

QUALITY ASSURANCE: A PRESSING PROBLEM FOR EDUCATION IN THE 21ST CENTURY

Khaled Almadani

University of Dundee, Dundee, Scotland, UK
E-mail: K.A.A.Almadani@dundee.ac.uk

Norman Reid

Universities of Dundee and Glasgow, Scotland, UK
E-mail: dr_n@btinternet.com

Susan Rodrigues

University of Northumbria, Newcastle, England, UK
E-mail: Susan.rodrigues@ed.ac.uk

Abstract

Quality assurance in secondary schools (ages about 12-18) and in higher education has been a growth industry for many years, with all kinds of agencies being funded. With apparently endless growth in education at all levels, with insistent demands on more resources, the political pressures in ensuring value for money have increased.

This study looks at what is meant by quality assurance, challenges some of the current procedures and points to some better ways forward for the 21st century. Specifically, it argues that quality assurance must focus on the key goals for education at each stage with the learner always at the focus of all procedures to assess quality. Finally, the study illustrates this approach by considering what 793 secondary students thought of their experiences at the point when they were almost completing their education journey in secondary schools in the Kingdom of Bahrain.

The research aim is to show how focusing on the actual learners can identify key issues that need addressed to enrich education provision. These issues include the emphasizing understanding and not memorization, the need for more group work and dialogue, restoring the visual-spatial aspects of learning, re-thinking curriculum balance, and re-examining national examination systems.

The most fundamental question of all is whether quality assurance has improved quality - a key issue for the 21st century?

Key words: *national assessment, nature of learning, quality assurance, understanding-memorization.*

Introduction

Quality assurance agencies exist in many countries. For example, in the four countries of the United Kingdom, there is a joint Quality Assurance Agency for Higher Education while, in Scotland, a School Inspectorate (founded in 1840) examines schools.

With apparently endless growth in education at all levels, with insistent demands on more resources, the political pressures in ensuring value for money have increased. However, it is in the interests of every school and university to offer the highest possible levels of education

for this enables the institutions to attract more learners and enjoy positive relationships with satisfied learners (Reid, 2010).

It cannot be assumed that every educational institution and every teacher is performing optimally. However, it is in the interests of all to maximize performance. Laine *et al.* (2011) have argued cogently that the school teaching profession requires the best talents available. They look at this in terms of selection and initial training as well as how teachers are supported and rewarded at various stages in their careers. They emphasise affirmative support at all stages, with teachers being valued and resourced. This is a welcome approach and stands in stark contrast to the way some governments have viewed teachers where it seems that every societal problem is blamed on schools.

One of major issues for the 21st century is to re-focus on what is meant by quality assurance and to think again about how quality can be assured. Sadly, almost all quality assurance procedures have been developed on the basis of very limited research evidence. This paper seeks to bring together what is known and argues that quality assurance must focus on the learner and their experience on their educational journey. Following that emphasis, school students towards the end of their final year of study (age 18) are asked to reflect back. The question asked is whether it is possible to gain useful insights into quality by asking the learners directly.

The Nature of Quality Assurance

Seymour (1992) points out that the concept of quality assurance was applied to manufacturing between 1950s and 1980s. The process concentrated on the entire production process in order to prevent quality failure (Sallis, 1993) and to ensure that the products are produced to a predetermined specification.

The idea for quality assurance started to move across into education in the 1980s but how to define it is uncertain (Aspin *et al.*, 1994). There is a wide array of stakeholders and consumers, with many different perspectives while the complexities of the teaching-learning process are extremely difficult to specify.

Hoy *et al.* (2000) regard quality as a tool for evaluating the educational process to meet the standards that are set by clients. At the same time, they consider the learners to be customers and the parents as clients. Zuber and Ryan (1994) state that quality means '*a characteristic, property or attribute that devotes a high grade, great excellence, accomplishment, or attainment*'.

'Quality' in secondary education is a term that is highly contested, considerably vague and highly contextual and different interest groups attach different meanings to the term (Harvey and Green, 1993). Quality assurance can be described as:

All those planned and systematic activities to provide adequate confidence that a product or service is satisfying given requirements of quality.

