

A comparison of different design when using the isolated-elements strategy

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Introduction

The *isolated interacting elements effect* is obtained when interacting elements are presented in isolation before presenting the full interacting material (e.g. Sweller, 2010). This procedure is superior to presenting the full interacting material twice (Pollock, Chandler & Sweller, 2002; Ayres, 2006).

The aim of this study was to compare five alternatives presentation to a direct presentation of the whole system. In a two-stage design the following five strategies were compared: a) isolated elements with no interactions were presented (stage 1) before the whole interacting system (stage 2); b) partially interacting elements were presented before the whole interacting system; c) the whole interacting system was presented twice; d) the whole interacting system was presented before partially interacting elements; e) the whole interacting system was presented before isolated elements. This new study will allow to cross two independent variables: 1) the order of presentation (part to whole vs. whole to part) and 2) the isolation level of elements (isolated element vs partially interacting elements). The study was conducted with instructional materials that feature both texts and graphics. In a previous experiment (Bellec, Tricot & Ayres, 2012) a comparison of strategies a, b and c showed no significant differences for recall questions but a significant difference between the strategie a and c for transfer questions (strategie c was superior).

Method

Eighty four students of a technical college from Poitiers, France, participated in this experiment. They had to learn about the effectiveness of hybrid engines as a solution to the reduction of greenhouse gas emissions.

Each group was randomly assigned to one version of the materials. A pre-test was used one week before the experiment, to evaluate the students' prior knowledge. A post-test (the same questions as the pre-test and 5 transfer questions) was assigned at the end of the second phase.

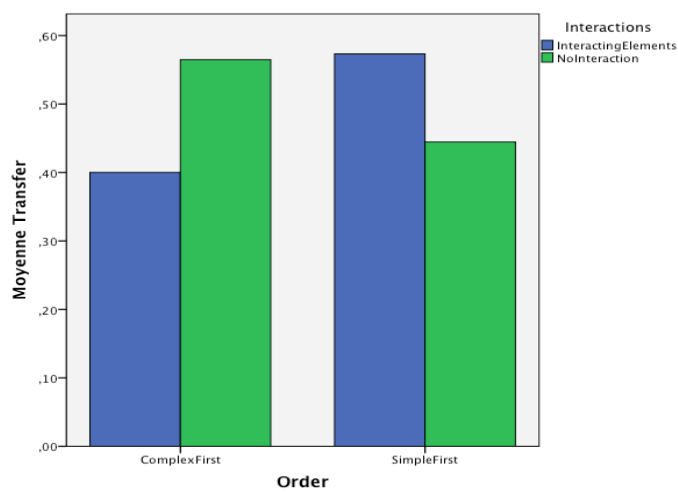
Results

There was no significant difference between the five conditions for recall and comprehension measures. For the transfer questions (Fig 1), we have an interaction effect: when the learning begin with the presentation of complex system (stage 1), the presentation of isolated elements in a second time gives better performance than the presentation of interacting elements. But, when the learning begin with the presentation of elements, the presentation of interacting elements is better than the presentation of isolated elements.

Discussion

As in the previous experiments, the order of presentation does not seem to have any effect on performance in recall and comprehension. Moreover, we do not get a particular effect on the level of isolation elements this is probably due to the fact that the participants had high pretest performance. We obtain an interaction effect for the transfer. Based on considerations of van Merriënboer's 4C/ID model for complex learning (see van Merriënboer & Kirschner, 2007), this effect may be the subject of future investigations.

Fig 1 : transfert questions



References

- Ayres, P. (2006). Impact of reducing intrinsic cognitive load on learning in a mathematical domain. *Applied Cognitive Psychology, 20*, 287-298.
- Bellec, D., Tricot, A., & Ayres, P. (2012). A comparison of different levels of interactions when using the isolated-elements strategy. *EARLI SIG2 meeting*, Grenoble, August 29-31
- Pollock, E., Chandler, P., & Sweller, J. (2002). Assimilating complex information. *Learning and Instruction, 12*, 61-86.
- Sweller, J. (2010). Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational Psychology Review, 22*, 123-138.