Article Course Evaluation for Low Pass Rate Improvement in Engineering Education

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Abstract: A course evaluation is a process that includes evaluations of lecturers' teaching performances and their course material moderations. These two procedures are usually implemented, whether officially by the faculty of engineering or by lecturers' own initiatives, to help identify lecturers' strengths and weaknesses and the ways forward to improve their performances and their qualities of teaching. This paper presents different ways of implementing these two criteria from students' and professionals' perspectives. Official questionnaires from the faculty of engineering, personal questionnaires using Google surveys, Moodle and special designed forms have been used for moderation and evaluations. The process of evaluation is the core of a feedback procedure followed by universities in order for them to monitor the teaching quality of their staff. Satisfactory results show that such a process can improve the lecturers' teaching performances, courses material quality, students' satisfaction and performances, and finally the pass rate of the class.

Keywords: education; engineering; evaluation; survey; feedback; moderation; pass rate; module

1. Introduction

Engineers play different contextual roles in industry and academia. In the latter, they not only teach students, but are also regarded as mentors and expected to extend open door policies to their students.

The teaching practice should be informed by the lecturers' working environment, namely the Faculty of Engineering, and their professional statuses as educators in the 21st century. Lecturers should be motivated by the importance of providing students with authentic learning experiences which are relevant to contemporary concerns, and place high value on developing responsible engineers who are insightful, can work independently, have good problem solving skills, and can apply and adapt their knowledge to unexpected and new situations.

It is known that the evaluation [1] of lecturers' teaching quality is usually conducted for two reasons; the improvement of practice, since more experience can be built up from the received feedbacks; and the faculty of engineering promotion, which is subject to the university policy for staff promotion as proof of teaching evaluation should be required. Also, the evaluation can be conducted by students or professionals—either colleagues or visiting experts appointed by the faculty of engineering. In the case of students' evaluations, the most important benefit lecturers can gain is feedback to help them refine their courses and teaching practices to provide students with better learning experiences [2–4].

The question here is: how important is the evaluation in the improvement of the low passing rate of the offered courses [5]. Although the evaluation's impact on the students' success cannot be demonstrated clearly, it can assist lecturers to improve their teaching style and upgrade their course materials, which usually have direct impact on students' performances. It can be seen that evaluation

processes can accurately identify the lecturers' strengths as well as areas in which they need to improve.

Usually, a course can be defined into four major parts; the prescribed textbooks, lecture notes, tutorials, and the practicals. Another important item can be useful to make the course easier to follow and more comprehensive is the study guide. Study guides are very important in the organization of the course. They are the road map and can be seen as contracts between lecturers and their students.

Prescribed textbooks are usually the official books for the course. Lecturers, after obtaining faculty approval, list these books as essential for reading and reference. These books will help students to focus better and supplement lecture notes, creating better chances of student success in the course.

Lecturers are advised to avoid recommended classic textbooks due to their outdated contents and applications. These books were basically designed for students who had very limited access to computers and digital information. Modern engineering textbooks should be user-friendly, with new and modern applications inspired from the modern engineering world. Tutorials in these textbooks ought to be designed to solve real-life problems using pedagogical approaches that help students understand the course through their own studies and revisions.

In order to give students greater variety and inspire them to think out-of-the-box and not to rely on what is prescribed to them, lecturers could also recommend textbooks written by different authors and prescribed by other universities. The recommended textbooks will not replace lecturerprescribed textbooks but give a chance to students to expand their horizons through exposure to something different. Usually, these textbooks are provided to students in the form of e-books for no extra expense.

Good design and presentation of lecture notes or course slides, despite the brevity of the latter, play an important role in making lectures very easy to understand and comprehensive. Succinct and well-summarized lecture notes help lecturers cope with the limited time allocated per session. Lecture notes facilitate revision for students.

Lecture notes should be designed and prepared in an attractive manner and the layout of the slides helps students psychologically follow the content when lecturers are busy presenting. The slides should have an easy logical flow and should be judiciously interspersed with some proverbs, photographs, or cartoons in line with the context of the lecture.

This added entertainment aspect could also include information related to the content of the course gleaned from famous researchers or well-known scientists and gives quality to the design of the slides. The extra information provides inspiration to students and assists them to see the course from a real-word perspective.

There is a famous quote from Socrates: I cannot teach anybody anything, I can only make them think. This quote describes the philosophy behind tutorials at engineering faculties. The main purpose of a tutorial is to give students a chance to develop their individual capacities to think deeply about engineering problems and thereby build their confidence.

Tutorials also encourage teamwork among students when they meet in small groups and discuss specific topics related to the subject matter of the course. Engineering tutorials which involve group work are appealing since they provide opportunities for students to practice and develop collaborative skills [6]. In a tutorial class, the lecturer will encourage interaction and participation in the discussion.

As tutorials are very important in mediating the course by helping students grasp the unclear concepts, the lecturer should link the problems given in tutorials to the theory in the lecture notes. Solutions to the most important problems should also be made available to students to enhance their understanding of the lecture material.

The overall goal of engineering education is to prepare students to practice engineering [7]. Therefore, practicals in engineering education play an important role in developing skills that will assist students to be ready for the professional engineering environment.

Engineering faculties consider laboratories as an essential part of undergraduate programs. Laboratory work is an established part of courses in engineering education that intends to produce skilled and highly competent engineers for industry. This enables students to integrate easily and quickly into industry.

Practicals enable students to link theoretical concepts learned in class to real-life applications. For example, practicals designed for the Signals and Systems and Telecommunications course constitute either software programming projects or hardware build projects or a combination of both.

The architecture of the proposed procedure for improvement of low class pass rate is depicted in Figure 1. Feedback is the core of the system. The teaching and course material evaluations are means to provide feedback about the course quality and thus help lecturers to improve and upgrade what is necessary in order to provide students with a better educational environment which will lead to better class pass rates.