This is easy to say. However, while widely accepted, this statement raises numerous questions itself:

- What is the '*product*'?
- What is the '*service*'?
- What are '*adequate requirements*'?

The '*product*' can be seen in terms of the learners and what they have gained from their journey through education. A '*service*' has been offered to them and the question is the extent to which that service has changed them educationally so that they can be seen to have achieved what they are capable of achieving. The nature of the '*requirements*' is, however, even more difficult to describe. However, in all of this the focus must be relentlessly on the learners (Figure 1).

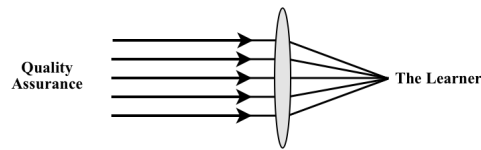


Figure 1: Learners at the Focus (derived from Reid, 2009).

The danger in all quality assurance is that the easy-to-measure peripherals are the focus. Instead, the focus must be relentlessly on the learners, their experiences in learning as learners and the nature of the final ‘*product*’. Thus, quality assurance needs to be seen in terms of the extent to which the agreed goals have been reached by learners. Here are some broad goals which seem to be broadly agreed across the literature (Figure 2):

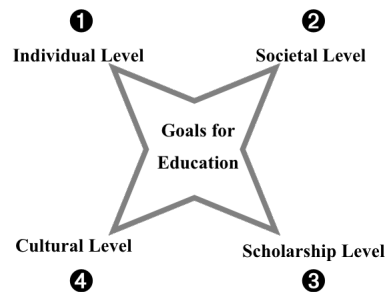


Figure 2: Four Goals.

The first goal relates to the extent to which individual student potential is released. The second recognizes that learners will have a role in the workplace, making a contribution to the nation. The third relates to the key role of all education in increasing knowledge and understanding and making that available to wider society while the fourth is more imprecise but extremely important: learners will have a role in contributing to the society of the future.

Quality assurance applies to schools and to institutions of higher education. The experiences in the latter can inform the possibilities for the former

Quality Assurance in Higher Education

Brown (2004), in reviewing quality assurance in higher education in the UK speaks of, ‘.....*the sad story of waste and confusion*...’. He gives a fairly brutal criticism of the whole process (written by one who was involved in the process). He noted, firstly, the political imperative which used models from commerce and industry and that these were totally inappropriate: we cannot quantify production and efficiency in higher education in any neat way. Secondly, the drive for competition rather than collaboration was flawed. Thirdly, because of the way the systems were set up, the higher education personnel did not ever feel that they owned the process (Watson, 2006): the actual institutions failed to challenge what was being imposed on them and failed to ask: where is the evidence?

One identified problem is that standards cannot be defined objectively in any agreed way. Thus, for example, degree quality is no evidence of educational quality (Yorke, 2009) for it is easy to generate degree ‘*creep*’. This leads to an important idea which can be captured in the question: are graduates different from others? Indeed, is any gain for graduates justified terms of the time and resources spent?

In a very recent study conducted by Hanson and Overton (2010) in the UK, graduates in

one science discipline were approached two years after graduation and asked to look back on their studies in the light of whatever job they were doing. The study showed:

- Graduates were very positive about the subject matter they had been taught.
- Graduates wanted more opportunity to develop what might be called '*generic skills*' in the way the subject was taught.
- The picture seemed constant across institutions of widely different character.

This is very encouraging and is, perhaps, the first study which looked at the perceptions of graduates, now established in a job but close enough to reflect back on their undergraduate experiences. This study has offered a model for the study described in this paper.

Employers have also been considered. There have been several major studies carried out in the UK by Harvey and his team during the 1990s (eg. Harvey and Green, 1994; Harvey, *et al.*, 1997). The studies started to develop some kind of concept of '*graduateness*', as seen by employers. '*Graduateness*' is what graduates tend to be able to do where others are less well equipped. This can be seen in their development of a continuum of employers' expectations from their graduate intakes.

