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Video and visual resources & technologies in teaching statistics

Graham R Gibbs

University of Huddersfield
Outline

- Video resources – levels, topics etc.
- Use of resources in teaching – student views
- Selecting videos – quality, accuracy etc.
- Make your own
- Technologies – Camtasia, Explain Everything, etc.
Video

- Especially on YouTube

- Cover
  - Statistics
  - Quants methods (e.g. surveys)
  - Software – SPSS, R, SAS, Minitab etc.
Videos - level

- School, A-level and equivalent. Especially for descriptive stats

- University level – often done by lecturers
  - [http://youtu.be/mnbBrFxFxWHA?t=6m7s](http://youtu.be/mnbBrFxFxWHA?t=6m7s)

- Some take statistical/mathematical approach
  - [http://youtu.be/MIqyIGvrUXE?t=2m5s](http://youtu.be/MIqyIGvrUXE?t=2m5s)

- Some use social science data (some use biological etc.)

- Lots demonstrate how to use SPSS etc. to do stats.
  - Eg. Andy Field [http://youtu.be/EkbkJ7x6bNA?t=3m37s](http://youtu.be/EkbkJ7x6bNA?t=3m37s)
Excellent maths support

- **Maths Tutor**
- [http://www.mathtutor.ac.uk/arithmetic/fractions/multiplying-and-dividing/video](http://www.mathtutor.ac.uk/arithmetic/fractions/multiplying-and-dividing/video)
  - to revise maths skills
  - basic arithmetic like calculating percentages and dealing with decimal numbers
  - introduction to algebra such as equations and squares
  - functions, graphs and series
Typical topics

- Basic concepts
  - P-value, scales, levels of measurement, mean, median, mode, IV and DV, variables
  - http://youtube.be/GMIPnzLQtTQ?time=1m12s

- SPSS use
  - Getting started
  - Interface, data entry, data modification/recoding, charts
  - Exploratory analysis, crosstabs, chi-square
  - Regression, correlation
  - ANOVA, t-test, non-parametric equivalents
Pedagogic use of video

- In class lecture
  - Can show only parts
  - Can pause and explain, excuse, etc.

- Use in guided independent study
  - Probably best if linked with lab instructions, used when needed, i.e. when doing assessment

- Use in labs
  - Needs headphones to stop noise for others
Student views of videos

- Find use in lectures good. Can follow and then practice in following lab.
- Use less frequently outside sessions
- Like ability to pause and replay
- Some used Maths Tutor site
- Some preferred to use textbook and reading material
- Prefer handwriting worked examples on screen to prepared PowerPoints
Non video visual resources

- Reusable learning objects and other models
- Students directly manipulate and see results
A learning object on creating and analysing tables of data

- [http://www.ucel.ac.uk/rosl/cross_tab_data/main.html](http://www.ucel.ac.uk/rosl/cross_tab_data/main.html)

- How to convert survey or experimental data into cross-tabular data and the steps involved in this process.

- Use early deaths of band members

- Developed at the University of Cambridge.
Correlation Explorer

- Software that allows you to manipulate points on a scattergram to see the effect on both the correlation statistic s and the regression line. Use the buttons for canned scattergrams to quickly change the display.

- [http://hhs.hud.ac.uk/w2/ltsu/Correlation.htm](http://hhs.hud.ac.uk/w2/ltsu/Correlation.htm)
A visual tool for exploring ANOVA

- Understanding ANOVA Visually (1998, 2000) by Tom Malloy (University Utah, USA)

- [http://www.psych.uta.edu/stat/introstats/anovash.html](http://www.psych.uta.edu/stat/introstats/anovash.html)

![Understanding ANOVA Visually](image)
Selecting videos

- Are data sets used suitable?
  - Students like to have data they can relate to or relevant to their discipline.

- Statistical explanations
  - Depends on pedagogic approach

- Production quality
  - Good sound needed
  - Is the speaker too chatty/amateurish etc.
Selecting videos 2

- Accuracy
  - Some videos get it very wrong
    - http://youtube.com/wHgI6ToLySw?t=5m10s

- Debates in statistics
  - Should video include this or not?
  - Explaining discretion makes it hard for students
Producing videos

Range of technologies:

- Camera, mic and digital editing suite
- Camtasia screen recording
- Flash/HTML5
- Screen writing (with stylus and tablet) (Kahn University style) [http://youtube.be/J1twbH3l3o?t=35s](http://youtube.be/J1twbH3l3o?t=35s)
- iPad solutions (include recording and screen writing)
“Explain Everything” on iPad
Making it accessible

- Short videos good
- Use screen writing – students like this
- Use graphics, visual devices etc.
- Sound quality – more imp. than picture
- Visual quality – depends. Needs good quality for text. HD can look more professional
- Visual aesthetics (composition, lighting etc.)
- Licensing – find free to use music etc.
- Copyright – Not at all clear, but now use the CC licence.
Towards a pedagogy of the visual

- **Makes the abstract concrete**
  - As a metaphor (graphs)
  - As symbols (equations)

- **Demonstrates process**
  - Transformation, calculation, decision making
  - Change shown by visual changes

- **Time**:
  - So changes can be seen, manipulated, repeated, paused
  - Provides space/time for absorption
Sites used most often to search for resources

2011 study. N=99
Where third party resources have come from

<table>
<thead>
<tr>
<th>Resource</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YouTube</strong>:</td>
<td>50</td>
</tr>
<tr>
<td>Your Libraries' digital resources (such as e-Books):</td>
<td>44</td>
</tr>
<tr>
<td>Other courses on your Institution's VLE (such as Blackboard):</td>
<td>32</td>
</tr>
<tr>
<td>Professional body website:</td>
<td>24</td>
</tr>
<tr>
<td><strong>HEA website</strong>:</td>
<td>19</td>
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<tr>
<td>Discipline specific website (such as Online QDA hud.ac.uk):</td>
<td>16</td>
</tr>
<tr>
<td>Corporate website:</td>
<td>14</td>
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<tr>
<td>Another Institution's website / VLE:</td>
<td>11</td>
</tr>
<tr>
<td>National educational repository (such as JORUM):</td>
<td>8</td>
</tr>
<tr>
<td>Open access repository (such as OpenLearn):</td>
<td>8</td>
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<td>iTunesU:</td>
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<td>Flickr:</td>
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<tr>
<td>Other (incl. own developed resources):</td>
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<tr>
<td>BUFVC:</td>
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<tr>
<td>MOOC / open courseware (such as eLearning):</td>
<td>0</td>
</tr>
</tbody>
</table>

Lots of use of available digital resources

2013 survey. N=115
Conclusions

- Video – there’s a lot out there
- Need care in selecting/recommending videos
- Make your own – technology is getting better and easier to use
- Google and YouTube to find