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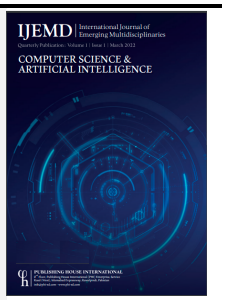

Innovative Software Tool for Effectively Measuring Teaching and Learning Effectiveness

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Abstract

Every one seeks to aspire to gain quality education. The biggest stake holders are students who labor through years acquiring knowledge and skill to help them prepare for their career. Parents spend fortune on their children's education. Companies spend billions developing new education products and services. Quality education is the golden key to prosperity for the individual and the nation. However, education standards are continuously deteriorating and it has become a global phenomenon. Unfortunately, teaching is often described as a 'popularity contest' and those teachers who are usually popular with students are often those who compromise teaching to appease students. Some teachers also 'teach-to-the-test ensuring high test scores. Such teachers hence, receive good student ratings. Teachers who are conscientious, rigorous and thorough are often the victims of good appraisal. Government and researchers are trying to capture the characteristics of a good teacher, but the results are vague and inconclusive. At present, there is no objective way to measure teaching effectiveness. We present an innovative method to objectively measure teaching effectiveness using a new Teaching Tool (TSquare). The TSquare used in the study is practical, easy to use, cost-effective and requires no special equipment to implement.

Keywords: Teaching effectiveness, Learning Effectiveness, Teaching Tool, Education Standards, Learning Outcomes, Student Appraisal, Real-time feedback, Non-intrusive, Teaching overload.

1. Introduction

Education is the foundation of modern society. For an individual a good education usually lead to a successful and a prosperous career. But how can one be sure that the students are receiving quality education and have mastered all the Course Learning Outcomes, in order to succeed in a highly competitive job market. Unfortunately, they cannot. The classroom is for all intent and purpose a 'black box'. Various traditional methods are being used to determine the teaching effectiveness but they are in most cases inaccurate, subjective, intrusive, expensive, cumbersome, complex and reactive in nature. In this work we propose an innovative approach that transforms the 'black box' into a transparent box

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without any of the disadvantages of the traditional methods mentioned above. It has been shown that this new approach significantly improves teaching and student learning. The new concept/approach is applicable for primary, secondary and tertiary education. The method is an implementation of the Non-intrusive, Real-time Teaching Effectiveness Framework (NR-TEF) also proposed by the author (see Figure 1).

More and more schools, colleges and universities are being established every year. Ministries and regulatory entities are busy ensuring academic standards are maintained as per the national qualification framework. However, it is a daunting task and often the results are not accurate. Stakes are extremely high for institutions, teachers and students. Many teachers are unfairly dismissed and the reason often cited is complacency and incompetency. Many cases end up in court using tax payer's money. Unfortunately, this has become a global epidemic. Losing a job can be traumatic and devastating experience especially when the victim does not know what s/he did wrong. Many of us have witnessed such cases.

Gates Foundations in 2009 launched the MET project (Measuring Effectiveness of Teachers) spent over 350 million dollars trying to capture the characteristics of a good teacher. The MET project involved 3,000 teacher volunteers and dozens of independent research teams. However, the results were inconclusive relying heavily on complicated and expensive subjective and intrusive methods of measurements. Hence, many critics argue that quality in the classroom could not easily be managed. Peter Drucker famously said, "If you can't measure it, you can't manage it." There are many other examples of similar projects undertaken by governmental and academic organizations however, the results are well short of expectations and sometimes highly controversial such as the heavy weightage placed on student evaluation surveys about the teacher. In all the studies the methods often deployed build upon the same old practices and dogma which are outdated and hence no real progress is evident.

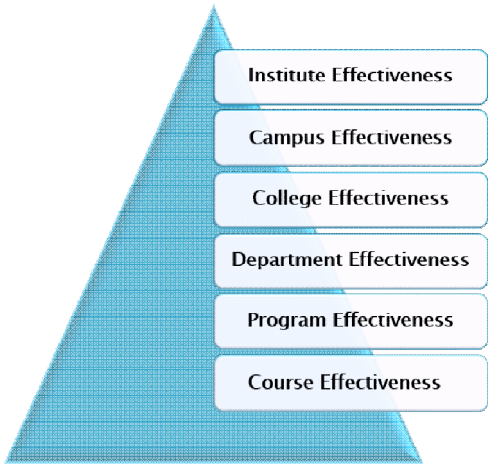

Figure 1: Bottom-up approach for measuring institute effectiveness

2. Problems

- Syllabus Coverage
- Learning Outcome Achievement

- Teaching Effectiveness
- Quality of delivery
- Overload with admin work
- Manually generated reports
- Inaccuracy and bias in teacher evaluation
- No real-time feedback to rectify T&L issues
- No Accountability
- Irrelevancy of assessments

