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Harnessing Assessment's Power to Improve Students' Learning and Raise Achievements: What and how should teachers do?

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Abstract. Assessment's power in bettering learning and rising achievement is widely recognized in recent years. However, recent studies on assessment practices in sub-Saharan African countries clearly indicate that in reality the assessment's actual power in improving learning remain unharnessed! As current assessment practice is limited to the use of snapshots written tests and examinations which mainly measure memorized facts and provide very little information (in form of grades/scores) on how to improve instructions and learning in schools. This article proposes ways through which assessment can used by teachers to improve teaching and learning in secondary school classrooms. Proposed ways are embedding assessment with teaching and learning process, sharing learning intentions with students, sharing success criteria with students, informing instructions using assessment data, promoting students' self-assessment and peer-assessment, giving opportunities for students to express their understanding, providing effective feedback and building confidence for success in teachers and students. The article concludes by highlighting the implications of the proposed ways for policy practices.

Key words: Formative assessment; Peer-assessment; Assessment for learning; Assessment as learning; Feedback.

Introduction

In recent years assessment has been acclaimed to contribute to student's learning and raise their achievement. For example, assessment data provide students with feedback on their progress towards achieving curriculum objectives thereby directing students to focus on the areas which needs more learning efforts. It also provides feedback to teachers on how their students are learning so that they can devise subsequent lessons in response to students' needs (Nilson, 2010; Webb &

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Jones, 2009). Generally, assessment helps to figure and focus subsequent teaching and learning.

Despite wider recognition of the value of assessment in improving students' learning and achievement, studies by World Bank (2008) and Ottevanger, Van den Akker & de Feiter (2006) in sub-Saharan African countries clearly indicates that the powerful engine of assessment for improving learning remain unharnessed. Current assessment practices are confined to the use of written tests which mainly measures memorized knowledge for the purpose of promoting students to the next education level, contrary to curriculum intentions which requires the integration of assessment in day-to-day classroom instructions (World Bank, 2008). Moreover, high-stake national examinations and continuous testing by classroom teachers (falsely named continuous assessment) provide very limited information useful to teachers and students for modifying instructions and learning in ways likely to improve students' achievements (National Research Council, 1996). This is because feedback from paper-pencil assessment usually comes in the form of scores or grades which has very little guidance for improvement. Consequently, students, parents, and schools behold the purpose of learning as meeting test requirements and attaining good grades. Black & William (1998) remind us that wherever rewarding higher learning achievers through grades or positions in class ranking is a habit then students find means of scoring high marks instead of striving for more learning. This situation calls for radical reforms in assessment practices by classroom teachers, so that learners can benefit from the assessment practices that can significantly contribute to their learning achievement.

Changing the focus of classroom assessments

For many decades classroom assessments has been used for measuring the amount of knowledge accrued by students as a result of instructions. Assessment results collected through standardized testing was a testimony for the knowledge acquired by student. These results were used to make decisions about the destiny of student e.g. access to higher education and providing information to parents and public in general. The use of assessment intentionally for determining what student know and can do to demonstrate achievement of curriculum outcomes is referred as assessment *of* learning (MECY, 2006).

In recent years, however this approach to assessment has been questioned due to the evidence from studies linking assessment and learning. Evidence shows that assessment can be intentionally used in classrooms for the purpose of promoting learning and improving achievement (Black & William, 1998; Black, Harrison, Lee, Marshall & Wiliam, 2005; Stiggins, 2005; Webb & Jones, 2009). This requires changing the purpose of assessment by focusing more on assessment *for* learning and assessment *as* learning (ARG, 2002; MECY, 2006). To enhance learning and improve achievement, assessment *for* learning and assessment *as* learning should feature classroom instructions than assessment *of* learning (Stiggins, 2005; Webb & Jones, 2009).

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Assessment *for* learning is a process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they want to go and how best they can get there (ARG, 2002). It is any assessment for which the first priority in its design and practice is to serve the purpose of promoting pupils' learning (Black, Harrison, Lee, Marshall & Wiliam, 2002). Assessment *as* learning is the one that utilizes learner's self monitoring and critique of thoughts that are implanted in learning process (MECY, 2006). It is an assessment that drives student's learning and academic self worth (Stiggins, 1999).