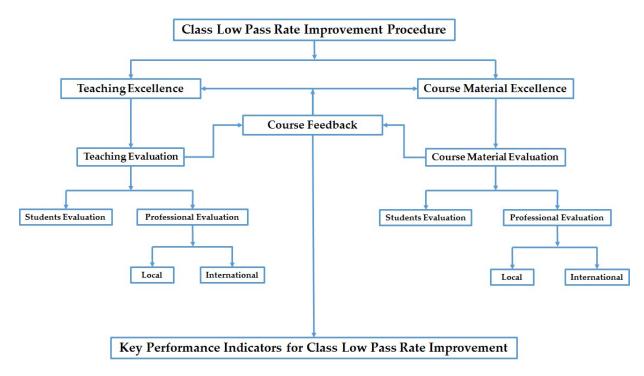


Figure 1. System architecture of the proposed procedure.

Google's survey service simplifies communication between lecturers and students and summarizes the collected data based on students' opinions and views. Figure 2 is one of the surveys [8–10] administered to students regarding teaching expertise and course material. Lecturers also use Moodle [11,12] to reach a decision when it comes to meeting and test dates. This help create sort of a cloud-community that maintains open and flexible access and communication between lecturers and students even beyond physical universities.



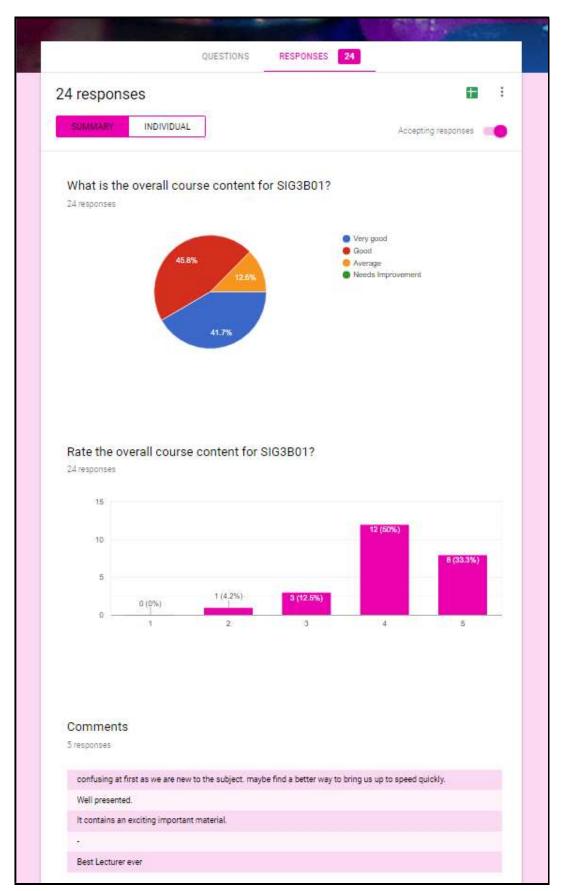


Figure 2. Google Survey for teaching excellence evaluation.

The paper is organized as follows. In Section 2, different evaluation processes are presented. Section 3 covers the process of moderation of the course material from the students' perspective and

professional academics' perspective. Finally, a conclusion summarizing the achievements which led to the improvement of the class pass rate is presented in Section 4.

2. Teaching Evaluation

Teaching evaluations are usually conducted for two reasons; to improve practice and to assist in the faculty promotion process. However, the most important benefit lecturers can gain is feedback to help them refine their courses and teaching practices to provide students with better learning experiences [13]. Teaching evaluation is important in the refining of the teaching excellence of any lecturer. Another important reason for teaching evaluation is the improvement of class pass rate and thus the faculty's throughput. Although evaluation cannot be directly linked to throughput, it can assist lecturers to improve their teaching styles and upgrade course materials, which invariably impact on students' performances.

Taking this into consideration, lecturers should conduct three types of evaluations, namely students' evaluations, peer evaluations by colleagues, and evaluations by international guests and experts.

2.1. Students' Evaluation

Students benefit equally from proper classes and from research, and lecturers should be well prepared on both fronts. Descriptions and evaluations of both types of teaching evaluations are described below.

2.1.1. Students Observe Lecturers (SOL)

Students Observe lecturers (SOL) is an application designed and developed by the author in order to give students the ability to observe the lecture flow and send comments live to the lecturer in order to adjust their lecture's speed and flow. The designed App is installed on both the lecturer's and the students' computers. Students' numbers and their computers' IP addresses are considered in the App in order to secure the communication between students and lecturers within the class session. Many students are shy by nature and do not have the courage to ask a lecturer in the middle of the lecture. Also, some students are afraid to ask questions or to stop a lecturer to ask questions. The author, from his teaching experience, has realized that some students lose focus in the middle of the lecture due to disruption or the speed that the lecturer follows. To take control and give students the chance to slow down or catch up with the lecture, an application was designed and installed on the computers of each student in which they can click on different option to evaluate the flow of the lecture. Results will appear instantaneously on the screen of the lecturer's computer, who should check it from time to time to get an idea about the flow and the response from the students. Figures 3 and 4 show samples of the proposed SOL App.

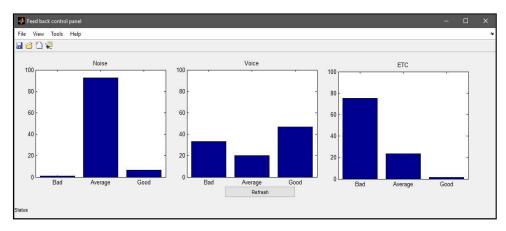


Figure 3. Students observe lecturers (SOL) feedback to the lecturer.

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Figure 4. SOL students' comments.

2.1.2. Course Evaluation

Teaching evaluations from students have two major goals. The first is to assess the performance and teaching quality of lecturers and to provide them with insight on what they are doing well and how they need to improve. The second is to develop students' responsibilities towards their faculty through taking part in the evaluation process in order to improve teaching quality in the faculty.