3. Basic Methodology

A radically innovative approach is presented that eliminates the uncertainty and the subjectivity of classroom evaluation of teachers or in another work measure the overall effectiveness of a teacher. The novel approach has been encapsulated into a new software called Teaching Tool (TSquare). The main purpose of the TSquare is to capture and measure the core Key Performance Indicators (KPI) those that are generally considered to be 'good teaching' practices. TSquare is not Learning Management System, Content Management System or any another course management software like Blackboard, Moodle or Canvas. TSquare is an analytical engine that measures teaching and learning effectiveness accurately and objectively. The dashboard for the T^2 tool is shown in figure 2.

Using the innovative Teaching Tool the teacher can measure their strength and weaknesses in teaching (see figure 3, 4 and 5). The teacher can review the customized reports and reflect on their teaching methods and delivery of content. This can support the lecture to minimize or eliminate some of their major weaknesses and build on their strength. In this way teachers will be able to improve their teaching effectiveness and hence improve student learning (see figure 6 and 7). The TSquare software used in this study is practical, easy to use, cost effective and requires no special equipment to implement. Hence, it has a global appeal for poor and the rich countries alike. TSquare is an accurate measuring stick for improving teaching and learning effectiveness. TSquare has been designed to take into account the needs of the teacher and the institution in terms of providing easy to use tools and resources to manage and improve teaching. The Teaching Tool do-away with the mundane and time consuming task of course management and course portfolios. Not only does the Teaching Tool improve teaching and student learning, it also saves valuable time and money for the institution which can be used for other productive work.

4. Results

The software is fully compliance with the national qualification framework of any country. With minor adjustments it can be tailored for any country and education system whilst retaining the core functionality: measuring and ensuring teaching effectiveness. The results of the study provides best practices in teaching. It has clearly and accurately measured all the KPIs associated with teaching. For example blended learning, student participation, course coverage and teaching methodologies. The Teaching Tool has provided significant support to the teacher in improving their performance and at the same time designing well-structured assessments for the students. Overall the results clearly indicates that the Teaching Tool has greatly assisted the students to acquire better understanding of the course material and hence perform better in assessments (see figure 4).