At its most basic level, employers wanted graduates who would add something to their organisation. At its best, employers really valued what they called *transformative skills* - the ability to take an organisation forward in new and effective ways. It is an interesting feature of the studies of the views of employers that the employers did not regard the subject matter which students had been taught as important as many other aspects of the learning experience. In the study of graduates, Hanson and Overton (2010) found that students valued the content they had been taught, did *not* want less content, but wished that the content had been taught in *different* ways to allow more generic skills to develop.

Quality Assurance in Secondary Stages (ages ~12-18)

One of the features of much quality assurance in secondary school education relates to examination performance. This assumes that examination performance at a school level, area level or national level gives an indication of quality within the school or schools. This is a massive assumption for which there is no supporting evidence. Indeed, at school levels, the greatest determinant of examination performance seems to be the quality of the intake of the school (Bradley and Taylor, 2003).

Perhaps the most common structure for quality assurance is the employment of those who inspect schools, at national or regional levels. These people are often drawn from those with teaching experience but some countries allow those who have never taught to be involved in the inspection of schools. In some countries, the procedures can be quite draconian and such inspectors can write reports about schools which are not open to comment or criticism and can more or less condemn a school to be seen as a '*failing school*'. Thus, Paton (2011) reported that the number of schools in England regarded as failing had doubled following reforms in the inspection process. Had the definition of a '*failing school*' changed? The whole system is clearly suspect. In other countries, the procedures are much more affirmative and draw teachers into the entire process in an supportive and affirmative way (e.g. Chile)

In all of this, the quality assurance is focusing on the '*product*'. However, all learners have go through long years of an educational '*process*'. Quality assurance needs to look far more carefully at the process, the actual experiences of the learners. The '*product*' can be explored by considering how learners see their studies from the perspective of their first job as well as how their employers see their new employees.

The overall goal for each subject area might be to develop learners, '*... who know and understand enough in their own discipline to be able to apply their knowledge and skills in the future, with some degree of basic competence and confidence.*' (Reid, 2009).

It is imperative that quality assurance does not distort the system. It is very easy for schools and universities to concentrate their efforts in meeting the criteria set down by external agencies, thus losing sight of other, maybe much more important, criteria which are not so easy to measure.

Danielson (2007a, b) notes the problems associated with the typical inspection processes and the importance of not stifling creativity on the altar of conformity. Check list approaches (even dressed up as performance indicators) may well *not* be helpful as education is much more than the sum of the parts. Indeed, institutions can offer very rich educational experiences but might fail on some criteria on check-lists.

The overall aim is to encourage a new generation of learners who are equipped to make a difference, no matter what their future career may be. Of course, the aim is to allow students to develop their potential fully, to develop a love of learning and to be equipped to take society forward in every sphere of life and enrich their communities.

When the '*product*' is considered, very often examination outcomes receive far too much attention. It has been shown that schools and universities are very adept in gaining ever increasing examination success, to satisfy some external regime in which examination results are used to rate school or universities (eg. Department of Education. 2010). However, there is no evidence that examination results reflect the *quality* of education.

Comparisons are frequently made at international levels (eg PISA, 2009) and many treat these as if they give a valid picture of standards. It needs to be stated that such comparisons are almost totally invalid for it is impossible to control the variables: national curricula, national assessment procedures, methods of teaching, the education culture. Indeed, in a recent exercise in South America, teachers were asked to rate questions in the sciences, some of these being drawn from international surveys. With unerring accuracy, the questions from international surveys were heavily criticised while the questions from other sources were not (Danili and Reid, 2009). The teachers were unaware of sources.

There is a confusion between two key ideas: accountability and improvement. This is often seen in Quality Assurance papers where authors glide from one to the other, without acknowledging that the goals for the two are very different. Very often, school inspections are presented as seeking improvement while the methods that are used reflect accountability.

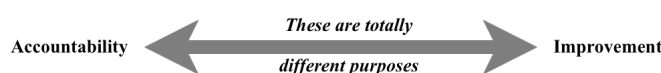


Figure 3: Accountability and Improvement.

In practice, it is very common to seek to measure the overall quality of the educational provision by looking at the quality of the students and this is often carried out by looking at performance. However, unlike production industry, the quality of the '*product*' (the student) is not a good indicator of the quality of provision. Thus, good teaching does not always lead to good examination outcomes (Ryle, 1949; McAnich, 1993).