Considering the above, lecturers should conduct surveys in which students participate anonymously to evaluate their lecturers' courses. In this paper, the author, who is lecturing a third year course on signal processing (SIG3B01), has conducted a survey which was based on a questionnaire which elicited students' overall opinions of the course, and specifically of the related course material such as slides, tutorial, practicals, and prescribed textbooks. Other questions were related to their opinions about the type of assessments and practicals on offer, and to the way in which their marks are calculated. Figure 5 shows the students' evaluation of the courses that he teaches.

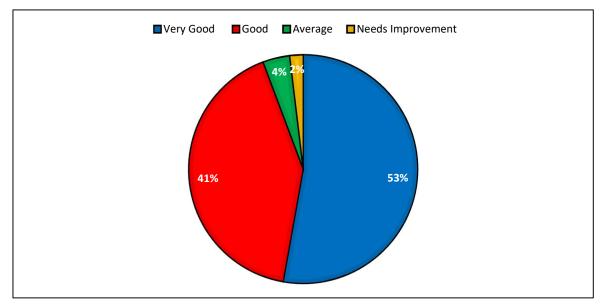


Figure 5. Students' evaluation of the SIG3B01 module.

2.1.3. Research Evaluation

In the author's experience, effective teaching is predicated on guidance and research; students need to be trained in both research methods and problem solving to be considered properly educated. The following are examples from different categories of students whom the author has had the

pleasure of supervising in undergraduate, masters, and doctoral degrees. Figures 6 and 7 are samples of their personal evaluations to his research supervision.

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Figure 6. Research evaluation by undergraduate final year project student.

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that h assigne	hmailes is an e ink out of the ities. He provid elped me be ed tasks. He a	more exceller dequately pre	poved r	how 1 ne far f	executed professional
Research	He has high quality of rese	arab	Disagr	ee Agree	Strongly Agree
nesearch	He is always up to date wit	1. Mar			
	His research is always relat	ed to real life problems		V	
	d Recommendations:	well contraner	0000	emic	- Factions
He was	s full of new	research ic	leas	and h	= helood
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me aro		a superviso	r,	D.	
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me gra recom m Student Signa	m		ite: 2	1/02/2	2017

Figure 7. Research evaluation by Master's student.

2.2. Peer-Teaching Evaluation

A lecturer-to-lecturer evaluation is a means of obtaining accurate information about a colleague based on the fact that an evaluation from someone with experience in the same field and who knows the lecturer's work, ethic, and behavior would result in an ultimately more useful and accurate evaluation. This also has the potential to develop lecturers' working practices and help them understand the points of view of their colleagues [14–16].

Other benefits of lecturer-to-lecturer evaluation is the building of good working relationships between colleagues which will create a best practice environment throughout the university.

A few colleagues from different departments, universities, and different countries were invited to evaluate the author's teaching, as shown in Table 1.

Course	South Africa	an Universities	International
Course	Author's University	Local University	University
SIG3B01	A colleague from another department, Civil Engineering Science, University of Johannesburg, was invited to evaluate the author's teaching performance.	A colleague from another university, School of Electrical Engineering, University of the Witwatersrand, Johannesburg, was invited to evaluate the author's teaching	A colleague from an international university Duisburg-Essen University Germany, was invited to evaluate the author's teaching

2.2.1. Local-Teaching Evaluation

Considering the benefits of peer teaching evaluation mentioned above, the author asked colleagues from different schools in his university and other colleagues from other universities to evaluate his teaching performance and to provide feedback.

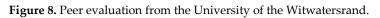
The author has chosen the heads of departments from schools of electrical engineering and civil engineering and asked them to attend his lectures to evaluate his teaching styles and his course material. He also asked the head of the Department of Electrical and Electronic Engineering Technology and the head of the Department of Civil Engineering Science from his university, the University of Johannesburg. A questionnaire evaluating the quality of his teaching was given to them. A similar questionnaire was given to another colleague from another university in South Africa at the School of Electrical Engineering at the University of Witwatersrand.

The reasons behind his choices were simple. Firstly, he needed feedback from a colleague in the same field of expertise and same school who is familiar with his curriculum and internal policies, as was the case with the Department of Electrical and Electronic Engineering Technology. Secondly, he also needed the opinion of someone who was from the same faculty but from a different school with different curricula, as was the case with the Department of Civil Engineering Science.

Thirdly, he needed an evaluation by a colleague from another university with different curricula and engineering programmes but from the same field of expertise, as was the case with the School of Electrical Engineering at the University of Witwatersrand. A sample of the questionnaire and evaluation form is presented in Figure 8.

10 of 28

May 2015		Peer Re	view of Tea	ching		UNNERS		May 2015		Peer	Review o	f Teachi	ng	
Instructor Ob Peer Reviewe	er:	uahada	Module: Sign			Code: SST3A1:	-	Instructor Attitudes	for the construction Showed student answers. Creates atmosph Creates	respect for questions and a friendly ere. an				
structor by p	should consider each tea placing a check mark un comments if possible t	der the ter	m best describin	g your e	valuation of th	ne instructor's		Recommendat	positive learning involvem	ent		\checkmark		
	Started class on time Introduced lesson (overview or focusing activity) Sequenced topics ingically Related lesson to previous or future lessons or assignments Summarized or reviewed major lesson points Ended class on time itons iting to see how th smoothly. Explained concepts clearly Used good examples to clarify points. Used graphics or visual aids or other enhancements to support presentation.	e lecture		/ /		ture went			I have le	re motivated ar earned from this				very good
O Box 524 Auckl Auckland Park Bu	ICSFI Corr Kingsway and Univers and Park 2006 Tel +27 11 559 nting Campus Auckland Park ngus Soweto Campus	4555 www.uj.a	ac.za				G	PO Box 524 Auck	dand Park 200 unting Campu	sway and University Road / 6 Tel +27 11 559 4555 ww s Auckland Park Kingswa o Carnus	w.uj.ac.za			



1 2.2.2. International Teaching Evaluation

In line with the earlier explanation, lecturers should try to get an international evaluation regarding their course materials and lecturing skills. In this context, the author took the opportunity to invite two international professors on two different occasions to attend his lectures to get their opinions about his teaching style, course material, and the teaching environment he provides to his students.