Classroom realities in most Sub-Saharan Africa as expressed in the studies by World Bank (2008), Kitta & Tillya (2010), Hamilton, Mahera, Mateng'e, & Machumu (2010) and Ottevanger, et al. (2006) shows that the traditional assessment *of* learning has dominated classroom assessment practice though curriculum demand otherwise. For example, assessment practices by majority of secondary school teachers in Tanzania has generally remained traditional involving the use of recall-based paper and pencil assessment methods such as tests, quizzes, examination and oral questions contrary to demands of the reformed curriculum (Shemwelekwa, 2008; Kahwa, 2009; Timothy, 2011; Banda, 2011). Thus, reconfiguration in assessment approaches is imperative so that assessment *for* learning and assessment *as* learning receive substantial emphasis.

Purpose of the review

This work focuses on how teachers can reconfigure their assessment practices so as to harness assessment's power in improving teaching and learning thereby raising achievement among secondary school students. The key question addressed is *'in what ways can teachers use assessment to improve learning and raise achievement?'*

Methodology of the review

This review involved systematic literature search on different educational databases using relevant keywords, free text and author searching. Only materials published between 1998 and 2013 were considered. The year 1998 was when a review article which provided evidence on the link between assessment and learning titled "inside black box" by Black and William was published. Educational databases consulted include: Educational Resources Information Center, Google scholar search, Australian Education Index, British Education Index.

Ways through which teachers can use assessment to improve learning and raise achievements

Generally, teachers should reconfigure their assessment practices by stressing substantially on assessment *for* learning and assessment *as* learning. In this part I have identified ways which teachers can use assessment to improve learning and raise achievements basing on the recent research and literature linking assessment and learning (Black & Atkin, 1996; Black & Wiliam, 1998; Atkin & Coffey, 2003; Black, et al., 2005; Mansell, James & Assessment Reform Group, 2009; Witt-Smith & Cumming, 2009). These are presented below.

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Embedding assessment in instructional process

This involves careful and purposeful use of questioning at different stages of teaching and learning process to elicit information from students about their prior knowledge, learning styles, interests, needs, differences and ability to analyze their own learning. The information is then used to modify subsequent teaching and learning (Mansell, James & ARG, 2009). This can be approached in two ways:

First, teachers may collect information about learners' background, abilities, learning styles, learning needs and interests.

For example, *at the beginning of the term, form five students were asked to write a memo to biology teacher describing:*

- *How they experienced biology in the previous classes.*
- *What they expect from their teacher,*
- *Their best approach to learning biology,*
- *What they need from the teacher as a support* (MECY, 2006).

*As a teacher read and reflect on students' memos, he got insights into students' learning needs, goals and styles, previous experiences, prior knowledge of biology, and their ability to analyze their own learning. Teacher then uses this information to plan instructions and learning activities. He further asked students to write similar memos every month as the instructions progress throughout the term. The details of the successive memos includes self-assessment of progress towards goals identified, comments on support they are receiving, learning challenges they encounter and plans for unmeet or future goals. All the letters with details were organized into a portfolio which was submitted to the teacher on monthly basis for review. Through the memos, teacher was able to monitor learning progress, identify learning difficulties on individual basis and improve his instructional practices (*Adopted from MECY, 2006).

Second, questioning can be used to elicit classroom interactions, provoke thoughts and dialogue among students, motivate the class and remind students about the previous lessons (Black & Wiliam, 2012). Although most teachers in Tanzania ask questions during teaching and learning process, research shows that when teachers ask questions they allow very short wait time and when they realize that no student volunteers to answer, teachers either seek answers from bright students only (often by naming the student), answer the questions themselves or switch to closed-ended simple questions where recall of memorized information rather than critical thinking provides answers (Paulo, 2014; Timothy, 2011). An effort to improve learning through assessment should not be *void* of asking open-ended questions with sufficient wait time for students to provide more thoughtful responses. For instance, questions such as "*most men believe that the sex of a child is determined by woman but not man, do you agree or disagree?"* Should be changed to "*most men believe that the sex of a child is determined by woman but not man" what do you think? And why do you think so?"* When teachers allow more wait time as they ask questions, students become more confident in responding, give thoughtful and elaborated responses and failure to respond decrease (Rowe, 1974).