This issue is taken up by Fenstermacher and Richardson (2005). Their arguments present a fresh analysis of the relationship between teaching and learning which allows for a degree of causality between teaching and learning but they caution against sliding into the conceptual fallacy that links learning and teaching too closely. They argue that '*quality*' teaching must include considerations not only of what is taught, but how it is taught. Such teaching may be called '*good teaching*'. Wisely, Fenstermacher and Richardson observe that, '*Our analysis suggests that this presumption of simple causality is more than naïve; it is wrong.*' (p. 191)

It has to be recognised that many aspects of school life are not within the control of either teachers or even headteachers. Thus, in most countries, the curricula are decided nationally,

the curriculum structures are laid down and the national assessment system is imposed on the schools. Indeed, all aspects of resource levels are determined by those outside the schools at national or local levels while the supporting infrastructure and management may be externally imposed (Figure 4).

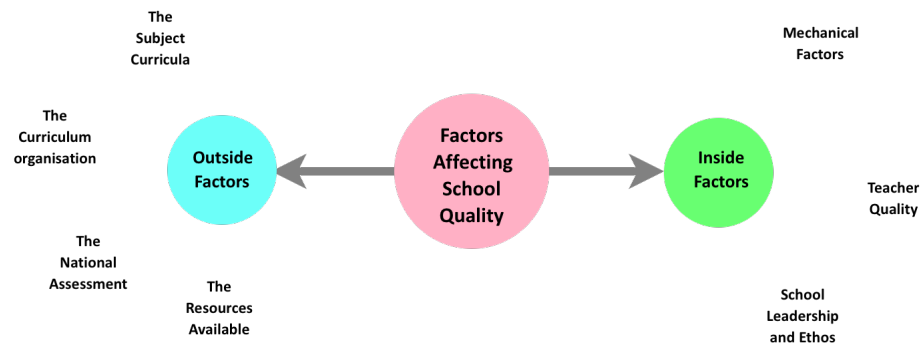


Figure 4: Factors Influencing Quality.

It is a sad observation that most systems of quality assurance involve the inspection of schools and any faults or failings are almost always laid at the door of the teachers. It is rare to find quality assurance that actually looks rigorously at curriculum and examination provision, usually determined nationally.

In a refreshing analysis of quality teaching, Danielson (2007a) suggests four domains of teaching responsibility and develops the key areas within each domain:

Table 1. The Danielson Model.

1	Planning and Preparation	How the teacher designs instruction.
2	The Classroom Environment	How the teacher sets the stage for all learning.
3	Instruction	How the students engage with learner.
4	Professional Responsibilities.	The characteristics of being a true professional educator.

Another feature of her work is the way she challenges the idea of teachers being assessed in some way by outsiders infrequently visiting the teaching situation. She notes how this is so artificial and unrealistic. Indeed, as soon as an outsider enters the teaching room, the situation in the room has changed.

One of her major contributions is the way she sees trained evaluators, who are still teachers, being a major part of the whole process. She seeks to shift the emphasis away from what is traditionally called, 'inspection' to what she calls 'collaborative reflection' (Danielson Group, undated). Her own research shows that this works well. Indeed, the principles have been adopted by Chile where it has operated since 2004, apparently with considerable success (Avalos and Assael, 2006; Higuera, 2009). Overall, it is multiple approach way of evaluation, with considerable on-going training: all teachers are involved in an affirmative way both as evaluators and those being evaluated.

Methodology of Research

General Background of Research

The goal of the research is to focus on the learners and ask them to look back over their experiences during secondary education (ages 12-18). The question is what insights can they bring that relate to quality and do they identify practical issues that need addressed.

Teachers were also surveyed and 793 teachers were also involved (Men: N = 389, Women: N = 404). Only one or two findings are mentioned here.

Sample Selection

In order to explore how school learners can be brought to the focus of the quality issue, a sample of 793 students, aged 18, at the end of their school career, were asked to look back on recent aspects of their educational journey. The school students were studying in the Kingdom of Bahrain where there is a highly organised school system, a well resourced education system and a quality assurance procedure has been operating since 2008. In addition, a sample of 793 secondary teachers was also surveyed but their feedback only form a small part of this report.