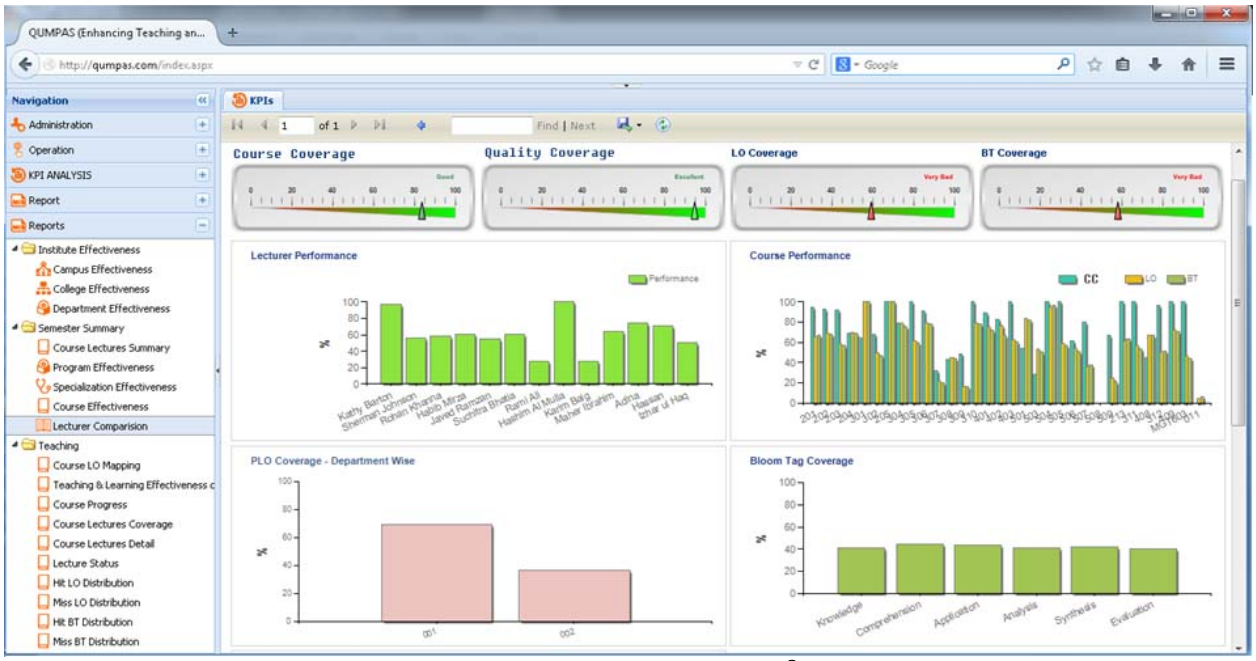

Figure 2: Dashboard for the T^2 tool

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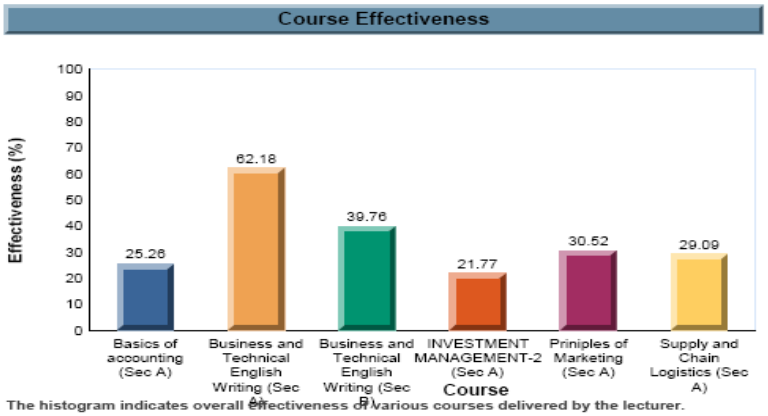
Lecturer Teaching Effectiveness & Personalized Feedback

Lecturer : Kathy Barton
Semester : Summer (2014)
Lecturer Teaching Effectiveness (LTE) : 34.76%
Print Date : 03-July-2014

Responsive Feedback

Code	Course	Course Coverage %	Course Learning Outcome %	Student Learning Effectivenes %	Attendance %	Response Required *SLE
504	Business and Technical English Writing (Sec A)	81.43	79.17	88.10	0.00	No
504	Business and Technical English Writing (Sec B)	38.57	54.17	66.29	0.00	No
408	INVESTMENT MANAGEMENT-2 (Sec A)	25.71	27.78	33.60	0.00	Yes
202	Basics of accounting (Sec A)	34.38	66.67	0.00	0.00	Yes
201	Priniples of Marketing (Sec A)	70.00	52.08	0.00	0.00	Yes
213	Supply and Chain Logistics (Sec A)	62.67	53.70	0.00	0.00	Yes
Overall Average :		52.13%	55.60%	31.33%	0.00%	