7 The author had the opportunity to invite a professor from Armenia. A sample of the 8 questionnaire and evaluation is presented in Figure 9.

9

	15	Peer Review	v of Teac	hing	NINETRT"	August 20	15 P	eer Review o	of Teachin	
				10-	ANVELEDRS	Instructor	Showed enthusias m		V	Com
Instructor O	served: Prof Khmales O	uahada Mor	dule: Signal P	rocessing 3B Code: SIG3	8801	Attitudes	for the content. Showed respect for		2000	
	Î	Ĩ	. 14	1 Canada	Co constant		student questions and answers.		*	
eer Review	er:-/) Affil	liation:	Ware, Sr. Data O office of Mana iness Unit, Ass	servent		Creates a friendly atmosphere.		~	
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				s evaluate the teaching skills of your evaluation of the instruct			oositive for student earning and		~	Instructor attitu
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	(overview or focusing activity)		~							
	Sequenced topics		V							
	logically Related lesson to		-							
	previous or future lessons or assignments		V							
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	points		v			Peer Review	" <i>0</i>	1	Date: 2	4 August, 2015
ommenda	Ended class on time tions:		V							
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esentation	Exploined concepts clearly		V							
	clearly Used good examples to clarify points.		V V							
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	clearly Used good examples to clarify points. Emphasized important points.		V							

10 11

Figure 9. Peer evaluation from VMware, Armenia.

12 2.2.3. Self-Teaching Evaluation

13 As academics, lecturers should acquire benefits from overseas institutions either via research 14 collaborations or by attending conferences. These are very important opportunities to gain exposure 15 to different professional environments and to develop communication skills through interactions 16 with academics from different parts of the world. Exploring opportunities to lecture at international 17 universities and to get feedback from their students and staff is also very important in the 18 professional career of an academic. The author had the opportunity to teach a course in 2014 as a 19 visiting researcher at the University of Duisburg-Essen in Germany. The faculty of engineering 20 approached him to design and lecture a Master's degree course on Information Theory. Feedback 21 from the University of Duisburg-Essen about his teaching experience is presented in Figure 10.

Universität Duisburg-Essen is t.w.i.c. is is is is <th>UNIVERSITÄT DUISBURG ESSEN</th> <th></th> <th>Zentrale Einrichtung IEM - Institut für Experimentelle Mathen Mathematische Methoden der Datenübertr</th>	UNIVERSITÄT DUISBURG ESSEN		Zentrale Einrichtung IEM - Institut für Experimentelle Mathen Mathematische Methoden der Datenübertr
Gebaude Ellemstr 29, 45326 Essen, 1. Etage, Raum ES 10 Essen, 27.06.2014 I.s. This letter acknowledges that Khmaies Ouahada lectured a regular 12 week course on Information theory for 25 Masters degree students in computer science at the University Duisburg-Essen. The course was a great success and students were very happy about his performance.		Ellernstr. 29 D-45326 Essen	Telefon 0201/183- 7650 oder 7649
This letter acknowledges that Khmaies Ouahada lectured a regular 12 week course on Information theory for 25 Masters degree students in computer science at the University Duisburg-Essen. The course was a great success and students were very happy about his performance.			Gebäude Ellemstr. 29, 45326 Essen, 1. Etage, Raum ES 10
Information theory for 25 Masters degree students in computer science at the University Duisburg-Essen. The course was a great success and students were very happy about his performance.	l.s.		
		jes that Khmaies Ouahada 25 Masters degree student	s in computer science at the University

22 23

Figure 10. Evaluation letter from Duisburg-Essen University, Germany.

24 **3. Course Material**

This section discusses the university's moderation philosophy and presents evidence of its practice. Universities usually stipulate a formal moderation procedure. In this paper, the author has extended this policy by approaching students and local and international colleagues to evaluate his courses for the sake of enhancing his teaching expertise.

29 In his case, the author's faculty curriculum comprises two types of modules or courses, namely 30 core/fundamental modules and exit-level modules. The Engineering Council South Africa (ECSA), a 31 watchdog for engineering curriculum quality, call final degree courses exit-level outcomes (ELO). 32 These courses are assessed and moderated twice in the exit level modules, both internally and 33 externally by someone from another university. This entails proper moderation of all the exam 34 papers, module content, and answer sheets. Non-exit-level modules can be moderated internally by 35 colleagues as is the case with the author's own modules, which are third year modules. Files with all 36 course material evidence, called ECSA files, are prepared by lecturers and moderators are expected 37 to inspect these for evidence of course teaching. 38

- 39
- 40
- 41

42 3.1. Students' Moderation

43 3.1.1. Textbooks

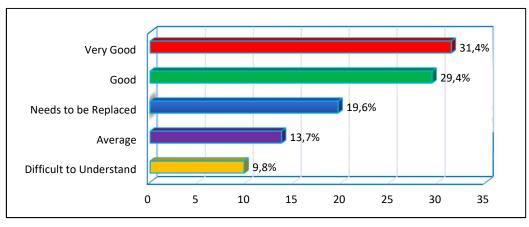
The recommended textbook is a further benefit to students that provides an alternative solution to students who could not afford buying the prescribed textbook in the first place. Although the prescribed textbooks are available in the university's libraries, many students are unable to access them because of the limited copies in relation to the number of students registered for the course.

From experience, another way in which lecturers could help students, mostly those who are struggling financially and cannot afford very expensive engineering textbooks, is for them to design their own textbooks. In this regard, the author designed his own textbook and made it available to his students on their blackboard, a website for course management. This e-book was inspired by the recommended textbook and was intended to build a strong relationship between the slides of his lecture notes and the prescribed textbook.

54 The author makes a direct link between the content of his slides used in class and the 55 corresponding content in the prescribed textbook. The result was very positive and students liked 56 the idea and his e-book became more readable and accessible to students than other available 57 textbooks.

