(Students) Learning Robotics Collaboratively: Assisting & Assessing Robotics Learning. Together!

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Robotics + Education Workshop

May 30, 2015

http://robotics.itee.uq.edu.au
The Goal: Change The World!
Collaboration: More than Just for Robots
Rapid Prototyping & Rapid Assessment
What is Platypus?

Many Things Put Together!

- (Yet another) Electronic Submission System
- A Question-based Online Peer Assessment Tool
- An “Anonymous” Review + Student Progress Tool
- A Tool With a Nuanced (Data-centric) View of Assessment

What is Platypus?

Many Things Put Together!

A “Reflection” Tool

That additionally supports online Peer Review & Rapid Feedback via a Shuffled Distribution Process

I. Collect Assignments (one per student)

II. Randomly Shuffle Questions between assignments to create $kM$ “Papers”
(Where $k$ is the peer review factor, or the number of papers a student needs to review, eg 3)

III. Each student grades $k$ papers (may be assigned randomly or via an alternative metric)
Why a Question-Based Shuffle?

• Replication & Randomization

• Assessment is an Observer
  \[ N(0, \sigma) \]

• Less Numbers Needed for Analysis
  – A Project Class is not Super Large

• Summative Assessment by parts

• Faster feedback
Welcome to Platypus

<table>
<thead>
<tr>
<th>#</th>
<th>Class</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ELEC3004</td>
<td>Digital Linear Systems: Signals &amp; Controls!</td>
</tr>
</tbody>
</table>
It’s Open...

* This file is application-wide controller file. You can put all
  application-wide controller-related methods here.

* CakePHP(tm) : Rapid Development Framework (http://cakephp.org)
* Copyright 2005-2012, Cake Software Foundation, Inc. (http://cakefoundation.org)
* Licensed under The MIT License
* Redistributions of files must retain the above copyright notice

* Copyright 2005-2012, Cake Software Foundation, Inc. (http://cakefoundation.org)
* @link http://cakephp.org CakePHP(tm) Project
* @package app.Controller
* @since CakePHP(tm) v 0.2.9
* @license MIT License (http://www.opensource.org/licenses/mit-license.php)
*
/***
 * Application Controller
 *
 * Add your application-wide methods in the class below, your controllers
 * will inherit them.
 *
 * @package app.Controller
 * @link http://book.cakephp.org/2.0/en/controllers.html#the-app-controller
 /***/
class AppController extends Controller {

  public $baseUrl = '/platypus';
  public $pageTitle = 'NO PAGE TITLE';
  public $navState = 'notloggedin';
  public $userdetails = array();
  public $loggedin = false;
  public $isadmin = false;
  public $memberaccesslevels = array('contributor' => 'Contributor', 'administrator' => 'Administrator');
  public $breadcrumbs = array();
  public $fullurl = 'http://robotics.itee.uq.edu.au/platypus';
SQL + Laravel

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<th>question_id</th>
<th>content</th>
<th>times_answered</th>
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</table>
“Statistics”: Tools to “Assess” Learning?
Basic Counts...

- Scores Histograms...
- Grade Correlations...

![Scores Histograms](image1)

![Grade Correlations](image2)
Interesting Finds: Dunning-Kruger Effect?

• Correlation Between Students' Actual & Estimated & Final Grades
Trustworthiness of Peer & Tutor Marking

Median Peer + Tutor Grade (%) vs. Final Grade (%)
Longer answers better?

- Total Student Feedback Output Characters vs. Total Student Marks Received
Longer feedback better?

- Tutor Feedback Length and Final Course Grade
Positive $\Delta$: Positive Outcome?
Worldwide Access
Peer Feedback Research

Tuned Models of Peer Assessment in MOOCs

Peer Assessment Learning Sessions (PALS): an innovative feedback technique for large engineering classes

Division of Civil Engineering

This paper reports the results of a study in Civil Engineering to facilitate a student learning environment that is within a "traditional" context but does not fit in with the traditional assessment structure. The authors found that participants scoring in the bottom quartile on tests of humor, grammar, and logic greatly overestimated their test performance and ability. Although they scored better than in the 12th percentile, they estimated themselves to be in the 90th. Several analyses indicated that this overestimation was due to defects in metacognitive skill, or the ability to distinguish accuracy from error. Paradoxically, improving the skills of participants, and thus increasing their metacognitive competence, helped them recognize the limitations of their abilities.

