



Visualizations for Teaching Vision and Wavefront Aberrometry

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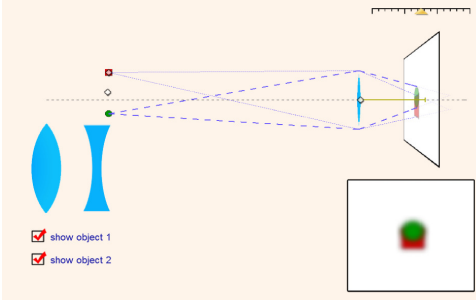
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Motivation

- 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

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Vision Visualization: Image on Screen



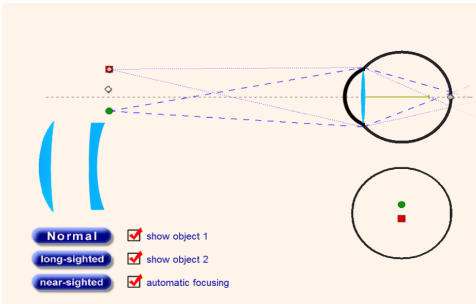
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Reactions and Outcomes

- 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

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Vision Visualization: Image in Eye



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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

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Aberrometry Visualization

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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

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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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