The students and teachers were draw randomly from across the schools in the country and represent a typical cross section of the population. Schools are gender separated and gender comparisons were made but are not discussed much here.

Instruments and Procedure

The surveys employed several formats based on the work of Osgood *et al.* (1957), Likert (1932). Reid (2003) has summarised the various formats available with exemplars while Reid (2006) discusses the principles for this kind of measurement. There were 48 questions for students (many in semantic differential format) and 40 for teachers but space only permits a few to be discussed here. The Semantic differential questions (Osgood *et al.*, 1957) use a six point scale while the Likert questions (Likert, 1932) use five from 'strongly agree' to 'strongly disagree'.

Data Analysis

The data analysis follows the principles laid down in Reid (2003, 2006). The data are presented descriptively here, as percentages. With gender comparisons, chi-square as contingency test is employed.

Results of Research

Much of what the learners showed was very positive but the focus here is on a few aspects which point to an agenda for the future. In all tables, N = 793 (*Boys: N = 378, Girls: N = 415*), with data all shown as %.

When asked about what the school shows them to do, the students tended to see memorisation as dominant over understanding:

School shows me what to memorise.	26	14	23	15	10	11	<i>School shows me what to understand.</i>
-----------------------------------	----	----	----	----	----	----	--

In the Kingdom of Bahrain, there is gender separation in education and the differences show in this question (Table 2). Thus, the teachers in the schools for girls do not emphasis memorisation quite so much:

Table 2. The memorisation-understanding issue.

School shows me what to memorise.	Boys	24	18	23	18	9	8	School shows me what to understand.	$\chi^2 = 20.6$ (df=5)	p < 0.001
	Girls	28	11	24	12	11	14			

The memorisation theme recurred in another question:

I like to understand things rather than simply memorise them. 55 20 15 5 4

This is almost a cry of desperation, and reflects what the natural way of learning is. Seeking to understand is natural; being forced to memorise is unnatural (Jung and Reid, 2009).

When asked about their preferred way of working, there was a very strong preference for working collaboratively:

I prefer working on my own. 12 6 10 10 14 47 I prefer working with others.

In life, people tend to work in collaboration with others. In schools, students are forced to learn much of their time on their own while collaboration is often labeled as '*cheating*'.

This was supported by an interesting reaction to what they saw as the most helpful ways of learning. Students were asked to tick two reasons (from a list of 8) that they thought are the most helpful for their learning. Their top two choices were:

- 67 Working in a group.
- 60 Questions and discussion with the teacher.

In another question, students were asked to indicate their preferred ways of working. In one question, the use of mental pictures stands out:

I often see ideas in terms of mental pictures. 40 40 14 3 2

This is consistent with the findings of many who have argued strongly that traditional education seriously hinders those with visual-spatial abilities (Silverman, 2002). Education has relied far too much on the symbolic (word and number) while high proportions find knowledge much more accessible in terms of mental pictures.

The sciences have a high profile in education in the Kingdom of Bahrain. They were asked how they felt about the sciences and most did not support this time allocation.

There was not enough time in science. 9 8 13 15 15 40 There was too much time in science.

The way they see the sciences is somewhat frightening:

We cannot call anything scientific knowledge unless it is absolutely true. 39 30 24 4 3

Maybe this offers a clue to what is unappealing about their studies in the sciences. Later, they were asked about subject popularity. Mathematics, biology and accounting

stood out as highly popular. By contrast, chemistry and physics did not perform at all well in the popularity stakes. Is this the curriculum, the way of teaching or the way of assessing, or some combination of these and other aspects?

The arts areas do not have such a prominent role in the schools as the science subjects but they were asked about their performance in arts subjects:

My best marks came in arts subjects. 21 13 17 16 10 23 *My worst marks came in arts subjects*

This suggests that this broad area of the curriculum was about right in terms of difficulty.

The questions moved on to look at why subjects were their favorites. These four reasons stand out from all the others.

