

Teaching and Assessing Programming Fundamentals for Non Majors with Visual Programming

App Inventor Mobile Programming +
Bloom's Taxonomy =
Effective Learning Basic Concepts

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Overview

- Motivation
 - “Quantitative Knowledge” Course
 - App Inventor Popularity –
 - Visual Programming Tool
 - Is it Working??
- Assessment of Learning
 - Goals:
 - Bloom's Taxonomy (Thinking Skills in Levels)
 - Self and Instructor Assessments
- Results – Students Like it, and
 - Map App Inventor Features to Learning in Levels
 - Outcomes Positive, Most Levels



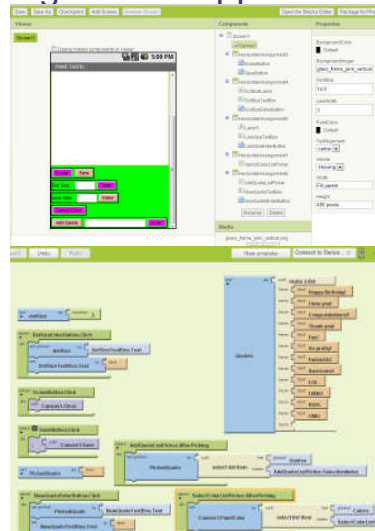
Course Tools

Mobile Apps with Google Android using App Inventor
(now MIT)



App Inventor, Visual Programming Mobile Apps

- Designer – GUI on Screen
 - Select “Components” (button)
 - Set initial “Properties” (shape)
- Blocks Editor
 - Implement “When Do” Events
 - Button touched, location changed, list picker selected, dialog response
- Phone or Emulator (live view)



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App Inventor Quick Look



App Inventor:
Designer, Blocks Editor, Emulator

<http://appinventor.mit.edu/>

Animal Quiz
and Facts
Student Words:



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Assessment Tools

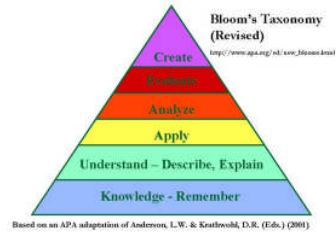
Measure Learning Outcomes in Levels



Bloom's Taxonomy

Six Cognitive Categories

- Increasing degrees of learning
 - Remembering, Understanding, Application
 - lower order thinking
 - Analysis, Evaluating, Creating
 - higher order thinking



Assessment based on demonstrated learnings

- Rated from 1 (low) to 5 in each category

Used in many fields (original committee 1956)

- Some in computer science

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5



Building Assessment Tool Using Bloom's



Numeric Rating	1 = No or Limited Evidence	2 = Less than Workable Knowledge	3 = Adequate Knowledge of Desired Learning	4 = Full Mastery of All Basic Skills	5 = Advanced Skills
Cognitive Category					
Application: How would you rate your ability to apply the events concept (When Do) to create apps? This requires the general pattern being known and applied to unfamiliar problems.	Lack ability to apply known concepts of events to new problems.	Able to use single events to perform new functions, e.g. changing different properties of a known component such as a text box.	Ability to use appropriate events for a consistent GUI and app execution. Includes GUI events and others such as Screen Initialize, and Clock timer.	Able to use multiple events to perform task that requires multiple GUI inputs.	Ability to demonstrate use and application of known complex component events (e.g. sensors and animation) and to utilize them to solve a new problem.

Each Category Rated 1 (low) to 5

3 to 5 "pass"

Specific App Inventor feature(s) of each of 6 Categories

- Rating on demonstrated skill in using the feature

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6



Here it is complete...