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Sharing learning intentions with students

This strategy requires teacher to tell learners about the learning intentions they are expected to achieve. This provides them with framework for guiding their learning activities. Stiggins (2005) argued that teachers have to clarify learning objectives to students at the start of instructional process and provide models of examplary and weak work for students to self evaluate their progress to the intended learning objectives. Assessment that encourages learning affirms to the premise that students can succeed if they are conscious of learning objectives, how far they have moved and how they can achieve the objectives. Setting and discussing learning objectives with students raise their awareness of what they should to learn, where they are in relation to where they should be and possible pathways to next learning (Davies, 2003).

Setting and sharing success criteria with students

In this strategy teachers set and clarify before students the benchmarks to be used for judging their learning achievements. Sharing assessment benchmarks entails engaging students in dialogue to enable them understand how the benchmarks can be met in practice. Setting and sharing learning criteria with students is important as it helps them discover what they are already capable of and what they should learn to achieve the set criteria. Davies (2003) emphasized that when teachers set learning criteria with students they can monitor their thinking, performance, and develop deep insights.

Moreover, sharing success criteria with students provide them with information they need for self and peer monitoring of learning. It gives them standards against which they can judge the quality of their work far before they submit it to teacher, thus on submission every work will be at the minimum criteria set and success by everyone is ensured. Success criteria can be in form of rubrics and samples or models of good work.

> For example: *a teacher may assign students to visit different waste management sites in the city to learn various ways of managing wastes, identifying the strength/ weakness of each method of managing wastes and finally write a comprehensive report on this outdoor activity. In order to assist students to accomplish this activity and learn beneficially a teacher should share with students the criteria upon which their report will be judged. Teacher can provide rubrics that contain criteria that can guide students in self-assessing the standard of their work.*

Informing instructions using assessment data

Teachers need to be conscious of their pupils' progress and difficulties they encounter when learning in order to adapt instructions to meet students' needs which are often unpredictable and variable (Black & Wiliam, 1998). Teachers can learn valuable information about student's progress and use it in bettering their instructional effectiveness in various ways.

Teachers may diagnose students' background experiences, skills, attitudes and misconceptions before teaching and use this information to assess students' learning needs. Further, teachers can examine students' work or product to get insight into

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their thinking and understanding. The information that teachers collects through these methods can be used to make informed decisions about their teaching such as adjusting rate of instructions, assigning remedial activities and planning alternative experiences.

Teachers' use of assessment information to improve instruction may also involve individual and collaborative analysis of assessment data in the form of student's responses to assessment task and linking them to their own teaching. The analysis may be extended to cover teaching strategies and resource allocation that resulted to the assessment data in hand. It is also important that teachers propose innovative teaching techniques and resource use and have their colleagues appraise these strategies critically. The use of assessment data in this way raises teachers' consciousness of their own practices and its relation to students' achievement (Griffin, 2009). For example:

> *Biology teacher was preparing to teach about human genetic disorders (albinism, sickle cell, color blindness etc). During the preceding lesson the teacher asked the class to tell all they know about human genetic disorders. Student's responses showed that genetic disorders were perceived to be caused by witchcraft and curse and that people with genetic disorders were perceive as badluck to their families and that they were useless because they can't do anything significant. These perceptions were contrary to the principles of genetics which emphasizes that genetic disorders are inherited from one generation to another as parental genes are passed onto the offspring. Due to this situation the teacher had to go back and redesign her next lesson to include some activities on principles of genetics so that student's misconceptions can be rectified. This is a typical case that has used student's misconceptions to adjust instructions.*

Promote students' self-assessment and peer-assessment

Teachers can raise achievement by engaging students in peer and self-assessment. They should allow students to self-assess their learning by encouraging them to review their work critically and constructively. Students are more likely to make efforts to raise the standards of their work if they are involved in making decisions about their work rather than being passive recipient of teachers' judgment of their work (ARG, 2002). For example the current practices in schools which involve marking students' work and giving feedback in form of grades can be reversed if teachers understand the value of involving students in assessing their work. Moreover, peer-assessment is valuable because students may accept easily peer comments on their work than comments made by teacher (Black, et al., 2002). Peer work is also valuable because the interchange will be in language that students themselves would naturally use and because students learn by taking the roles of teachers and examiners (Sadler, 1998 as cited in Black, et al., 2002).

