

Using Shiny for Formative Assessments

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Formative Assessment - “A range of formal and informal assessment procedures... undertaken by teachers in the classroom as an integral part of the normal teaching and learning process in order to modify and enhance learning and understanding” (Crooks, 2001)

Summative Assessment - “used to evaluate student learning, skill acquisition, and academic achievement at the conclusion of a defined instructional period—typically at the end of a project, unit, course, semester, program, or school year.” ²

¹ <http://edglossary.org/high-stakes-testing/>

² <http://edglossary.org/summative-assessment/>

Use Cases

- The primary purpose is to collect data from students and provide them with *immediate* feedback/scores
 - Self-Report Surveys
 - Multiple Choice Assessments

Two Approaches

Using Survey Website

- Can utilize all the features of the survey service (e.g. invites, item types, styling)
- Data is managed by the survey service
- Results are presented using Markdown
- Can host on shinyapps.io

Fully Shiny Server

- More flexibility during the data collection process (e.g. computer adaptive testing)
- No need to communicate with another service
- Students are not redirected
- Need to have your own Shiny server

Using Survey Service

In this example Qualtrics is used, but could easily be modified for other services including SurveyMonkey.

1. Create an Rmarkdown file that shows the individual results
2. Update the `config.R` file with appropriate parameters

Redirection

- The key is to redirect the user to our shiny server when done.
- For Qualtrics, we can pass the ResponseID using the following format:
`http://daacs.net/shiny/DemoResults/?responseId=${e://Field/ResponseID}`

Survey
Termination



- ☐ **Default** end of survey message.
- ☐ **Custom** end of survey message...
- ☐ Redirect to single response report.
- ☒ **Redirect** to a full URL, ex. "http://www.qualtrics.com":
- ☐ Send additional thank you **email** from a library... When distributed via the Survey Mailer.
- ☐ **Anonymize Response.** Do NOT record any personal information and remove contact association (not recommended).

Demo

Start Survey: https://excelsior.eu.qualtrics.com/SE/?SID=SV_42w3IMUxIFzWF0h

Test Results: http://daacs.net/shiny/DemoResults/?responseId=R_2Qt847VHMigyzcv

Shiny Only Solution

```
source('ShinyAssessment.R')

assmt.results <- reactiveValues( # Object to save results
  math = logical() )

saveResults <- function(results) { # Call back function
  assmt.results$math <- results == math.items$Answer }

# Create the Assessment
test <- ShinyAssessment(input, output, session,
  name = 'Statistics',
  item.stems = math.items$Stem,
  item.choices = math.items[,c(4:8)],
  callback = saveResults,
  start.label = 'Start the Statistics Assessment',
  itemsPerPage = 1, inline = FALSE)

uiOutput(test$link.name)      # Display a link
uiOutput(test$button.name)    # Display a button
```


Shiny Only Solution

```
output$ui <- renderUI({  
  if (SHOW_ASSESSMENT$show) {  
    # The assessment will take over the entire page.  
    fluidPage(width = 12,  
              uiOutput(SHOW_ASSESSMENT$assessment))  
  } else {  
    # This is the normal Shiny UI code here.  
    # ...  
  }  
})
```

Demo

Bonus: User Authentication

- Huidong Tian¹ developed a way adding user authentication in the free version of Shiny
- This has been extended to:
 - Include a logout button
 - Ability for users to create an account

¹ <http://withr.me/authentication-of-shiny-server-application-using-a-simple-method/>

Demo

Login

Username:

Password:

Login

Create new account

Username:

Password:

Confirm Password:

Email Address:

Create Account

```
if(USER$Logged) { # User interface when logged in

  tabs[['myPage']] <- tabPanel('myPage',
    h4(paste0('You are logged in as ', USER$Username)),
    p(paste0('Email: ', USER$Email)),
    p(paste0('Group: ', USER$Group)),
    uiOutput('uiLogout')
  )

} else { # Login page

  tabs[['Login']] <- tabPanel('Login',
    fluidRow(
      column(4, offset=1, h3('Login'),
        uiOutput('uiLogin')),
      column(4, offset=1, h3('Create new account'),
        uiOutput('uiNewAccount') )
    ) )

}
```

Future Directions

- Implement as a Shiny Module
- Create an R package to make using this framework easier.
- Add computer adaptive testing for multiple choice assessments

Thank You!

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