- 32 *Understandable, made me think.*
- 22 *Creative and enjoyable teaching.*
- 18 *Easy to learn.*
- 11 *Teaching method effective.*

Thinking of assessment, there is a nice example of the tensions that students at this age often show. On the one hand, the security of factual knowledge shows clearly:

I prefer to learn the facts and then be tested on what I remember. 23 31 26 12 8

On the other hand, they tend to want examination questions which allow them to demonstrate their ability to think:

In exams, I like questions which give me the scope to go beyond what is taught and show my ability to think. 23 24 26 11 16

The importance of the teacher in the eyes of the school students is seen in their responses to this question:

I believe it is the job of the teacher to supply me with all the knowledge. 42 29 15 9 5

When asked about the resources in the school, there was general acceptance of their adequacy but they did express the view that they wanted more access to computers.

However, when asked about the relevance of school to their needs, the picture was more ambivalent.

Work at school is relevant to my needs. 13 12 22 20 13 19 *Work at school is irrelevant to my needs.*

Of course, at age 18, they may have some ideas about their future areas of study or possible places of work. However, they will not yet be aware of how what they have learned may or may not be of value in the future.

The final question invited them to imagine they were in charge of their school and asked what one thing they would change. Interestingly, nearly one third offered no ideas at all. However, about one quarter focused on aspects of what actually goes on in the teaching situation, some of the frequently mentioned points being:

- More variety in teaching methods;
- Focusing on the interaction of students with the teachers in the classrooms;
- More attention to the practical and applications in teaching science subjects;
- Focusing on understanding and avoiding memorising methods;
- Encourage students towards self-learning and studying;
- More use of computers, with an increase in electronically-equipped classrooms;
- More laboratories and more use of them in the sciences.

They were offered a range of descriptions which reflected the purposes of quality assurance procedures and were asked to tick the three that they saw as most important. It is interesting that the selected those aims which reflected an emphasis on improvement more than twice as often as those which reflected accountability.

There was a repeated cry for training. In considering developing quality, two thirds asked for on-going training while one third wanted it at the outset. There was a consistent picture where the teachers clearly thought quality in all they did was vitally important but were not totally convinced that current procedures were optimal. Indeed, they overtly asked to be trusted! There were quite marked differences between men and women, with the women being consistently more positive.

Perhaps it best summed up by their responses to this question (Table 3):

Table 3. Quality assurance and improvement.

The quality assurance system has improved the educational experiences of my students.	<i>Men</i>	9	29	27	22	13	$\chi^2 = 14.9$ (df=4)	p < 0.01
	<i>Women</i>	9	36	32	16	8		

Discussion

Their view of the nature of science is sad, but rather similar to what Al-Shibli (2003) found with students aged 15-22: students have a black-and-white view of knowledge, specially scientific knowledge. The whole concept of the hypothetical nature of such knowledge seems almost completely missing.

Their view of what makes subjects attractive reflects findings elsewhere. Thus, over 60 years ago, Piaget (1962) noted that young learners were naturally trying to make sense of the world around. This is the natural way of learning - seeking to understand. In the recent work of Jung and Reid (2009) with young adolescents in South Korea, they noted the relationship between being able to understand and holding positive attitudes towards the learning in science.

The four reasons they suggest which make subjects appealing also relate strongly to the findings of Reid and Skryabina (2002). They found three reasons, two of which related to the nature of the curriculum and the quality of teaching, the third relating to career potential.

It is interesting that learning about culture, life, discovery, practical work were not rated as important factors in making a subject attractive, each drawing between 2 and 3%. Even more important was the finding that memorisation drew only 1% as a factor in making a subject attractive, confirming that memorisation is NOT the key way forward in education, despite the fact that most of the rewards in most countries in most national examinations systems largely come from recall or recognition of memorised information (see Al-Ahmadi and Reid, 2009, 2011).

