

What National Examinations Reforms should be made and how may technology be leveraged?

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Abstract

This paper argues for reforming National Examination using a three prong approach and they are 1) monitoring examinations where issues of politics, practicality, security, fairness, accessibility etc are addressed enhancing test items with multimedia (animation and sound) technologies 2) coordinating playful and stimulating teaching and learning tasks through well managed inter-agencies (Singapore Examinations and Assessment Board SEAB, Ministry of Education etc) implementation and public engagement and 3) portfolio of performance tasks, as an agricultural educational instrument to promote creativity and problems solving, through artifacts of mastery learning and lifelong learning. References are made to CITO¹ based in Netherlands, one of the world's leading testing and assessment companies where the author prototype some demonstration examples using open technology tools such as [customized Simple Machines Forum](#)², [Open Source Physics tools](#)³ (Wee & Ning, 2014), and [Blogger](#)⁴ etc.

1. Introduction

Many may be tempted to ask the following question “How may technology be further leveraged into the National Examinations?” This leads to a bigger question about modernization changes on National Examinations needed, in order to prepare future ready learners of Singapore.

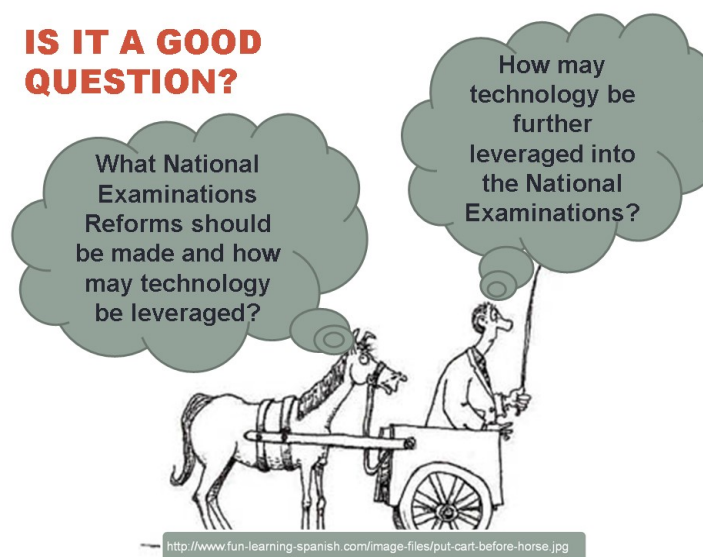


Figure 1. The key question is on “What national examinations reforms should be made”, to nurture future ready learners.

¹ <http://www.cito.com/>

² <http://www.phy.ntnu.edu.tw/ntnujava/index.php>

³ <http://iwant2study.org/ospsg/index.php/interactive-resources/physics/01-measurements/5-vernier-caliper>

⁴ <http://weelookang.blogspot.sg/>

2. Literature

Chakwera, Khembo, & Sireci (2004) provided an objective account on the political, practical, security, psychometric measurement, reality, fairness and access issues when implementing high-stake testing in Malawi, Africa. Baird & Lee - Kelley (2009) detailed some of lack of managerialism in implementing national examination policy in England, UK and argue for better coordination and more time of various stakeholders to prototype in stages, warning again a hasty national roll-out approach.

AGRICULTURAL EDUCATION

Professors of Education speak about even in International Conference Technology Learning and Teaching ICTLT