> For example *a teacher can ask students to prepare a portfolio during a particular piece of instruction and provide students with rubrics indicating what is required in the portfolio that they will prepare. To encourage self and peer-assessment a teacher*

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may ask students to exchange their portfolios for peer review. Each one will then review the work of his/her colleague and provide comments for improvement. The reviewed work is then returned to the owner who will make corrections taking into considerations comments given by peer. This can be done several times before the work is finally submitted to teacher.

In this way students mutually benefit from learning and every one will believe in success than failure. Assessment task may be attached with the rubric like the one provided below to guide self and peer-assessment.

Portfolio assessment rubric

Components of a portfolio:

- Task performed by student as part of self practice
- Daily reflections on the classroom discussion and activities
- Personal notes on the topic

Table 1: Sample of rubric for peer assessment

Criteria	Good	Better	Best
Relevance of self practice tasks	Did Self practice tasks but is not directly related to the topic discussed	Did Self practice tasks but very few tasks are directly relevant to the topic discussed	Self practice tasks that are directly relevant to the topic discussed.
Number of issues addressed in the reflection	Only one page daily reflection touching few aspects on the topic discussed.	Few pages reflection touching many aspects of the topic discussed.	Several pages reflection touching all important aspects discussed.
Number of objectives addressed in personal notes.	Personal notes addressing few objectives of the topic discussed but not systematically organized	Personal notes addressing most objectives of the topic and systematically organized.	Personal notes addressing all objectives of the topic and systematically organized.

Providing constructive feedback

Teachers can raise pupils' achievement by providing feedback which enlightens students to identify their subsequent learning steps and how to take them, build on success and strengths as well as correct weakness. Stiggins (2005) emphasized that teacher should channel students to continually access constructive as opposed to judgmental feedback that enlightens students realize strategies for improving the quality of their work. Teachers in science for instance provide various laboratory work e.g. *dissecting small animals to display various body systems such as digestive system, excretory system or reproductive system*. After doing lab work students may be required to write a lab reports to be submitted to the teacher. In order to help

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students learn and benefit from such assessment task, teachers should give descriptive feedback which may point out students' weakness and strengths on experimental procedures, use of appropriate tools and report writing skills as illustrated in the example of teachers' comments for students' lab report on dissection of a small animal (Table 2).

Table 2: Teacher's comments for student's lab report on dissection

Assessment criteria	Level of performance	Example of teachers' comments
Accuracy of experimental procedures	Student followed most experimental procedures accurately but damaged several major blood vessels due to improper positioning of the cutting scissors	*The experimental procedures you followed are ok. But you need to revisit your dissection manual to learn proper positioning of a cutting Scissor. Please give yourself more practice on proper positioning of a cutting scissors to avoid damaging major blood vessels while dissecting.*
Appropriate use of dissecting tools e.g using scissors for cutting skin	Student demonstrated mastery in selecting appropriate dissecting tools	*Your selection and use of dissecting tools is good but you may learn on how to use more dissecting tools other than those discussed in class.*
Organization of report	Student organized the report such that beginning, middle and end of the report are obvious but student fail to position some information accurately. For example misplaces some sub-stapes and does not give appropriate examples.	*You showed mastery in organizing your report by clearly showing beginning, middle and end. But please re-examine your decision to place sub-step **X** and **Y** under step **Z**. You should read samples of lab reports from books/internet to learn how to organize reports and give appropriate examples where needed. See me if you fail to access relevant websites/books with samples of lab reports.*

Building confidence for success in teachers and students

Teachers should build confidence among themselves and students that everyone can improve. Conventionally, teachers have used assessment techniques such as open date quiz and exams as well as threats to poor reports to parents for motivating students to expend their efforts to learning. This is rooted in teacher's axiomatic stance that maximizing anxiety equals optimizing learning. This total to sorting students on pass/fail groups (Stiggins, 2005). This practices has emotional effects since those who passed exams build confidence as they believe that success is within their reach, they dare to take risks of striving for success, as they try hard efforts continue to result into success and finally they become academic and emotional winners. On the other side those who fail begin to re-assess their capacity

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to triumph in learning. They start to give up which, in turn deprives them of the emotional drivers needed to exert more efforts in learning (Stiggins, 2005).