Conclusions

This survey has revealed some key areas for further exploration and these are problem generic in all school systems in varying degrees:

- (a) While the schools (and examination system) emphasises memorisation, the learners want to understand. This can only be addressed by re-examining the national curricula and the way national examinations are set.
- (b) There is a need to look closely at group-work and how group-work tasks can be incorporated into the curriculum.
- (c) The whole area of the visual-spatial needs re-considered.
- (d) The amount of time devoted to the sciences needs considered as well as the way the sciences are presented.
- (e) There are opportunities to re-examine curricula and teaching approaches to see the extent to which these encourage thinking, challenge and creativity.
- (f) The national examination systems needs re-examined: how do we balance the security of factual knowledge with the desire to express ideas?

These six issues may well be important issues for quality in many countries. However, the study shows that it is possible to gain useful insights by asking the learners directly to look back on their experiences and this may be a fruitful (and economic) way to move forward. The study is now looking at ways by which some of these issues can be addressed. The big question always has to be whether the procedures of quality assurance have improved quality. The answer to that is far from clear and may be one of the biggest questions for education in the 21st century.

References

- Al-Ahmadi, F., Oraif, G. (2009). Working memory capacity, confidence and scientific thinking. *Research in Science and Technological Education*, 27(2), 225 - 243.
- Al-Ahmadi, F., Reid, N. (2011). Scientific Thinking - Can it be Taught? *Journal of Science Education*, paper accepted.
- Al-Shibli, A. A. S. (2003). *A study of science student teachers perceptions of learning in the education colleges in the Sultanate of Oman*. PhD Thesis, Glasgow University of Glasgow.
- Aspin, D. N., Chapman, J. D., Wilkison, V. R. (1994). *Quality Schooling: a Pragmatic Approach to Some Current Problems, Topics and Issues*, London: Cassell.
- Avalos, B., Assael, J. (2006). Moving from resistance to agreement: The case of the Chilean teacher performance evaluation, *International Journal of Educational Research*, 45(4-5), 254-266.
- Danili, E., Reid, N. (2009). Assessment: Time-consuming and Potentially Dangerous? *Journal of Science Education*, 10(1), 47.
- Bradley, S., Taylor, J., (2003). *The Economics of Secondary Schooling*, Lancaster, Lancaster University, Department of Economics, Management School, retrieved 22/05/2011, from <http://www.lancs.ac.uk/staff/ecasb/papers/economics%20of%20secondary%20schools%204.pdf>
- Brown, R. (2004). *Quality Assurance in Higher Education*, London: RoutledgeFalmer.

Danielson, C. (2007a). *Enhancing Professional Practice: A Framework for Teaching*, Alexandria, VA, USA: Association for Supervision & Curriculum Development.

Danielson, C. (2007b). *Teacher Leadership that Strengthens Professional Practice*, Alexandria, Virginia: Association for Supervision and Curriculum Development.

Danielson Group. (Undated) *Promoting Professional Learning through self-assessment, reflection on practice, and professional conversations*, retrieved 22/05/2011, from <http://www.danielsongroup.org/coaching.htm>.

Danili, E., Reid, N. (2009). Assessment: time-consuming and potentially dangerous? *Journal of Science Education*, 10(1), 47.

Department of Education. (2010). *Performance Tables* (applies to England only), retrieved 22/05/2011, from <http://www.education.gov.uk/performance/tables/>.

Fenstermacher, G. D., Richardson, V. (2005). On Making Determinations of Quality in Teaching, *Teachers College Record*, 107(1), 186-213.

Hanson, S., Overton, T. I. (2010). *Graduate Survey*, Hull: The Higher Education Academy, Physical Sciences.

Harvey, L., Green, D. (1993). Defining quality Assessment and Evaluation in Higher Education, *Assessment and Evaluation in Higher Education*, 18(1), 9-34.

Harvey, L., Green, D. (1994). *Quality in Higher Education: Employer Satisfaction*. Report, Birmingham: UK.

Harvey, L., Moon, S., Geall, V., Bower, R. (1997). *Graduates' Work: Organisational Change and Student Attributes*, Report, Birmingham: CRQ and AGR (supported by DfEE and CIHE).

Higueras, J. I. (2009). *The Evaluation of Education in Chile: Two Opposing Approaches, Chile Report to IDEA Research Network "Testing, Testing, Testing..."* Seminar-Forum, México Feb. 19-21, retrieved 22/05/2011, from <http://www.idea-network.ca/userfiles/image/file/Evaluation%20Report%20-%20Chile.pdf>

Hoy, C., Bayne-Jardine, C., Wood, M. (2000). *Improving Quality in Education*, London: Falmer Press.