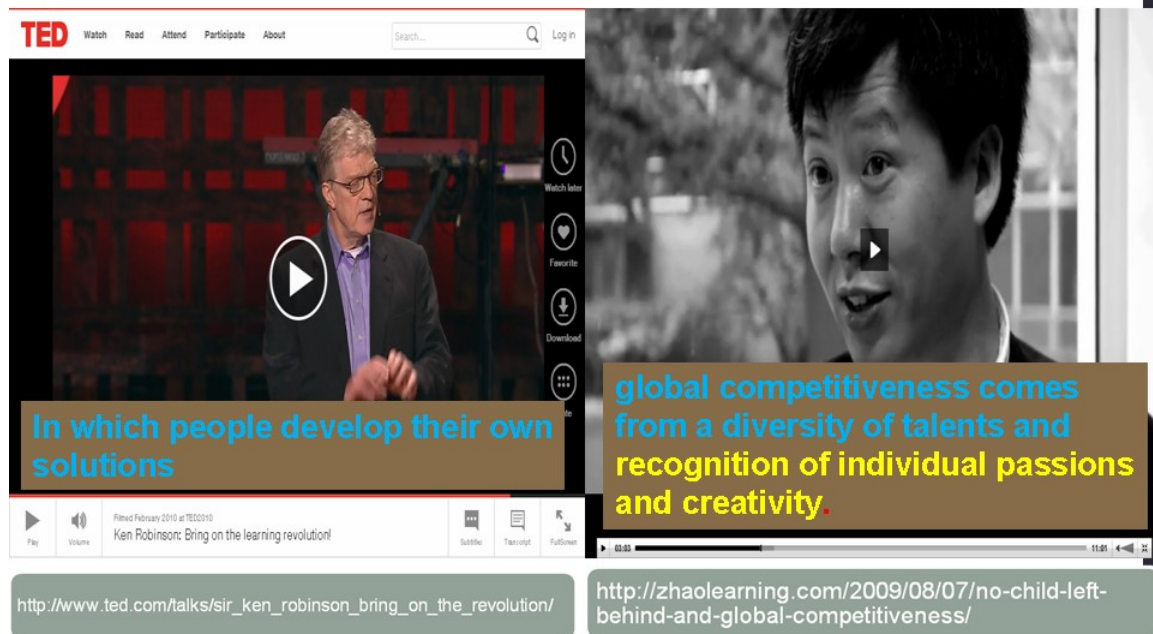


Figure 2. Agricultural education activists such as Ken Robinson (left) and Zhao Yong (right) argue for reforms in education requiring a growth mindset instead of a factory production mindset.

In the field of educational research, prominent scholars like Ken Robinson⁵ and Zhao Yong⁶ are activists for an agricultural model of education to nurture creative class (Zhao, 2013) of future learners, as oppose to the current factory model of batching students with common core knowledge and skills.

3. Possible Solution

In synthesizing the literature on current national examinations and promising future agricultural model of education, one possible solution by CITO, Netherlands, is a 3 prong approach, 1)

⁵ http://www.ted.com/talks/sir_ken_robinson_bring_on_the_revolution/

⁶ <http://zhaolearning.com/2009/08/07/no-child-left-behind-and-global-competitiveness/>

monitoring examinations, where a variety of issues (Chakwera et al., 2004) are addressed, 2) integration of stimulating teaching and learning tasks, need for solid inter agencies management and coordination (Baird & Lee - Kelley, 2009), and 3) portfolios as performance of learning, in preparation of an agricultural model of education, promoting learning for life and mastery⁷.

i. Monitoring examinations

PROTOTYPE MONITORING EXAMS

<http://www.phy.ntnu.edu.tw/ntnujava/index.php?topic=1992.0>

The screenshot shows a digital examination interface. At the top, a question asks: "What is the reading of the vernier calipers shown below in mm?". Below the question, there are two options for the question format: "1. Traditional and Computer Pictures" and "2. Multi Choice Questions". The "Traditional and Computer Pictures" option is selected, showing a traditional vernier caliper image and a computer-generated image of the same instrument. The computer image shows a main scale from 0 to 60 mm and a vernier scale from 0 to 10 mm with a 0.1 mm resolution. The vernier scale is aligned such that the 6th mark (0.6 mm) is between the 26 mm and 27 mm marks on the main scale. Below the images, the "Multi Choice Questions" section lists five options: (a) 20.0, (b) 26.0, (c) 26.4, (d) 30.0, and (e) 35.4. A "3. Feedback for Assessment" section is also visible, providing the correct answer and user statistics.

What is the reading of the vernier calipers shown below in mm?

2 cm 3 cm

1. Traditional and Computer Pictures

or

0 10 20 30 40 50 60

0 1 2 3 4 5 6 7 8 9 0

0.1mm

2. Multi Choice Questions

(a) 20.0
(b) 26.0
(c) 26.4
(d) 30.0
(e) 35.4

3. Feedback for Assessment

Your are correct, the answer is (c).
2010/11/09 23:42
There are 45 users answer this question, and 40 users answer it correctly!

Figure 3. An example of how a prototype monitoring examination can look like, with traditional and computer pictures, typical multi-choice questions and feedback for assessment.

A prototype multi-choice question⁸ could look this, where traditional questions are asked with sound instructional design presenting traditional and computer format together and feedback for assessment for learning. Issues of security and psychometric measurement can be further addressed here through unique logins and authentication.

ii. Stimulating Teaching & Learning Tasks + Real Life

As concerted stakeholders of national examinations, stimulating teaching and learning tasks coupled with real equipment (Wee & Ning, 2014) need to be distributed with professional

⁷ <http://www.moe.gov.sg/media/speeches/2015/03/06/moe-fy-2015-committee-of-supply-debate-speech-by-minister-minister-heng-swee-keat.php>

⁸ <http://www.phy.ntnu.edu.tw/ntnujava/index.php?topic=1992.0>

development workshops for teachers. Using resources that are publicly (Wee, Chew, Goh, Tan, & Lee, 2012; Wee, Lee, Chew, Wong, & Tan, 2015) available lower the issues of equity access and practical implementation.