Stiggins (2005) observed that assessment for learning motivates students as it helps them believe that success is within their reach. He further stressed that schools are no longer places that merely arrange and order students as per their scores; they should places where all students become successful in realizing pre-determined learning benchmarks. Teachers can build confidence for success among students by first identifying and recognizing differences in learning abilities among students and designing and giving tasks for students with different learning abilities. Each task can then be followed by series of other learning tasks each with increasing complexity until every learner attain specified minimum standards of performance. Generally, there are different ways that teacher can use so that learners benefit from assessment information. Since the ultimate beneficiary of any learning process is the learner, then teachers should think of different ways through which they can tape the power of assessment in shaping students learning than limiting the use of assessment information to accountability purposes.

Barriers impeding teacher's use of assessment for improving learning

Although assessment *for* learning and assessment *as* learning has been touted as promising ways for improving student's self awareness of leaning process, supporting motivated learning and rising achievements, there are noteworthy barriers to teacher's use of assessment for improving learning.

In the current context where assessment is used for accountability purposes, summative forms of assessments and large scale testing are still the main drivers of classroom instructions. For example, in US, teachers abandoned assessment *for* learning practices in their classrooms because they felt constrained by state assessments under No Child Left Behind legislation (Popham, 2008). Similarly, Ottevanger, et al. (2006) reported 'a lot of teaching to the test' with teachers focusing on topics and skills that appear frequently in the national examinations and devoting a lot of time acclimatizing students to examination-type questions. Researchers observed that 'in Botswana teachers invariably copy questions from national examination papers and sometimes mimic their questioning style as the papers are seen by many as defining the standards to be attained and maintained in assessment' (p. 19). These classroom cultures which focus on summative forms of assessments impede assessment for learning and suggest misalignment between systemic assessment priorities and assessment *for* learning reforms.

Another main barrier to the adoption of assessment *for* learning is the misconception that assessment *for* learning and summative assessments are detached processes (Bennett, 2011; Gardner, 2012). Teachers view assessment *for* learning practices as different from summative forms of assessments. This perception results into low adoption of assessment *for* learning because summative assessment is prioritized in the national assessment systems. Teachers are inclined

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to focus on summative assessments because its results are used to communicate student's achievement, form part of the students' academic record and criteria of school progress and teacher effectiveness within the accountability context (DeLuca , Luu, Sun & Klinger, 2012).

Lack of positive personal experiences of assessment for learning among teachers is also a barrier. Evidence shows that innovative assessment approaches such as assessment *for* learning are yet to be integrated in teaching and learning process in many schools in SSA countries (Ottevanger, et al., 2006; World Bank, 2008). Thus teachers have not had positive personal experiences with new assessment practices as students. Assessment practices by these teachers may be shaped by their own experiences of assessment as students and they may continue to assess learning in a conventional ways they experienced as students in a learning environment that centers on assessment for accountability (Harrison, 2005).

Lastly the use of assessment for improving learning may be practically constrained by shortage of time and large class sizes. Literature reiterates teachers' beliefs that traditional forms of assessment are more time efficient and valuable because they serve summative requirements and accountability demands (Hargreaves, Earl & Schmidt, 2002; Mabry et al., 2003). Even in countries where substantial numbers of teachers appreciate the potential of assessment f*or* learning in improving student's achievement, teachers are concerned with the too much class time required to integrate assessment *for* learning. This limits the amount of curriculum teachers can cover (Morgan & Watson, 2002). The concerns for time become even more intense when the class size is large because the interaction and exchange between teacher and student on individual basis is compromised.

Implication for policy and practices

Reconfiguration of teachers' assessment practices is influenced by policy and practical contexts in which the reforms occur, thus supportive policy is crucial for successful reforms. In this part policy and practical implications of the proposed ways of harnessing assessment's power are highlighted.

Enthusiasm to engage in change

Since we are human beings, we are vulnerable to the tendency of preserving the existing beliefs and habits. We tend to be reluctant to transform established beliefs or construct to new ones. Changing classroom assessment practice is both emotionally and intellectually demanding to teachers because teachers will need to think about and find new ways of facilitating students' learning through assessment so that every learner attains the intended curriculum (MECY, 2006). Emotionally, teachers will have to abandon traditional views of transmitting knowledge and maintaining classroom control at the expense of redistributing learning responsibility to students including assessment responsibility.