58 The author believes lecturers should always obtain feedback by getting their students to evaluate 59 lecturers' initiatives and ideas. In this regard, he conducted a survey among his students to gauge 60 their responses to the prescribed textbook, the recommended textbook, and his own textbook. Figures

61 11–13 show the reaction of his students to these aspects.



62 63

64 65

Figure 11. Students' Evaluation of the prescribed textbook.

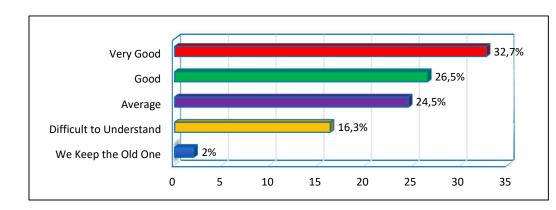


Figure 12. Students' evaluation of the recommended textbook.

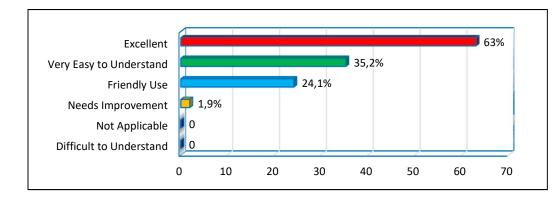


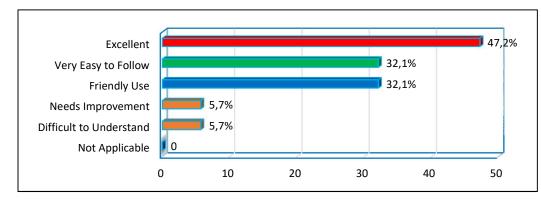


Figure 13. Students' evaluation of the author's proposed e-Book.

68 3.1.2. Lecture Notes

From the author's experience in teaching, the author always designs his notes to be structured in a manner that would promote a logical and elucidatory flow to help students who "get lost" in the lecture and gives them a chance to catch up. This is achieved by inserting short problems in between subsections, where students are asked to solve them. These questions will help students to understand the previous slides' contents and help others to catch up during the time reserved for such applications. At the end of each lecture, an example ought to be given that summarizes all sections in the slides and promotes clear understanding of the lecture.

Figure 14, results from a survey that was conducted among the author's students, shows their reactions, their opinions, and their ratings of the author's lecture notes and slides.



78 79

Figure 14. Students' evaluation of lecture notes.

80 3.1.3. Tutorials

81 From the author's lecturing experience, the best way to teach students is to create a competitive 82 atmosphere among them and give prizes. Students love competing with each other, especially when 83 rewards are on offer. In order to help students arrive at the correct answers, the lecturer should ask 84 relevant questions. Brain-storming challenging questions makes students feel that they are in class 85 not just to take notes and leave, but to take part in finding solutions and being proud of that 86 achievement. Students should know that active participation in class and tutorials will ease their 87 revision at home.

A survey was conducted among the author's students to gauge their opinions and rating of histutorials. The results are shown in Figure 15.

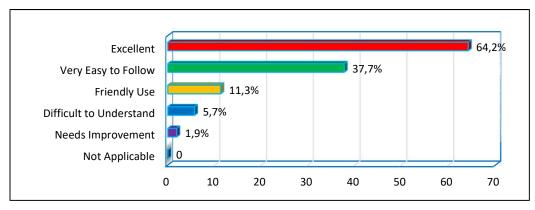




Figure 15. Student evaluation of tutorials.

92 3.1.4. Practicals

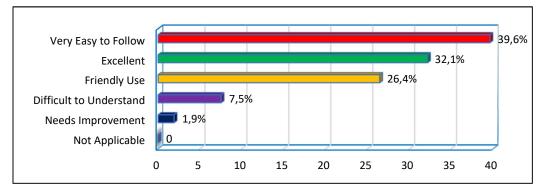
93 Lecturers should pay attention to the capacity of students to handle practicals [17–19].

It is very important to recognize that students come from different backgrounds and possess different skills as a result of their secondary educational experiences. Many students come from underprivileged places where it is hard and even impossible to get access to computers and thus programming skills differ from one student to the other. The same is applicable to hardware practicals.

Based on the above, a practical that caters for different types of students will be fair for all of them. In this regard, a survey was conducted among the author's students to gauge their opinions on the quality of his practicals and their preference of the type of practicals they prefer—hardware, software, or a combination of both. Interestingly, although programming was the least preferable choice for practicals, students accepted it with hardware implementation because they know that engineers ought to improve their programming skills to be ready for industry.

Figures 16 and 17 respectively show, firstly, the ratings of his students regarding the quality of his practicals and, secondly, their preferences regarding the three different types of practicals and

107 their best choices.



108 109

Figure 16. Students' evaluation of the practicals.

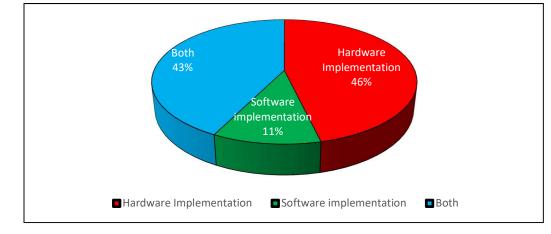




Figure 17. Students' preferences for different types of practicals.

112 3.1.5. Class Tests

Reduced student workloads in a stress-free assessment atmosphere helps to improve throughput rates. This can be achieved by designing assessment schemes which allow both students and lecturers more time and flexibility to prepare for courses.

116 The department of Electrical and Electronic Engineering Science has changed its assessment 117 strategy from the traditional summative assessment model consisting of semester tests and exams to 118 a more fine-tuned outcomes-based continuous assessment model [20]. Each module is divided into a 119 set of outcomes which encompass key knowledge areas and can be regarded as a chapter with a 120 common theme. This system is considered to offer optimum efficiency for knowledge acquisition and 121 serves to demonstrate our students' capabilities to pass all knowledge areas in each module. During 122 the course of the semester, students are given three small formative assessments for each module 123 outcome. To pass a module outcome, a student has to achieve a 50% mark in two of the assessments 124 or a 70% mark in one of the assessments.

