

The Signaling Effect

Theory

The signaling effect presents the increase in learning outcomes due to guiding and promotion of attention to relevant information. Signals are based on natural attention attractors like movement, contrast or sound. In multimedia this effect can also be achieved through various methods like¹⁾:

1. enumeration, → arrows, underlining,
2. **bold text**, *italic text*, **coloring**,
3. summaries or overviews.

Practice

Examples of signaling implementation in practice:

- preview **summary** paragraph²⁾
- **section headings**³⁾
- **labels color change** synchronized with a spoken explanation⁴⁾⁵⁾
- **step-by-step presentation** of diagram elements synchronized with a spoken explanation⁶⁾

Research results

A recent research⁷⁾ has confirmed and attempted to explain the signaling effect using recorded eye movements data of the experiment participants. Some of the conclusions of this and similar studies concerning the signaling effect are:

- Signaling can guide attention to relevant information, which reduces cognitive resources normally assigned for search of information⁸⁾
- Eye-tracking studies confirmed that signaling results in more attention devoted to relevant information⁹⁾
- Some studies have found increase in retention tests performance, but not on transfer tests¹⁰⁾, but others found positive effects of signaling on transfer tests, but not on retention tests¹¹⁾¹²⁾
- In cases when signaling is used, time for finding information is usually reduced, but duration of time spent watching/processing this information increases when compared to no signaling conditions

1) , 4) , 7) , 8) , 9) , 11)

Ozcelik, Erol, Ismahan Arslan-Ari, and Kursat Cagiltay. Why does signaling enhance multimedia learning? Evidence from eye movements. *Computers in Human Behavior* 26, no. 1: 110-117. January 2010.

2) , 3) , 12)

Mautone, Patricia D., and Richard E. Mayer. Signaling as a Cognitive Guide in Multimedia Learning. *Journal of Educational Psychology* 93, no. 2: 377-389. June 2001.

5) , 6)

Jamet, Eric, Monica Gavota, and Christophe Quaireau. Attention guiding in multimedia learning. *Learning and Instruction* 18, no. 2: 135-145. April 2008.

¹⁰⁾

Jamet, Eric, Monica Gavota, and Christophe Quaireau. Attention guiding in multimedia learning. *Learning and Instruction* 18, no. 2: 135-145. April 2008. and Tabbers, Huib K, Rob L Martens, and Jeroen J. G Merriënboer. Multimedia instructions and cognitive load theory: Effects of modality and cueing. *British Journal of Educational Psychology* 74, no. 1: 71-81. March 2004. cited by Ozcelik, Erol, Ismahan Arslan-Ari, and Kursat Cagiltay. Why does signaling enhance multimedia learning? Evidence from eye movements. *Computers in Human Behavior* 26, no. 1: 110-117. January 2010.

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