STIMULATING TEACHING & LEARNING TASKS + REAL LIFE

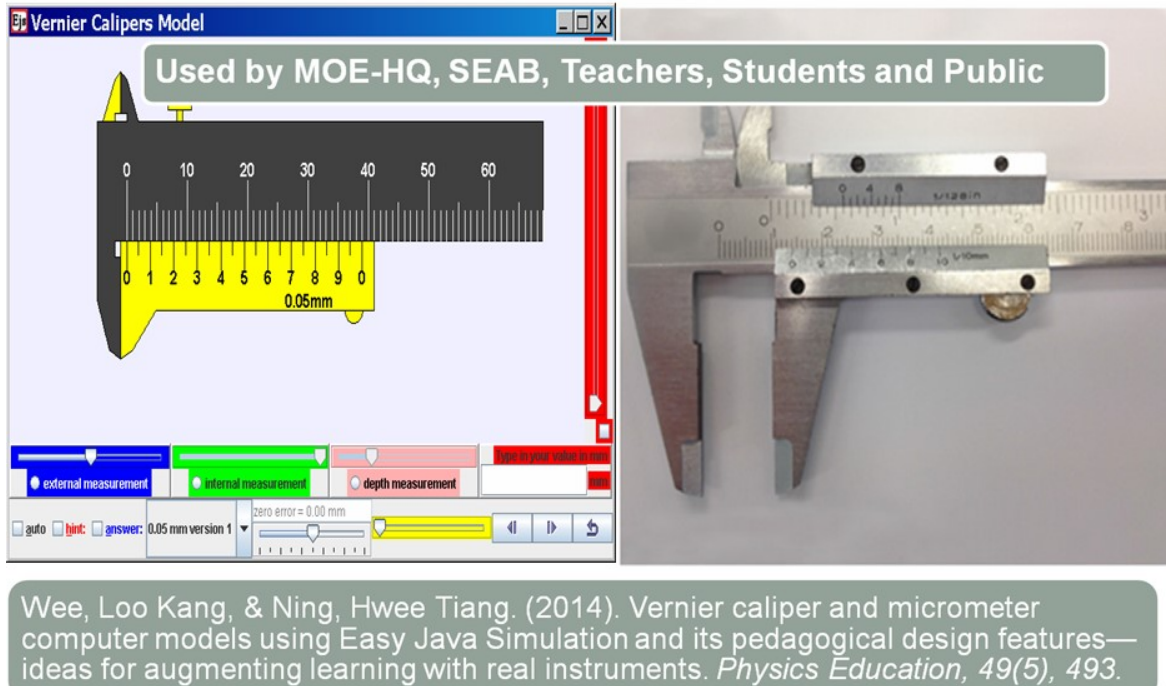


Figure 4. An example of how tapping on open educational resources⁹ available on the public internet, lower the issues of equity access and practical implementation.

iii. Personalized and agricultural Portfolio

As for nurturing future ready learners with personalized and agricultural model of mentoring from teachers, a self-directed system of demonstration of performance tasks (Wee & Leong, 2015) could take any form that the learner's choose, mimicking real life situations facing adulthood career choices.

⁹ <http://iwant2study.org/ospsg/index.php/interactive-resources/physics/01-measurements/5-vernier-caliper>

PERSONALIZED PORTFOLIOS

Search Key for Growth in Any Subject/Area

weelookang.blogspot.sg

Open Source Physics Simulations by looka...

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Pedagogical and Professional – experience Repertoire (PaP-eR)

Using Tracker as a Pedagogical tool framed (3 parts) using Pedagogical and Professional – experience Repertoire (PaP-eR)

Topic: Dynamics of Motion (Sliding Example) Kinematics Scenario
Name: lookang
School: etd
Level/Stream: express/normal academics
Related Concepts/Ideas from other topic(s): Kinematics, readings on PaP-eR Loughran, Berry, & Mulhall (2012). Understanding and developing science teachers' pedagogical content knowledge, 2nd Edition
<https://www.sensepublishers.com/media/1219-understanding-and-developing-science-teachers-pedagogical-content-knowledge.pdf>
password network: ST LT networks on OPAL

Creative Commons Attribution-Share Alike 3.0 Singapore License.. Dynamic Views template. Powered by Blogger.

Figure 5. An example of how tapping on technology platform such as Blogger serves as a self-directed system of demonstration of performance tasks portfolio maintained by the learners as mentored by teachers and the public.

4. Conclusion

Thus, the table below summarizes the three prong approach 1) monitoring examinations 2) playful and stimulating teaching and learning tasks and 3) portfolio of performance tasks, and the free and open technology tools to be leveraged on for national examinations reforms needed to prepare future ready learners.

Reforms	Technology
Monitoring Exams	Learning Management Space, Big Data Analytics, Adaptive Feedback System, Automated Marking tool
Play & Stimulating Teaching & Learning Tasks	Open Source Interactive Tools, Mobile Learning tools, Real Apparatus, Games, Inquiry tools, 1to1 computing
Portfolios	Blogs, YouTube, Twitter, Facebook, arXiv, ResearchGate, Google Scholar, LinkedIn

5. Reference

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