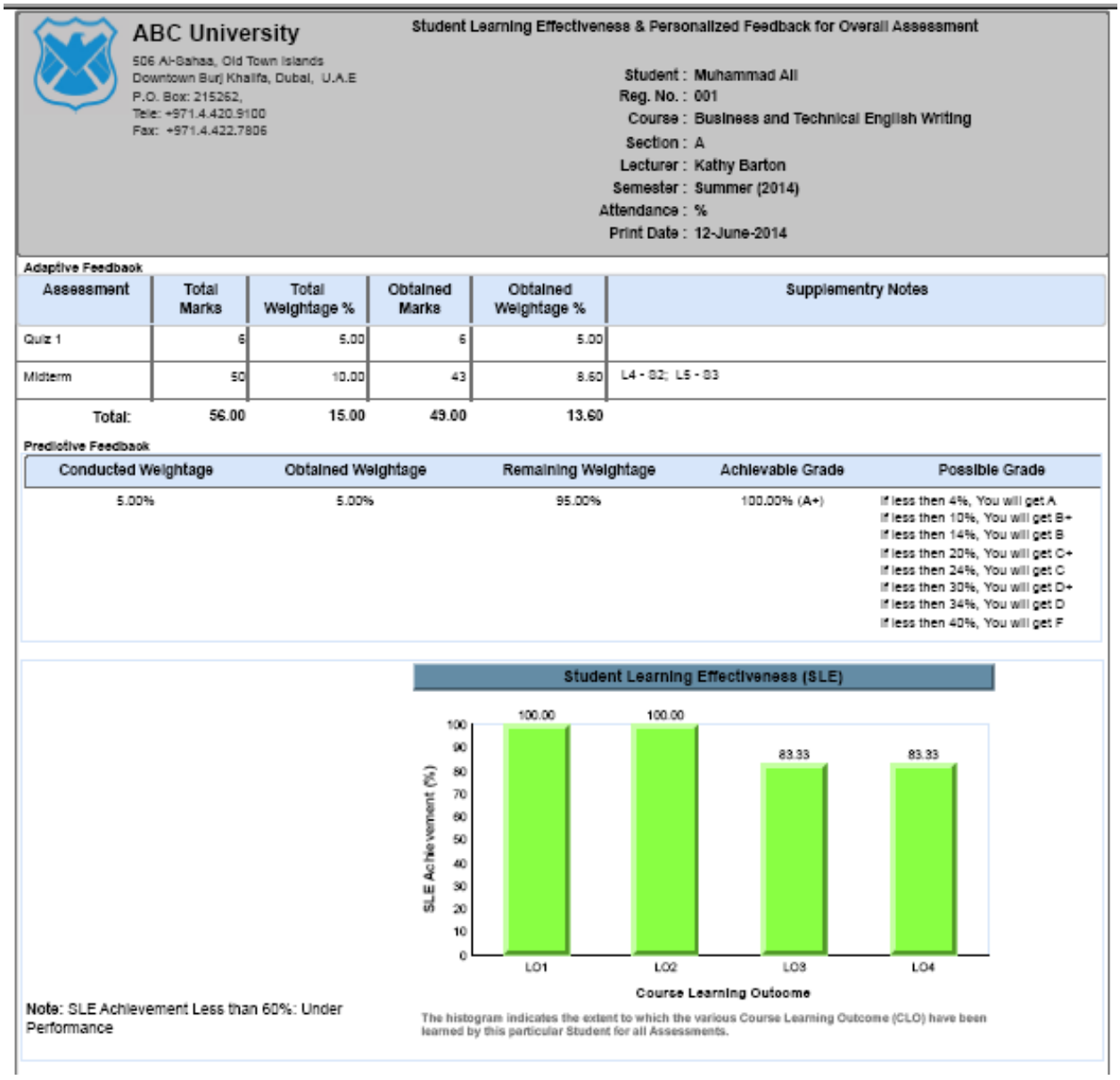


The histogram indicates overall effectiveness of various courses delivered by the lecturer.

Note: Effectiveness less then 60%: Under Performance

*SLE: Student Learning Effectiveness
Responsive feedback is required for the Lecturer to improve SLE

Figure 3: Individual lecturer performance management



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Student Learning Effectiveness & Personalized Feedback for Overall Assessment

Student : Muhammad Ali
Reg. No. : 001
Course : Business and Technical English Writing
Section : A
Lecturer : Kathy Barton
Semester : Summer (2014)
Attendance : %
Print Date : 12-June-2014

Adaptive Feedback

Assessment	Total Marks	Total Weightage %	Obtained Marks	Obtained Weightage %	Supplementry Notes
Quiz 1	6	5.00	6	5.00	
Midterm	50	10.00	43	8.60	L4 - 82; L5 - 83
Total:	56.00	15.00	49.00	13.60	

Predictive Feedback

Conducted Weightage	Obtained Weightage	Remaining Weightage	Achievable Grade	Possible Grade
5.00%	5.00%	95.00%	100.00% (A+)	If less then 4%, You will get A If less then 10%, You will get B+ If less then 14%, You will get B If less then 20%, You will get C+ If less then 24%, You will get C If less then 30%, You will get D+ If less then 34%, You will get D If less then 40%, You will get F

Student Learning Effectiveness (SLE)

Note: SLE Achievement Less than 60%: Under Performance

The histogram indicates the extent to which the various Course Learning Outcome (CLO) have been learned by this particular Student for all Assessments.