The philosophy is that a student can fail one opportunity and use the experience gained to pass subsequent assessments. The 70% threshold was instituted to allow students who have mastered given outcomes the opportunity to demonstrate their knowledge once and then be able to focus on the remaining work.

The author has been using outcome-based assessments since 2011. In 2015, he had the opportunity to lecture three courses to third-year students, namely Signal and Systems (SST3A11) in the first semester, and Digital Signal Processing (SIG3B01) and Telecommunications (TEL3B01) in the second semester. After almost five years of using outcome-based assessments, the author decided in 2015 to evaluate this assessment scheme and to develop an assessment scheme using different assessment styles. This was done to avoid the heavy load caused by the outcome-based assessment and the types of questions given to students.

In his first semester course, Signal and Systems, the author applied the departmental assessment
 module, treating the practicals as outcomes on their own. The scheme for calculating student marks
 is depicted in Table 2.

1	3	9

Table 2. Scheme used for assessment of the SST3A11 module.

Assessme nts	Kind of Assessment	Assessment Details	Assessment Weight	Outcom e Weight
		Outcome A		25%
Assessmen	Writing	Problem Solving and	700/ Eugenetica	
t 1	assessment	Derivation	70% Exemption - 0.7 Max 1 + 0.3	
Assessmen t 2	Practical	Problem Solving and Derivation	- 0.7 Max 1 + 0.3 Max 2	

Assessmen	Writing	Problem Solving and		
t 3	assessment	Derivation		
		Outcome B		25%
Assessmen	Writing	Problem Solving and		
t 1	assessment	Derivation	- 700/ Evenution	
Assessmen t 2	Practical	Problem Solving and Derivation	- 70% Exemption 0.7 Max 1 + 0.3	
Assessmen	Writing	Problem Solving and	– Max 2	
t 3	assessment	Derivation		
		Outcome C		25%
Assessmen	Writing	Problem Solving and		
t 1	assessment	Derivation	- 700/ Eugeneration	
Assessmen t 2	Practical	Problem Solving and Derivation	 70% Exemption 0.7 Max 1 + 0.3 Max 2 	
Assessmen	Writing	Problem Solving and	- Iviax 2	
t 3	assessment	Derivation		
		Outcome D		25%
	Practica	ls: Reports and Matlab prog	ramming	
		Final Mark		
Avera	age (Outcome A -	- Outcome B + Outcome C +	Outcome D)	100%

140 In the second semester of the SIG3B01 module, the author applied a different assessment scheme 141 from the one used with the SST3A11 module: he retained the three assessment opportunities to meet 142 the ECSA requirements but treated the practicals as one of the assessments. The reason for dropping 143 the number of assessments was because they create a heavy load on students, affect their results, and 144 therefore the throughput rate. Another modification was to give different varieties of assessment that 145 did not only focus on problem solving and derivation. He introduced a multiple-choice type of 146 assessment to cater for students who are not comfortable with problem solving as the only type of 147 assessment. Since different types of questions require different time allocations, he adjusted the 148 percentage of each assessment mark to the final mark. The final assessment weights are shown in 149 Table 3.

150

Table 3. Structure used for assessments of the SIG3B01 module.

Assessments	Kind of Assessment	Assessment Details	Assessment Weight	Outcome Weight
		Outcome A		33%
Assessment 1	Writing assessment	Multiple-Choice + Theory	30%	
Assessment 2	Practical	Report + Demonstration	30%	
Assessment 3	Writing assessment	Problem Solving and Derivation	40%	
		Outcome B		33%
Assessment 1	Writing assessment	Multiple-Choice + Theory	30%	
Assessment 2	Practical	Report + Demonstration	30%	
Assessment 3	Writing assessment	Problem Solving and Derivation	40%	
		Outcome C		33%
Assessment 1	Writing assessment	Multiple-Choice + Theory	30%	
Assessment 2	Practical	Report + Demonstration	30%	-

Writing assessment	Problem Solving and Derivation	40%	
	Final Mark		
Average (Outo	come A + Outcome B + Outcome C)		100%
	assessment	assessment Problem Solving and Derivation	assessment Final Mark

151 In the case of the TEL3B01 module, the author kept the same assessment style as for SIG3B01 but 152 moved the practicals on their own-not as in the case of SST3A11-into a small project which 153 contributed a certain percentage to the final mark of the module. The idea behind this was to give 154 students a chance to do a separate project for submission at the end of the semester while taking 155 advantage of the practical allocated times to do revision or homework. This new model, to be 156 consistent with the ECSA's assessment requirement, needed a third assessment. The author thus 157 introduced a quiz which carried a lower percentage to accommodate the rest of the assessment types. 158 The final assessment weights are shown in Table 4.

159

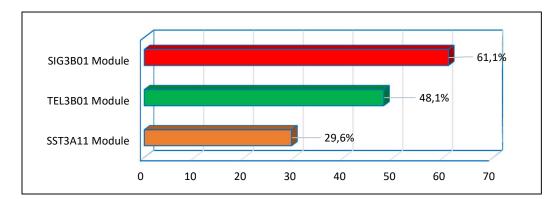
Table 4. Scheme used for the TEL3B01 module assessment.

Assessments	Kind of Assessment	Assessment Details	Assessment Weight	Outcome Weight
		Outcome A		35%
Assessment 1	Test	Quiz	20%	_
Assessment 2	Test	Multiple-Choice + Theory	30%	-
Assessment 3	Test	Problem Solving and Derivation	50%	-
		Outcome B		35%
Assessment 1	Test	Quiz	20%	
Assessment 2	Test	Multiple-Choice + Theory	30%	
Assessment 3	Test	Problem Solving and Derivation	50%	-
		Practical		30%
Dreatical	Droject	Report	30%	_
Practical	Project	Hardware implementation	70%	-
		Final Mark		
0.	35 × Outcome A	A + 0.35 × Outcome B + 0.3 × Practice	al	100%

160 The author conducted a survey among his students to gauge their preferences and to assess how 161 comfortable they were with each of the assessment types. He preferred not to rely on the results only 162 but wanted them to express their views on this matter to assist in improving the proposed assessment

163 schemes.

