on the administration rules which need modification to go up with scientific works.

5.2. Questionnaire

It is seen that, the average value for the student decision about the lecture is lowered after 10 years with a low ratio near the unity although the facilities for the second course are better. It should be mentioned that the students in the second

course after 10 years have more facilities. The computer application in lectures is available and used in addition to the printed notebooks in hands. In all cases the two averages are very near. The final statistical factors for the deduced average values for different items are computed and the results are added to Table 13. It is simply seen that the lecture has a negligible variation of 0.0173% although the presentation by office tools in addition to the printed book for the lectures. It must be noted that the course has been modified so that the level of course becomes higher. This may be a trust conclusion because the corresponding value of 33.95% for the model course (Protection of Electric Networks) gives a lower indication than the original of 42.688% despite of the available book in Arabic. This model cannot be standardized because it is a unique course, but it is inserted in this paper to show the location of variation.

Similarly, the section workshop has a limited variation of about 0.0557% in progress since the course is a design material (subject). Its variation is very difficult because it depends on the creation and understanding principles. Also, the references in the second time are available more so that the variation excess reaches 50.275% where the English book and English notebooks were available. On the other side the readings for the results related to the course contents indicates to a great progress reaches 24.24% so that the development is occurred according to the decisions of students in the first questionnaire. Finally, the students interest in the course specially and in the education in general gives no change at all (-0.0227%). The studied sample proves that the investigated course has been developed to the better contents according to the registered contents of the course in both cases (See Table A2 and Table A4 in Appendix) [12]. Thus, the continuous feedback of students represents a vital factor for the development of a specified course. This development is easy for any course because the selected sample can be considered as a difficult. So, it is possible to develop the education contents continuously through the feedback with students.

6. Conclusion

Recently, the computers become the principle tool in life so that its utilization in education will be very important. Therefore, the computerized presentation for lectures of courses will save the time of explanation and clarifies all difficult points.

Since the students have no time normally, the references for each course will be very needed. It is necessary to define all references and books accurately at the beginning of study.

However, the youth will lead the country later so that the building of youth becomes a main goal for education. Then, the building of creation performance for each student in the teaching process must be the target of the course. Also, the creation will deduce a thinker student to be able for discussing and innovation to be a part of the modification cycle.

Since the students are the output product of education, their feedback will be very important to modify, and then to develop the education free of charge almost.

As the community of university consists of both student and teacher, the interaction between students and the teacher appears to be a vital factor for the modification of education as a step for the development.

Otherwise, the world is changing, usually, without stop so that the continuous modification of education should have acted, regularly.

Appendix

Table A1. The statistical results of the students for the 55 students.

Year: Final year of B Sc (4th Year) Stations

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	39	9	7		
2	Preparing before	7	41	7		
3	Like the lecture style	41	9			5
4	Lecture timing	49	5			1
5	Lecture Duration	15	8	32		
6	Sheet works	20	26	7		2
7	Problems Difficulty	4	27	18	4	2
8	Content Level	39	15	00		1
9	Course timing	38	16			1
10	disadvantages	12	32	9		2
11	understanding	1	31	20	3	
12	Lecture Revision	19	16	14	5	1
13	Reference	26	43	10	2	1
14	Book Sources	49	9	3		1

No	Question	a	b	c	d	Not answered
15	Solving sheets	23	27	8	1	1
16	Solving by yourself	15	29	6	4	1
17	Problem idea	24	15	14	00	2
18	Contents	5	39	12		
19	Benefits	50	5	00		

Source: Faculty of Engineering, Port Said University, Port Said, Egypt

Table A2. The contents of the course (Design of Electric Stations).

Introduction	Chapter V: Design Basics for the Lay Out
Chapter I: Load Curve	5-1 Rules
1-1 Standard curve	5-2 Measuring Instrument
1-2 Total Load curve	5-3 Cells (Indoor- Outdoor – Panel Style)
1-3 Factors for the load curve	5-4 Area Utilization
1-4 Special Factors for Study	(Under Ground – Horizontal - Vertical)
Chapter II: Performance of load variation	(Direct – Reverse Return Style)
2-1 Classification of loads	5-5 Tables & Dimensions
2-2 Distribution of loads	Chapter VI: Design of The Station Lay Out
2-3 Statistics of the Load curve performance	6-1 Individual Elements (B. B. – C. B. – P. T. –
2.4 Dispatching Centers	C. T. – I. L. – Transformer – B. C. – B. T.)
Chapter III: Design of Bus Bar	6-2 Power Stations
3.1 Basic Rules	(Units – Cell – Grouping – Standby)
3.2 Bus Bar Systems	6-3 Sub Stations
3-3 Bus Bar Sectionalizing	(Up – Down – Up/Down)
[a) Bus Tie b) Bus Coupler]	6-4 Distribution Stations
3-4 Synchronism	(Main – Secondary – Terminal)
3-5 Bus Bar Height	Chapter VII: Station Requirements
Chapter IV: Design of Single Line Diagram	7-1 Sequence of operations
4-1 Power Station Diagrams	(Opening – Closing – Transition)
4-2 Substation Diagrams: Indoor – Out Door	7-2 Control Room
(Single level – multi-level)	(Supervision – Half or Full automated –
4-3 Distribution Stations	Dispatching Control – Internet Concept)
(Single Transformer – Double Transformer –	7-3 Earthing & Grounding
Switch Station)	(Specification – Testing – Connections)
4-4 Auxiliaries (Rectification – D. C. Supply –	7-4 Compressors & Air Lines
Compressor – Pump – Fire Fighting)	7-5 Tender Technology and Calculations
4-5 Three Wire Diagram	7-6 Auxiliaries in Power Stations
	References

