

Fostering the mastery of complex skills through a formative assessment methodology with Video enhanced Rubrics

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Fostering the mastery of complex skills through a formative assessment methodology with Video enhanced Rubrics

Background

Learners can experience difficulties to imagine what it means to master a complex skill in terms of concrete behavior using solely a text-based analytic rubric (TR).

The Viewbrics-project aims to foster learners' mental models of complex skills through the process of Formative Assessment (FA) combined with 'video enhanced rubrics with modelling examples with embedded self-explanation prompts', also called VER's.

The following research questions was examined for the complex skills of collaboration, presentation and information literacy.

- Do the mental models of complex skills benefit from VER?

Our general assumption is that both VER and TR groups have richer mental models for all three complex skills than the control group (H1). Most importantly, we assume that the VER-group has richer mental models for all three complex skills than the TR-group (H2).

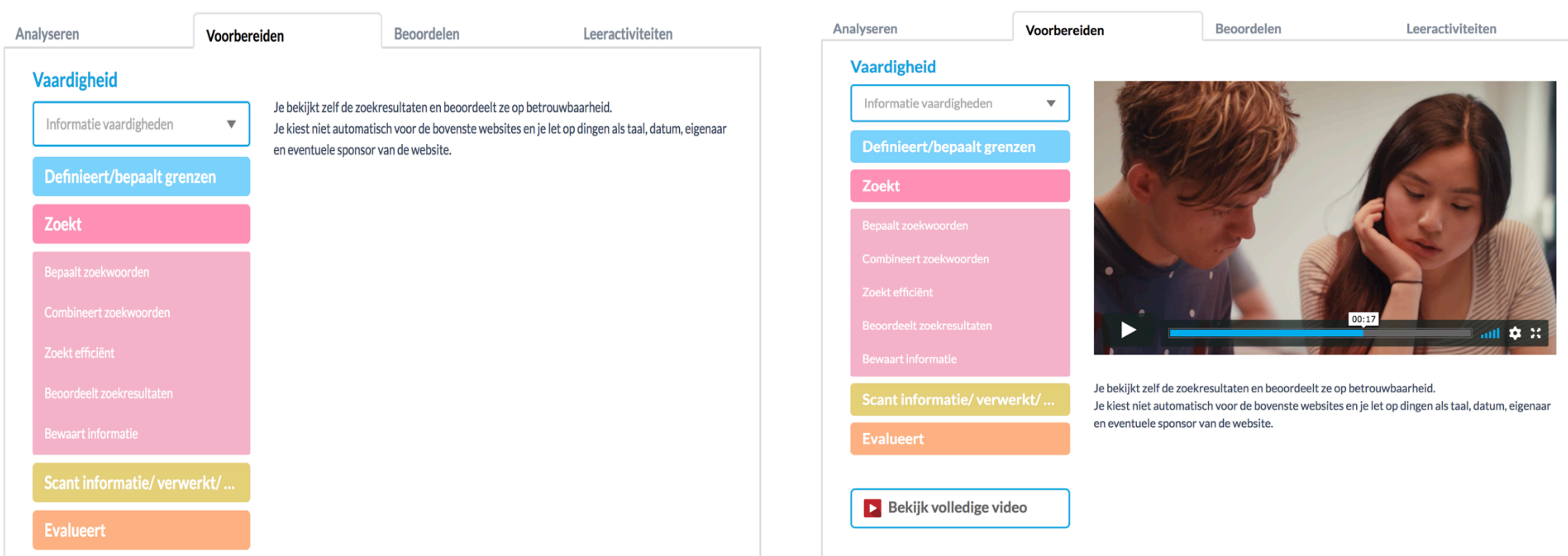


Figure 2. The image on the left illustrates the TR version of the Viewbrics-app, whereas the image on the right illustrates the VER version of the Viewbrics-app. The skill of information literacy is selected from a drop-down menu and the skill-cluster 'searching' is displaying its five constituent skills. The TR version shows textual description found in the highest level of the textual analytic rubric. Whereas the VER version shows the TR text supported with a video fragment illustrating the appropriate constituent skill.

Method

Participants

The learners (n = 153) were a convenience sample of six existing classes from two Dutch schools for pre-university education (80 female, 73 male; M = 12.48 years, SD = 0.53; range: 12-13 years).

Design

- The study was a three-group (VER, TR, control) within-subjects design (T1 = 0 weeks, T2 = 12 weeks, T3 = 24 weeks) and evaluated the effect on the growth of learners' mental models for complex skills between both experimental groups and the control group.
- The experimental groups used their specific version of the Viewbrics-App and its embedded FA (VER or TR, Figure 2). The control group used the FA methodology of their standard curriculum and did not receive the Viewbrics-App.
- The standard curriculum of all groups contained two hours of project-based education per week in which the complex skills of presentation, information literacy and collaboration were formatively assessed by their teacher. The control group continued this standard curriculum, where the VER and TR groups were given the Viewbrics-app to guide the self- and peer assessment alongside the standard curriculum.

Results

Mental model quality was measured by applying Van Beek-Sweep's (2018) scoring instrument to 1377 concept maps created by 153 learners on T0, T2 and T3 (see Table 1). This instrument allows for awarding point towards the number of concepts (width), hierarchical levels (depth) and relationships (strength) of a concept map (Figure 1). The total amount of points represents the richness of the mental model.