Visual Programming with App Inventor Assessment Matrix

<https://docs.google.com/file/d/0BwsTRjvLbRNOX3FOWkp6cUVnT3c/edit>

In survey form:

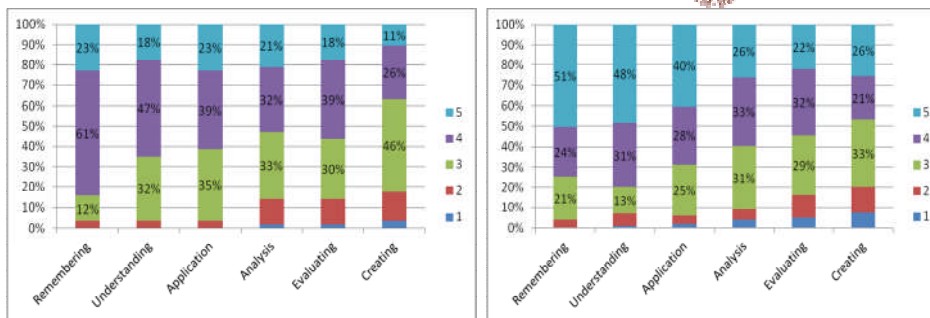
<https://docs.google.com/spreadsheets/viewform?formkey=dDI3SIIIQjVzUGxpNERRNXV3UGJKLXc6MA>

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7



Comparing Ratings



Student Self Evaluation

Faculty and Staff Ratings

Each student evaluated by faculty and teaching assistants(s)

Differences:

- Faculty/Staff ratings higher
 - Especially in Remembering, Understanding, Application

- Whole semester's work with student

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8



Assessment Findings

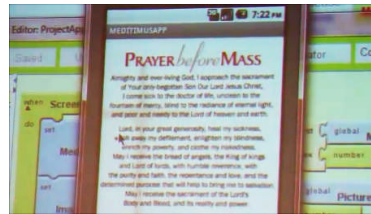


Student self assessment = Learning Level and Example:

- Remembering (self rating 3) I would be able to recognize the components themselves if such as buttons, text boxes, clock etc but when it comes to activity starter or SMS components, it would take me long to be able to figure out what they are...
- Application (self rating 4) ...I knew how to initialize events when the screen was opened, when certain buttons were clicked, when a math total was met (and if it wasn't met I knew how to make another event happen (if/else)...

Highlights:

- Student and staff ratings most similar for ratings of 1 and 2
 - Agreement on failings
- Common examples of success
 - App Inventor GUI, text messaging
- Most challenging
 - TinyDB, Activity Starter



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Course Success?



Rating	Remembering	Understanding	Application	Analysis	Evaluating	Creating
1	0%	0%	0%	2%	4%	8%
2	4%	4%	4%	15%	15%	19%
3	17%	34%	43%	36%	43%	45%
4	64%	49%	38%	36%	32%	25%
5	15%	13%	15%	11%	6%	4%

Lower of Self and Staff Evaluations - Percent of Students

Achieving Learning Outcomes:

- Most students successful
 - Especially in Remembering, Understanding, Application
- Creating category exceeds course goals

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Prayer and
Meditation

Psychology
Testing:
Derivative
Compound Preference
Test (DCP)



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Summary



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App Inventor Effective, and Popular

- Assessment confirms desired learning
- **Increased interest in programming careers!**

Bloom's Application to Visual Programming

- Rigor in assessment
 - Cognitive Categories apply to App Inventor Features
- Self and staff assessment differences...


Future Use

- Use with App Inventor ELSEWHERE?
 - Refine mapping and use of App Inventor Features
- Similar assessment with other tools

Acknowledge

- Reviewers, Thanks!
- Loyola's Faculty Center for Ignatian Pedagogy
- **App Inventor Community:** MIT, Google, ...

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12 

Backup Materials



- Computer - sound connection
- Videos as .mp4
(gdrive, log in, ft-fac-luc-cs-edu>PicsToShare>StudentProjects)
- App Inventor
<http://appinventor.mit.edu/>
find set up tab, check java, dl install,
log in, start all three, load project
- Assessment
Full Table <https://docs.google.com/file/d/0BwsTRjvLbRNOX3FOWkp6cUVnT3c/edit>
Survey <https://docs.google.com/spreadsheets/viewform?formkey=dDI3SIIIQIVzUGxpNERRNXV3UGJKLXc6MA>
- Example App (my projects)
Starter TwoButtonsAppInventor, or construct similar
PaintTastic CompleteApp_ifavela

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13