Keywords: Peer assessment; learning; self-reflection

1. Introduction

As Ramsden (1988) states:

It is one of the essential features of such incompetence that the person so afflicted is incapable of knowing that he is incompetent. To have such knowledge would already be to remedy a good portion of the offense. (Miller, 1993, p. 4)

In 1995, McArthur Wheeler walked into two Pittsburgh banks and robbed them in broad daylight, with no visible attempt at disguise. He was arrested later that night, less than an hour after videotapes of him taken from surveillance cameras were broadcast on the 11 o'clock news. When police later showed him the surveillance tapes, Mr. Wheeler stared in incredulity. "But I wore the juice," he mumbled. Apparently, Mr. Wheeler was under the impression that rubbing one's face with lemon juice rendered it invisible to videotape cameras (Franco, 1996).

We bring up the unfortunate affairs of Mr. Wheeler to make three points. The first two are noncontroversial. First, in many domains in life, success and satisfaction depend on knowledge, wisdom, or savvy in knowing which rules to follow and which strategies to pursue. This is true not only for committing crimes, but also for many tasks in the social and intellectual domains, such as promoting effective leadership, raising children, constructing a solid logical argument, or designing a rigorous psychological study. Second, people differ widely in the knowledge and strategies they apply in these domains (Dunning, Meyerowitz, & Holzberg, 1989; Dunning, Petre, & Stoey, 1991; Stoey & Dunning, 1990), with varying levels of success. Some of the knowledge and theories that people apply to their actions are sound and meet with favorable results. Others, like the lemon juice hypothesis of McArthur Wheeler, are imperfect at best and wrong-headed, incompetent, or dysfunctional at worst.

Perhaps more controversial is the third point, one that is the focus of this article. We argue that when people are incompetent in the strategies they adopt to achieve success and satisfaction, they suffer a dual burden: Not only do they reach erroneous conclusions and make unfortunate choices, but their incompetence rob them of the ability to realize it. Instead, like Mr. Wheeler, they are left with the mistaken impression that they are doing just fine. As Miller (1993) perceptively observed in the quote that opens this article, and as Charles Darwin (1871) sagely noted over a century ago, "ignorance more frequently begets confidence than does knowledge." (p. 3)

In essence, we argue that the skills that engender competence in a particular domain are often the very same skills necessary to evaluate competence in that domain— one's own or anyone else's. Perhaps the most important lesson we have learned from our research is that incompetence is not just a problem for people who fail in life; it is a problem for us all. If we cannot recognize our own incompetence, we are likely to believe we are doing well. If we cannot recognize others' incompetence, we may believe they are doing well, too.
Benefit: Focus on Learning Outcomes
Platypus II: Available For Your Class Too

http://robotics.itee.uq.edu.au/~platypus/
For More Information:

http://robotics.itee.uq.edu.au/~platypus/
Future Work

• Richer Inputs
  – [Matlab] Figures
  – Simple Diagrams/Sketches
  ➔ Rich media in general

• Alternate Question Types
  – Lab Reports, etc.
  ➔ User-Defined?

• Team Submissions/Review

• Visualization Tools
Artificial intelligence

Rise of the machines

Artificial intelligence scares people—excessively so

May 9th 2015 | From the print edition

ELON MUSK busies himself building other people’s futures. A serial entrepreneur who made his first fortune in the early days of the world wide web, he has since helped found a solar-power company to generate green electricity, an electric-car firm to liberate motorists from the internal-combustion engine, and a rocketry business—SpaceX—to pursue his desire to see a human colony on Mars within his lifetime. It makes him the sort of technologist you would expect might look on tomorrow with unbridled optimism.

Not all future technology meets with his approval, though. In a speech in October at the Massachusetts Institute of Technology, Mr Musk described artificial intelligence (AI) as “summoning the demon”, and the creation of a rival to human intelligence as probably the biggest threat facing the world. He is not alone. Nick Bostrom, a philosopher at the
Students will be students

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