Figure 4: Individual student learning effectiveness and feedback

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Lecturer Comparision
Semester : Summer - 2014
Print Date : 19-July-2014

Lecturer Effectiveness

Lecturer	Course Coverage %	Course Learning Outcome %	Student Learning Effectivenes %	Attendance %
Kathy Barton (L1)	44.29	83.33	61.33	0.00
Sherman Johnson (L2)	19.78	52.89	51.86	0.00
Habib Mirza (L4)	23.14	60.77	54.18	0.00
Javed Ramzan (L5)	39.56	67.29	73.59	0.00
Suchitra Bhatia (L6)	29.43	60.42	69.23	0.60
Rami Ali (L7)	47.50	46.67	0.00	33.33
Hashim Al Mulla (L8)	59.16	75.15	58.41	61.68
Maher Ibrahim (L10)	32.06	73.15	57.56	0.00
Lecturer 12 (L12)	56.41	65.55	59.57	4.83
Hassan (L13)	32.64	68.85	70.75	0.00
Prof. Izhar ul Haq (L15)	10.50	33.46	0.00	0.00

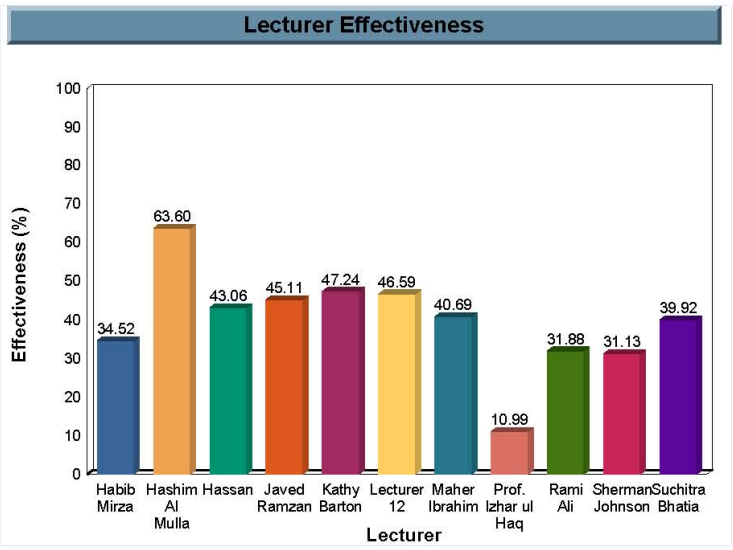
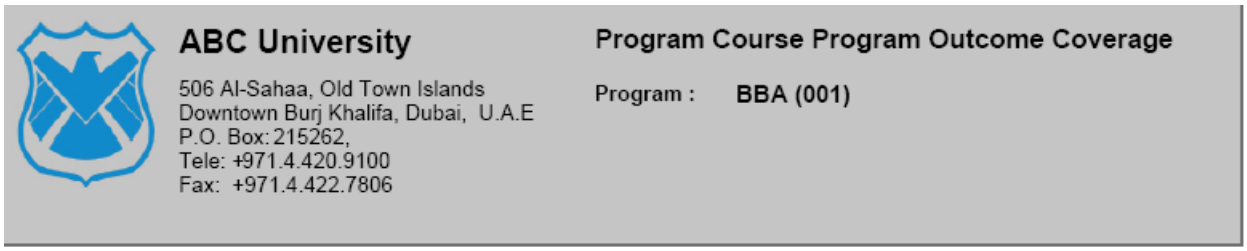


Figure 5: Comparative analysis between lecturers on teaching effectiveness



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Program Course Program Outcome Coverage

Program : BBA (001)

Course Information		Program Outcomes					
Code	Course	PLO1 (10%)	PLO2 (15%)	PLO3 (25%)	PLO4 (30%)	PLO5 (20%)	Total
202	Basics of accounting	5.48				10.06	7.77
212	Businees Law						0.00
206	Business Communication						0.00
207	Business Writing						0.00
209	HR Management						0.00
211	Human Resource Management and Organisation Behavior						0.00
205	International Business	2.22	4.00	6.25	10.00		5.62
204	Macro Economics			12.13	15.97		14.05
201	Priniples of Marketing	4.40	7.88		14.84	9.14	9.06
203	Professional Selling			11.11	11.48		11.30
210	Research Method						0.00
213	Supply and Chain Logistics		1.88	6.88		8.00	5.58
208	Total Quality Management						0.00
Total		**4.03**	**1.96**	**3.64**	**6.54**	**4.53**	**4.17**