- In information literacy**, we found that the control condition averaged a mental model score of 3.87 points (median of the posterior distribution), TR scored 4.67 points above the control condition and the VER 11.88 points above the control condition.
- In collaboration**, we found that the control condition averaged a mental model score of 8.88 points (median of the posterior distribution), TR scored 6.74 points above the control condition and the VER 10.42 points above the control condition.
- In presentation**, we found that the control condition averaged a mental model score of 14.12 points (median of the posterior distribution), TR scored 0.11 points above the control condition and the VER 11.52 points above the control condition.

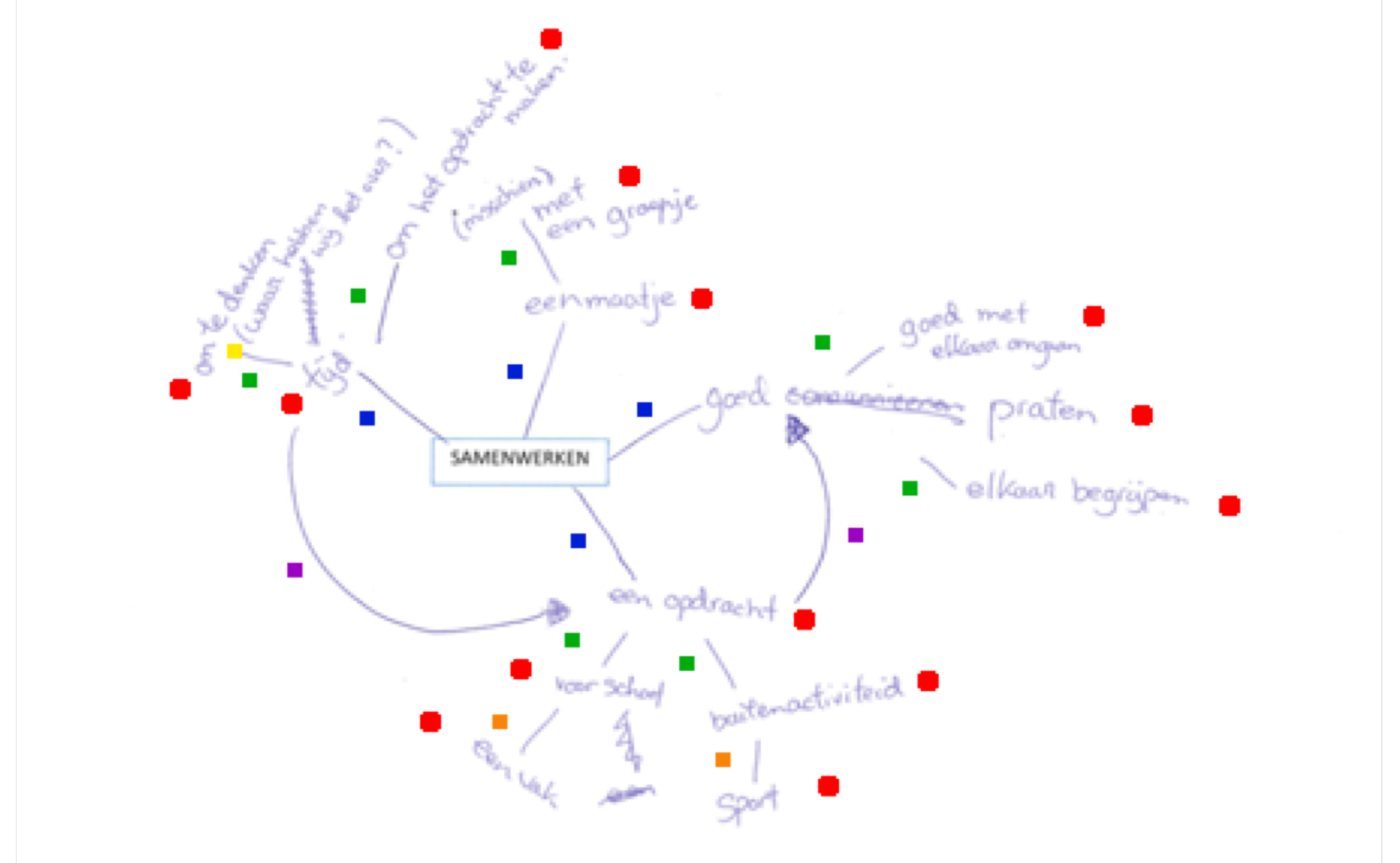


Figure 1. ● concept, ● individual statement, ● 1st hierarchic level, ● 2nd hierarchic level, ● 3rd hierarchic level, ● complex relationship.

Conclusion

A Multivariate Multilevel analysis shows that learners receiving:

- VER developed significantly richer mental models for all skills. Whereas TR developed significantly richer mental models for collaboration and information literacy skills compared to the control group (H1).
- VER developed significantly richer mental models for all three skills, when compared to both other groups (H2).

Table 1.

This table shows the growth of the (TR and VER group) mental models compared to the control group, the mental model growth of school 1 compared to school 0.