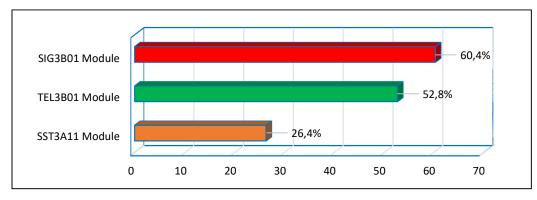
Figures 18–20 provide information on student choices and the type of scheme that helped to improve their marks. Figure 18 illustrates that students prefer the assessments tool used for SIG3B01 as the scheme that best suits an outcomes-based approach. From Figure 19, it is clear that the assessment tool used with SIG3B01 is the one they feel comfortable with. Figure 20 shows that multiple-choice assessment is the best tool to help students improve their marks.



169

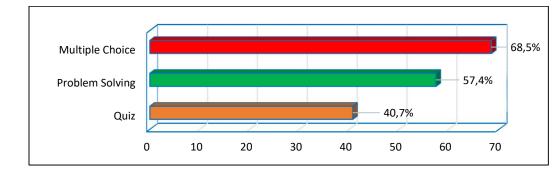


Figure 18. Student evaluation of module assessments schemes.



171 172

Figure 19. Student preferences for the assessment schemes.



173 174

Figure 20. Student preferences for different types of assessment.

175 3.2. Professional Moderation

176 This section offers an explanation of the author's moderation philosophy in the context of 177 continuous evaluation of his course content by local as well as national and international colleagues, 178 at his request. Table 5 gives an overview of his approach, and the statistics that are offered as evidence 179 of his moderation.

180

Table 5. Peer-module moderation.

			Course Moderation	
Courses	Course Material	South Africa	an University	- International
Courses	Course Materiai	Author's University	Local University	University
SIG3B0 1	 Lecture Notes Tutorial Practicals Textbook 	Colleagues from other departments were invited to evaluate the lecturer's course material. The line manager as the head of the department (HOD) took part in this process.	Colleagues from other universities were invited to evaluate the lecturer's course material.	Colleagues from other countries and internationa universities were invited to evaluate the lecturer's course material.

181 The author has approached colleagues and academics from different departments, universities,

and countries to moderate his course material, as shown in Table 5. He tried to get a broader opinion

183 from academics from different backgrounds. He has asked colleagues from different departments of

- 184 his faculty of engineering. He has also asked the opinion from a line management perspective from
- 185 his head of department. He has approached colleagues from the University of the Witwatersrand,
- 186 which has very strong ties with industry, and the University of Pretoria, which has longer history 187 than his university. At the international level, he has approached academics from North Africa
- 188 (Tunisia) and from Europe and Asia (Italy and Oman).
- The author has personally prepared a special moderation form, which was sent to the moderators with his course containing his study guide, practical guide, lecture notes, tutorials, and his textbook. Figures 21–23 are examples of moderation reports by academics from local and international universities. These moderation forms were designed by himself with questions to
- 193 moderate the course material as explained earlier.
- 194 This kind of moderation is informed by his belief that lecturers should challenge themselves to
- 195 induce innovative thinking. It also builds self-confidence to know that your course material has been
- 196 subjected to expert evaluation and acknowledged by colleagues whom you respect both locally and
- 197 internationally.

	Course Moderation				UNIVERSI			Course Moderation				UNINE
Course Develo	per: Prof Khmaies Ouahada Module: T	elecommu	unication	ns 3B Col	de: TEL3B01	2-27-22-1-42-		Recommendations: t lecuture notes. Graphical and	interesting			JUHAN
Moderator Na				versity								5
The course eva	luation should consider each teaching elemen	nt in the t	table and	d evaluate 1	the course	Practical		Well designed and presented	Average	Good	Very Good	Excellen
material provid	ed by the lecturer by placing a check mark under	the term b	best des	cribing your	evaluation	Practical		Up-to-date projects	_	+	-	1
of the course m	aterial. Add comments and recommendations if	possible to	o illustra	te your eval	uation and			In accordance with the course		1	-	-×
for future impro				1		Comme	nts and	Recommendations:	1	1	1.	
ter ruture impre									202 181 181			
	1	Average	Good	Very Good	Excellent			t practicals. Related strongly to				gy,
Study Guide	Presents course content clearly				V	nam	ely v	visible light communication. Will	arouse a l	lot of i	nterests.	
SANGARANA A	Presents Rules and agreements clearly		-	-	V			<i></i>				
1 1	Presents Consultations times clearly	3 8			V							
			-									
	Presents Assessments dates clearly											
S 6	Presents Assessments dates clearly Present material relevant to the purpose of the		-	-	V							
	Present Assessments dates clearly Present material relevant to the purpose of the course Recommendations: study guide. Precise and comprehe	ensive.			 ✓ 	Tutorial		Questions well structured Solutions well-presented and clear In accordance with the course	Average	Good	Very Good	Excellen
	Present material relevant to the purpose of the course Recommendations:	ensive.					nts and	Solutions well-presented and clear	Average	Good	Very Good	~
	Present material relevant to the purpose of the course Recommendations:				~	Comme		Solutions well-presented and clear In accordance with the course Good examples to clarify points			Very Good	\checkmark
Excellent	Present material relevant to the purpose of the course Recommendations: study guide. Precise and comprehe	ensive. Average	Good	Very Good	~	Comme		Solutions well-presented and clear In accordance with the course Good examples to clarify points Recommendations:			Very Good	\checkmark
	Present material relevant to the purpose of the course Recommendations: study guide. Precise and comprehe Slides in accordance with the study guide		Good	Very Good	Excellent	Comme		Solutions well-presented and clear In accordance with the course Good examples to clarify points Recommendations:			Very Good	\checkmark
Excellent	Present material relevant to the purpose of the course Recommendations: study guide. Precise and comprehe Slides in accordance with the study guide Quality of the slides		Good	Very Good	Excellent	Comme		Solutions well-presented and clear In accordance with the course Good examples to clarify points Recommendations:			Very Good	\checkmark
Excellent	Present material relevant to the purpose of the course Recommendations: study guide. Precise and comprehe Slides in accordance with the study guide Quality of the slides Epplain concepts clearly		Good	Very Good	Excellent	Comme		Solutions well-presented and clear In accordance with the course Good examples to clarify points Recommendations:			Very Good	\checkmark
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Figure 21. TEL3B01 module moderation report by a colleague from the School of electrical engineering at Wits University.