Figure 6: Coverage of Program learning outcomes using T^2 tool

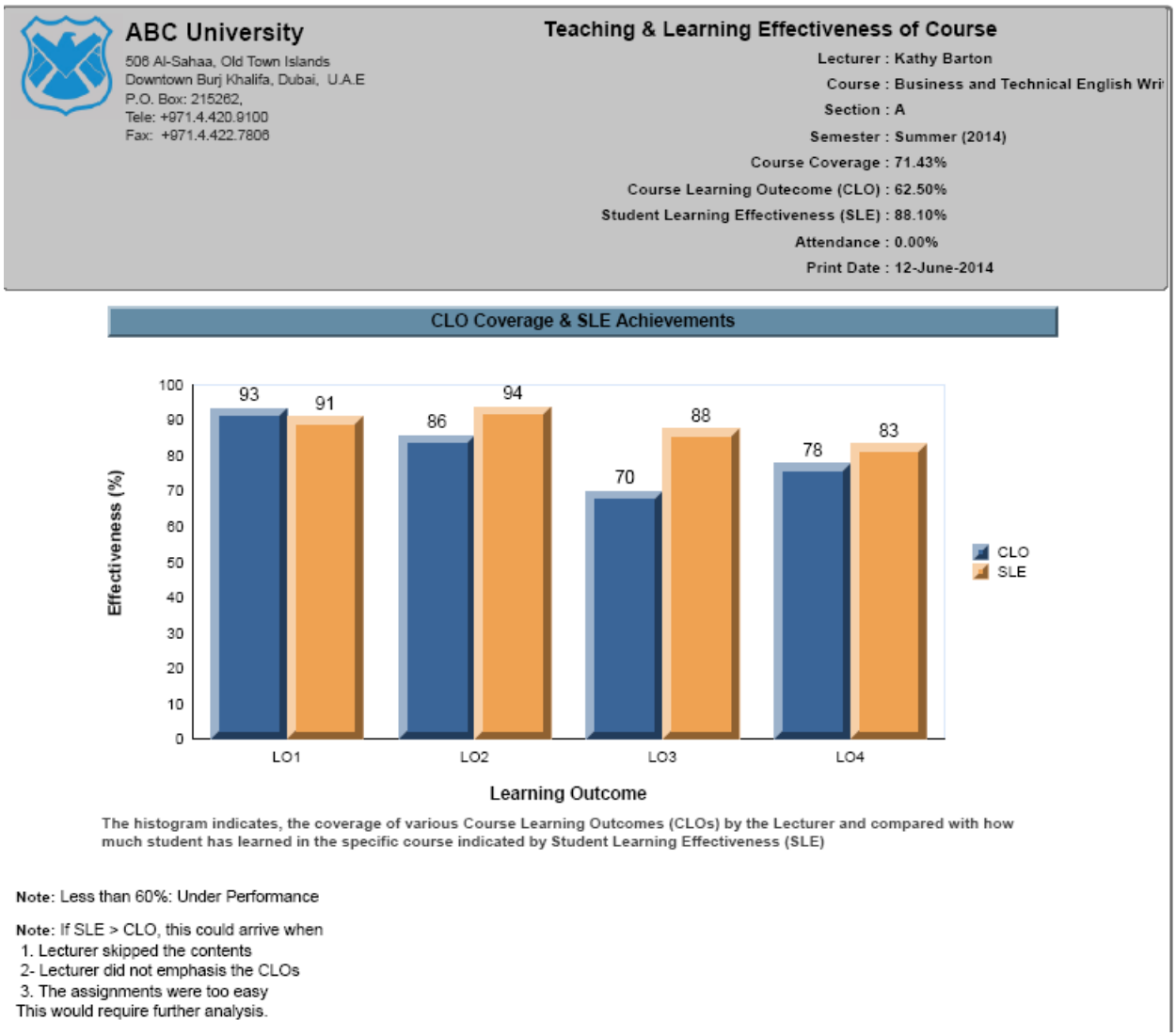

Figure 7: Student learning outcome coverage and learning effectiveness

5. Conclusion

An innovative Teaching Tool has been developed that support teachers to improve teaching and student learning. TSquare is not management software but an analytical engine with extensive reporting and real-time feedback. It has a global appeal and if implemented successfully could transform the way we define and measure teaching and learning effectiveness.