Virtual Microscopy in Cytotechnology Education: Application of knowledge from Virtual to Glass.

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No conflict of interest
• The main objective:
• Distance learning students
  – Standardize curriculum
  – Expansion (U.S. & Internationally)
• Part-time program
  – Design specifically for each student (2+ years)
• Keep up with technological advances/trends
Methods

• Enrolled current students (N=6)
  – UNMC = 5, Carle Clinic = 1
• IRB consent
Methods

- Digitized 142 glass slides – Breast, Thyroid, Lymph Node FNA
  - 61 teaching, 81 practice
- iScan Coreo Au (Ventana)
  - 40X, 2D
  - PathXchange website
- Output file
  - JPEG 2000, Average = 426.52MB
Methods

- Student tutorial on software
- Traditional lecture
- Virtual teaching images
- Virtual practice images
- No glass slide screening from these body sites
- No faculty instruction during study
  - Including no multi-head scope sessions
Methods

• 10 glass slide screening test with LM
  – Breast (n=3), thyroid (n=3), Lymph node (n-4)
• Survey
Results

• Kruskal-Walis test
  – No statistically significant difference ($p=0.967$) between median test scores of the last three classes of Light microscopy/light microscopy (LMLM) group.

• Mann-Whitney
  – No statistically significant difference ($p=.14$) between median test scores
    • VMLM (median = 94)
    • LMLM (median = 86)
Median Test Scores

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<thead>
<tr>
<th></th>
<th>LMLM</th>
<th>VMLM</th>
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<tr>
<td>Value</td>
<td>86</td>
<td>94</td>
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Survey Results

- Directions were clear
- Accessibility off campus was easy
- Images downloaded in reasonable time
- Switching from slide to slide was easy
Results

VM less stressful to eyes

VM enjoyable and fun

Screening VM slides was easy

VM less stressful to my body
I desire VM over LM

Applying VM to LM was easy

VM optimized info for learning

VM allowed more time studying
Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree
---|---|---|---|---
3D images better
Resolution sufficient
Switching magnification easy
VM images were clear
• Learning through VM could be applied effectively to glass slide screening

• Students preferred LM
  – Lack of experience using VM
  – Software issues (arrow keys) not opening properly (Technical issues)
  – Annotations positive feedback
Limitations

- Student bias towards LM - previous 4 months of traditional training.
- Interaction with faculty previously (not during study)
Discussion

- Scanning issues
  - Time
  - Rejected/broken slides
  - Out of focus / re-scan up to 4 times

- Size of files / server
  - Huge file size (Only ¼ or less of entire slide)
  - External hard drive
• Train from beginning of program using VM
  – Learning curve will be similar to LM
• Developing exams with virtual images
• Develop bank of unknown slides
Thank you

- Maheswari (Manju) Mukherjee, CT(ASCP), MS – Graduate Assistant
- David Wert, BS – Tissue Science Facility Supervisor
- Dan Moser, PhD – Associate Director, Information technology Services
Questions?