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Figure 22. SIG3B module moderation report by the HOD.

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Figure 23. SIG3B module moderation report by a colleague from ENIS, Sfax, Sfax University, Tunisia.

4. Discussion

In this section, we present the benefits of course moderation and teaching evaluation and their effect on the students' performance and class pass rate. The feedback obtained through students and professionals is the key to improvement of teaching quality and class pass rate.

4.1. Course Evaluation

Students teaching evaluation has two major goals. The first is to evaluate the performance and teaching quality of their lecturers and provide them with insight on what they are doing well and how they need to improve. The second goal is to build within students' responsibility towards their university by taking part in the drive to improve teaching quality for the future enrolled students.

Taking into consideration the feedback from different surveys presented in the previous sections, the author conducted a survey among students to evaluate the overall of his three courses he lectured, Signal and systems (SST3A11), digital signals (SIG3B01) and analog telecommunications (TEL3B01).

Figures 24 and 25 are respectively students' evaluation for analog and digital signals and systems. The content of both courses is mainly on transforms and filters. It is clear from the figures that students' opinions/ratings are close for both courses, with a rate of higher than 90%. With regards to TEL3B01 module which deals with analog modulations, the extensive theory makes the course unattractive, different from Signals and Systems courses. Figure 26 shows students rating of more than 80%. These results show how important is for lecturers take into consideration the feedback from students and colleagues in order to improve his course.

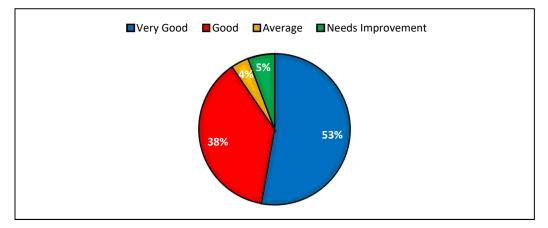


Figure 24. Student evaluation of the SST3A11 module.

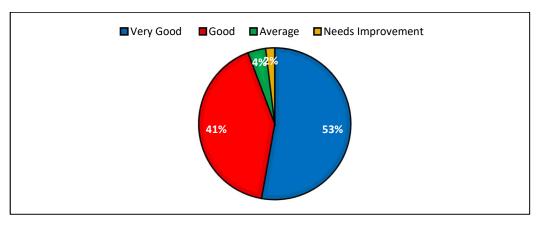


Figure 25. Student evaluation of the SIG3B01 module.

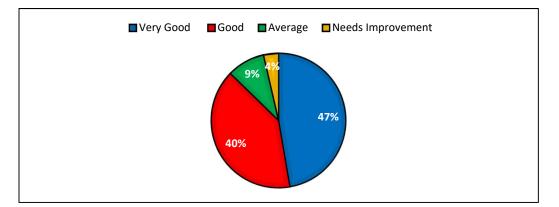


Figure 26. Students evaluation of the TEL3B01 module.

4.2. Pass Rate

Asking students and colleagues to evaluate your course helps improve the course because preparing a high-quality and friendly educational environment for students is one of the most important factors in improving class pass rate. Students' opinions and interaction with professionals from local or international universities help make a course more fruitful. Providing more consultation time and revision sessions to help students catch up with the course before examinations and helping underprivileged students with free hard copies of lecture notes play significant roles in making the course accessible to students.

The comparative results between the author's modules SST3A11, SIG3B01, and TEL3B01 lectured in 2015, and a summary of the benefit of the author's teaching philosophy in improving the class pass rates are presented in Figure 27.

Comparative results between the author's modules in SIG3B01 and TEL3B01 lectured since 2010 summarizing the benefit of improving the author's teaching skills and updating his teaching philosophy in improving the class pass rates are presented in Figure 28.

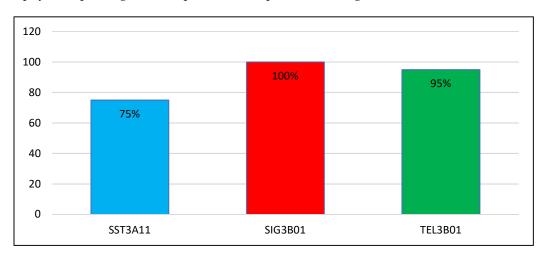


Figure 27. Class pass rates of different modules.

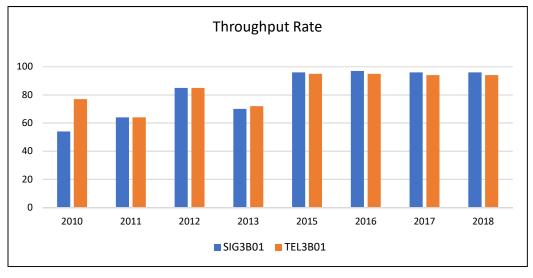


Figure 28. Class pass rate from 2010 to 2018.

5. Conclusions

The improvement of class pass rate was a result of the most important procedure any lecturer should follow; receiving feedback. Feedback in education, whether from students or professionals, helps tremendously in improving the teaching and learning skills of any lecturer. Feedback on the teaching style and skills, teaching philosophy followed by the lecturer, and quality of the course material contribute enormously to the improvement of the quality of the course, the quality of the teaching environment, and thus the improvement of classes with low pass rates.

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Conflicts of Interest: The author declares no conflict of interest.

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