Source: Faculty of Engineering, Port Said University, Port Said, Egypt

Table A3. The statistical results of the students for the 60 students.

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	39	22			
2	Preparing before	14	42	5		
3	Like the lecture style	46	12			2
4	Lecture timing	56	5			
5	Lecture Duration	7	8	45		
6	Sheet works	27	19	12		2
7	Problems Difficulty	6	33	20	2	
8	Content Level	34	24	2		
9	Course timing	30	28			2
10	disadvantages	9	40	11		1
11	understanding	7	32	14	8	
12	Lecture Revision	21	14	10	14	1
13	Reference	31	33	4	2	1
14	Book Sources	46	8	6		2
15	Solving sheets	18	30	12	00	
16	Solving by yourself	12	37	11	00	
17	Problem idea	28	20	13	1	
18	Contents	4	43	13		
19	Benefits	52	8	00		

Source: Faculty of Engineering, Port Said University, Port Said, Egypt

Table A4. The modified contents of the course (Design of Electric Stations).

Introduction	5-3 Sub Stations
Chapter I: Design Basics	5-4 Distribution Stations
1-1 Objective Function	Chapter VI: Station Requirements
1-2 Elements of Design	6-1 Sequence of operations
1-3 Types of Stations	6-1 Earthing & Grounding
Chapter II: Bus Bar Systems	6-2: Dimension Calculations
2-1 Theoretical Items	6-3: Tender Technology and Calculations
2-2 Classification	Chapter VII: Auxiliaries in Stations
2-3 Sectionalizing	7-1 Control Room
Chapter III: Single Line Diagram	7-2 Fire Fighting
3.1 Basic Rules	7-3 Boards
3.2 Stations	7-4 Compressors & Air Lines
3-3 Auxiliaries	7-5 Water Pumping
3- 4: Three Wire Diagram	Chapter VIII: D C Station
Chapter IV: Basics for the Lay Out	8-1 Requirements
4-1 Rules	8-2 Types
4-2 Measuring Instrument	8-3 Calculations for Design
4-3 Cells	8-4 Battery Arrangement
4-4 Area Utilization	Chapter IX: Economics
4-5 Tables & Dimensions	9-1 Basics
Chapter V: Design of The Station Lay Out	9-2 Cost of Elements
5-1 Individual Elements	9-3 Installation Cost
5-2 Power Stations	References

Source: Faculty of Engineering, Port Said University, Port Said, Egypt

Table A5. The statistical results of the students for the 48 students.

Protection

No	Question	a	b	c	d	Not answered
1	Attendance all Lectures	27	21	00		
2	Preparing before	11	37	00		
3	Like the lecture style	37	7			4
4	Lecture timing	42	6			
5	Lecture Duration	2	13	33		
6	Sheet works	19	14	12		3
7	Problems Difficulty	8	25	14	2	1
8	Content Level	21	27	00		
9	Course timing	26	22			
10	disadvantages	9	30	8		1
11	understanding	1	21	23	2	1
12	Lecture Revision	10	12	18	8	
13	Reference	21	30	1	1	2
14	Book Sources	38	7	5		2
15	Solving sheets	3	19	22	2	2
16	Solving by yourself	7	14	19	6	2
17	Problem idea	12	16	16	3	1
18	Contents	4	30	12		2
19	Benefits	39	8	00		1

Source: Faculty of Engineering, Port Said University, Port Said, Egypt

Table A6. The contents of the course (Protection of Electric Networks).

		Chapter 5: Protection Circuit	135
		Current Protection	135
Introduction	5	Voltage Protection	154
		Differential Protection	157
		Distance Protection	168
Chapter 1: Electric Networks	7	Chapter 6: Protection System	177
Network Divisions	8	Generators	177
Dispatching Centers	11	Transformers	185
Protection Systems	14	Lines	191
Protection Basics	17	Motors	208
Networks of Renewable Energy	32	Bus Bar	216
Chapter 2: Measuring Transformers	37	Chapter 7: Protection Network	221
Potential Transformer	37	Integrated Circuits	221

Source: Faculty of Engineering, Port Said University, Port Said, Egypt

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