Jung, E. S., Reid, N. (2009). Working Memory and Attitudes. *Research in Science and Technological Education*, 27(2), 205-224.

Laine, S, Begrstock-Sherrat, E., Lasagna, M. (2011). *Improving Teacher Quality*, Jossey-Bass, San Fransisco, Wiley.

Likert, R. (1932). A technique for the measurement of attitudes, *Archives of Psychology*, 140, 5-55.

McAninch, A. R. (1993). *Teacher thinking and the case method: Theory and future directions*, New York: Teachers College Press.

Osgood, C. E., Suci, C. J., Tannenbaum, P. H. (1957). *The measurement of meaning*. Urbana, IL: University of Illinois Press.

Paton, G. (2011). *Failing schools 'double' under Ofsted reforms*. The Telegraph, (May 28th, 2011), retrieved 28/05/2011, from <http://www.telegraph.co.uk/education/7376938/Failing-schools-double-under-Ofsted-reforms.html>

Piaget, J. (1962). *Play, Dreams and Imitation in Childhood*, New York: Norton.

PISA (2009). *The OECD Programme for International Student Assessment*, retrieved 22/05/2011, from <http://stats.oecd.org/PISA2009Profiles/#>

Reid, N. (2003). *Getting Started in Pedagogical Research in Higher Education*. Hull: The Higher Education Academy, Physical Sciences.

Reid, N. (2006). Thoughts on Attitude Measurement. *Research in Science and Technological Education*, 24(1), 3-27.

Reid, N. (2009). *Quality Assurance in Higher Education in Pakistan: Focus on the Learner*. In (Eds.), Raouf, A, Ahmad, N., Qureshi, R., *Quality in Higher Education: Challenges and Practices*. Lahore: Pakistan, p. 91-11.

Reid, N. (2010). Quality Assurance in Higher Education in Pakistan: Looking to the Future. *In Proceedings of the 3rd International Conference on Assessing Quality in Higher Education*. Lahore: Pakistan, p. 2-11.

Reid, N., Skryabina, E. (2002). Attitudes towards Physics. *Research in Science and Technological Education*, 20(1), 67-81.

Ryle, G. (1949). *The concept of mind*. New York: Barnes & Noble.

Sallis, E. (1993). *Total Quality Management in Education*. London: Kogan Page.

Seymour, D. T. (1992). *On Q: Causing Quality in Higher Education*. New York: Macmillan.

Silverman, L. (2002). *Upside-Down Brilliance: The Visual-Spatial Learner*. Denver: DeLeon.

Yorke, M. (2009). *Honours Degree classifications: what we can tell and cannot tell from the statistics*, A QAA Briefing paper, retrieved 22/05/2011, from http://www.qaa.ac.uk/news/media/pressreleases/hestats_24sep09.asp

Watson, D. (2006). *Who killed what in the Quality wars?* A QAA Briefing paper, retrieved 22/05/2011, from <http://www.qaa.ac.uk/enhancement/qualitymatters/qmdecember06.pdf>

Zuber, S. O., Rayan, Y. (1994). *Quality in Postgraduate Education*, London: Kogan Page.

Received: *May 25, 2011*

Accepted: *June 08, 2011*

<i>Khaled Ahmed Almadani</i>	PhD Research Student at the School of Education, University of Dundee, Dundee, Scotland, UK. E-mail: K.A.A.Almadani@dundee.ac.uk Website: http://www.dundee.ac.uk/eswce/people/kalmadani.htm
<i>Norman Reid</i>	Professor of Science Education, Universities of Dundee and Glasgow, Scotland, UK. E-mail: dr_n@btinternet.com
<i>Susan Rodrigues</i>	Professor of Science Education, School of Education, University of Northumbria, Coach Lane, Benton, Newcastle upon Tyne, NE7 7XA, England, UK. E-mail: Susan.rodrigues@ed.ac.uk Website: http://www.northumbria.ac.uk/