Visualizations for Teaching Vision and Wavefront Aberrometry

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**Motivation**
- Teaching wavefront aberrometry
  - Method of vision diagnosis - visual process
  - Students have little knowledge of vision
- Research on knowledge construction
  - Use knowledge of eye and vision in new context of wavefront aberrometry
- Design visualizations to facilitate effective transfer to new context

**Reactions and Outcomes**
- Students reaction: clearer representation
  - Differences are more drastic
  - ‘More precise’ - final result more quickly
  - Tended to overlook some features
    - Focused primarily on only one thing
    - Ex – overlook light rays, focus on lens shape
- Disadvantages
  - No way to deal with concave lenses alone
  - Too basic for some students

**Reactions and Outcomes**
- Easily applied information from “Screen”
  - Image and object distance
  - Radius-of-curvature of lens
- Nearsightedness and Farsightedness
  - Easily see light rays cross – image location
  - Corrective lenses – move image location
- Disadvantages:
  - Lenses don’t look convex/concave
Aberrometry Visualization

Reactions and Outcomes

- Student reactions:
  - More clear than hands-on, distinctive
  - 2D is hard to understand without 3D first
  - Tended to overlook some features
  - Focused primarily on only one thing
  - Ex – overlook light rays, focus on lens shape
- Understood wavefront aberrometry
  - Needed help understanding why grid changes

Conclusions

- Research-based visualizations
  - Assisted in helping students (of all levels) understand wavefront aberrometry

- Guided inquiry visualizations worked best
  - Students likely to overlook features otherwise

- Assisted students in understanding a difficult physical phenomenon

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