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Capacity building for teachers

As shown by evidence from recent research on assessment practices in many Sub-Saharan African countries, assessment practices by many school teachers are deeply rooted on the traditional approaches which entail the use of one size fits all paper and pencil tests for ascertaining how much the intended curriculum student has accrued.

Changing these practices to reform oriented assessment *for* learning and assessment *as* learning that require teachers to use assessment to enhance students' learning necessitates capacity building. To secure new attitudes and higher expectations which are critical to improvement, teachers need new experiences that may result into different beliefs (Fullan, 2007). Capacity building therefore should involve changing the mind sets of teachers so that they view assessment as a tool for learning than tool for accountability. Moreover, it should involve building their pedagogical capacity to create, administer and analyze new form of assessment tasks focused at enhancing learning. This can be achieved by providing teachers with variety of working models of implementation by teachers from whom others can learn and derive convictions and confidence that better assessment is feasible. The first step therefore should entail setting small number of schools, providing school based professional development and supporting execution of innovative assessment practices (Black & William, 1998). These few will then represent concrete examples of how better assessment appears in reality (Black & William, 1998). Capacity building gives teachers concrete examples that improvement is doable in practice (Fullan, 2007).

Genuine leadership support

Unless school managers are strongly committed to nature and support growth and transformation in teacher's professional knowledge and practice, changes in assessment practice will not be achievable (MECY, 2006). Educational managers need to appreciate the raison d'être for reforming assessment practices so that they can reconsider and adapt school policies and support teachers in terms of funding, time and conducive environment for them to try effective assessment practices. School leaders who are regarded as critical resource in the professional guidance and instructional directions in schools should be called up on to spend more time with teachers in conversations about innovative assessment practices (Fullan, 2007).

Conclusion

It should be understood that there is no single approach to successful adoption of innovative assessment practices which can enhance students' learning and rise standards. However, emphasis should be on the provision of concrete examples of what and how should teachers do. Concrete examples if accompanied with context based professional support will increase teachers' confidence to try out and consequently adopt assessment practices that exploit assessment's power in enhancing students learning.

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References

Assessment Reform Group(ARG). (2002). *Assessment for Learning: 10 Principles – Research-based principles to guide Classroom practice*. United Kingdom: Assessment Reform Group.

Atkin, M., & Coffey, J. E. (2003). *Everyday assessment in science classroom.* Virginia: National Science Teachers Association.

Banda, S. (2011). Application of constructivist approach in competence-based curriculum in secondary schools in Tanzania. The case of chemistry subject in Songea municipality. Unpublished Masters Dissertation. University of Dar es Salaam.

Bennett, R. E. (2011). Formative assessment: A critical review. *Assessment in Education: Principles, Policy and Practice, 18*(1), 5-25.

Black, P. J., & Wiliam, D. (2012). Developing a theory of formative assessment. In J. Gardner (ed.), *Assessment and Learning,* (pp. 206-229). London: Sage.

Black, P., Harrison, C., Lee, C., Marshall, B., & William, D. (2005). *Assessment for learning: Putting it into practice*. Berkshire: McGraw Hill.

Black, P. J., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2002). *Working inside the black box: Assessment for learning in the classroom*. London: King's College London School of Education.

Black, P. & Wiliam, D., (1998). *Inside the Black Box: Raising standards through classroom assessment*. London: School of Education, King's College.

Black, P., & Atkin, J. M. (1996). *Changing the subject: Innovations in science, mathematics and technology education.* London: Routledge.

Clarke, S. (2001). *Unlocking formative assessment: Practical strategies for enhancing pupils' learning in the primary classroom.* London: Hodder & Stoughton Educational.

Davies, A. (2003). Learning through assessment: Assessment for learning in science classroom. In J. M. Atkin & J. E. Coffey (Eds.), *Science educators essay collection: Everyday assessment in science classroom* (pp. 13-26). Virginia: NSTA Press.

DeLuca, C., Luu, K., Sun, Y., & Klinger, D. A. (2012). Assessment for learning in the classroom: Barriers to implementation and possibilities for teacher professional learning. *Assessment Matters,* 4, 5-29.

Fullan, M. (2007). *The new meaning of educational change.* New York: Teachers College Press.

Gardner, J. (2012). Assessment for learning: A compelling conceptualization. In J. Gardner (Ed.), *Assessment and learning* (pp. 279-286). London: Sage.

Griffin, P. (2009). Teachers' use of assessment data. In C. Wyatt-Smith & J. Cumming (Eds.), *Educational assessment in the 21st century: Connecting theory and practice* (pp. 183-208). Dordrecht: Springer.

Hamilton, M., Mahera, W. C., Mateng'e, F. J., & Machumu, M. M. (2010). *A need assessment study of Tanzania's science education.* Retrieved on 7th March, 2012 from: http://www.unesco.org.

Hargreaves, A., Earl, L., & Schmidt, M. (2002). Perspectives on alternative assessment reform. *American Educational Research Journal, 39*(1), 69-95.

Harrison, C. (2005). Teachers developing assessment for learning: Mapping teacher change. *Teacher Development, 9*, 255-263.

Kahwa, J. (2009). Identification of the gaps between intentions and practices in the implementation of the 2005 revised biology curriculum. Unpublished Masters Dissertation. University of Dar es Salaam.

Kitta, S., & Tilya, F. (2010). The status of learner-centred learning and assessment in Tanzania in the context of the competence-based curriculum. *Papers in Education and Development, 29,* 77-91.

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Mansell, W., James, M., & Assessment Reform Group. (2009). *Assessment in schools: Fit for purpose? A Commentary by the Teaching and Learning Research Programme.* London: Economic and Social Research Council.

National Research Council. (1996). *National science education standards.* Washington: National Academy Press.

Nilson, L. B. (2010). *Teaching at its best: A research-based resource for college instructors.* San Fransisco: John Wiley & Sons.

Ottevanger, W., Van den Akker, J., & de Feiter, L. (2006). *Developing science, mathematics and ICT in secondary education: Patterns and promising practices* (SEIA Thematic Study Report no.7). Retrieved on 23rd June, 2013 from: http://siteresources.worldbank.org/INTAFRREGTOPSEIA/Resources/No.7SMICT.pdf

Mabry, L., Poole, J., Redmond, L., & Schultz, A. (2003). Local impact of state testing in southwest Washington. *Education Policy Analysis Archives, 11*(22). Retrieved on 10th April, 2013, from http://epaa.asu.edu/epaa/v11n22

Manitoba Education, Citizenship and Youth (MECY). (2006*). Rethinking classroom assessment with purpose in mind: Assessment for learning, assessment as learning and assessment of learning.* Manitoba: MECY.

Morgan, C., & Watson, A. (2002). The interpretive nature of teachers' assessment of students' mathematics: Issues for equity. *Journal for Research in Mathematics Education, 33*(2), 78-90.

Paulo, A. (2014). Pre-service teacher's preparedness to implement competence-based curriculum in secondary schools in Tanzania. *International Journal of Education and Research, 2*(7), 219-230.

Popham, W. J. (2008). Classroom assessment: Staying instructionally afloat in an ocean of accountability. In C. A. Dwyer (Ed.), *The future of assessment: Shaping teaching and learning* (pp. 263-278). New York: Lawrence Erlbaum.

Rowe, M. B. (1974). Wait time and rewards as instructional variables, their influence on language, logic and fate control. *Journal of Research in Science Teaching*, *11,* 81–94.

Shemwelekwa, R. (2008). The effectiveness of adoption of competence-based education for teaching and learning mathematics in secondary schools in Tanzania.Unpublished Masters Dissertation. University of Dar es Salaam.

Stiggins, R. J. (1999). Evaluating classroom assessment training in teacher education. *Educational Measurement: Issues and Practice, 18* (1), 23-27.

Stiggins, R. (2005). From formative assessment to assessment for learning: A path to success in standards-based schools. *Phi Delta Kappan*, *87*(4), 324-328.

Timothy, V. A. (2011). An assessment of competence-based curriculum implementation in teaching and learning ordinary level physics. The case of Singida municipality, Tanzania. Unpublished Masters Dissertation. University of Dar es Salaam.

World Bank. (2008). *Curricula, examinations and assessment in secondary education in Sub-Saharan Africa* (World Bank Paper no. 128). Washington, D. C: World Bank.

Wyatt-Smith, C., & Cumming, J. (2009). *Educational assessment in the 21st century: Connecting theory and practice.* Dordrecht: Springer.

Webb, M., & Jones, J. (2009). Exploring tensions in developing assessment for learning. *Assessment in Education: Principles, Policy and Practice, 16*(2), 165-184.

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