Self-regulated learning of probability calculus through checklists of learning and task selection

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Background. Although learning-task selection is a key self-regulated learning skill, this appears difficult for many learners (Bjork et al 2013 DOI:10.1146/annurev-psych-113011-143823; Kostons et al 2012 DOI:10.1016/j.learninstruc.2011.08.004). An earlier experiment (230 bachelor students) indicated that prompting students to self-assess their performance of a probability calculus learning task they just completed and providing them with performance feedback influenced their task selection. That is, in terms of complexity and instructional support, the subsequent learning task they chose was more in line with their performance of the task just completed. We hypothesized that checklists with similar prompts would also facilitate high school students' task selection and result in better posttest performance.

Method. In three experiments (Experiment 1: n = 101; Experiment 2: n = 51; Experiment 3: n = 254; total N = 406), high school students were presented a database comprising 5 probability calculus learning tasks for each of 3 instructional support levels (high: first 3 of 4 steps worked out; low: first of 4 steps worked out; no support) for each of 5 complexity levels (i.e., 5 x 3 x 5 = 75 learning tasks) conform Kostons et al.2 Each learning task presented a problem to be solved in 4 steps and had only one correct solution. In all experiments, participants completed eight self-selected learning tasks in the condition they were randomly allocated to, and subsequently performed the same 5-item posttest (i.e., one task per complexity level without support presented in randomized order). Checklist prompts were: "In the task just completed, in how many steps [0-4] did you have to think hard?" (effort: Experiment 1); correct answers of steps in the task just completed (performance feedback: Experiment 2); heuristic advice for selection of next task (advice: Experiment 3); "Given your responses to the previous questions [task just completed], what kind of task would you choose next [I: lower/same/higher complexity; II: more/same/less support]?" (choice: Experiments 1-3). Performance feedback (treatment factor Experiment 2) was not provided in Experiment 1 but to all participants in Experiment 3.

Results. Main response variables of interest were the demand (complexity/support) of a subsequent learning task given performance of a learning task just completed (calibration) and posttest performance (score). Table 1 summarizes the outcomes of Bayesian analysis of variance (ANOVA; JASP 2016 https://jasp-stats.org/) of the treatment effects in the experiments on calibration and score, to estimate evidence against vs. in favor of a 'no difference' null hypothesis (Leppink et al 2017 DOI:10.1007/s40037-017-0332-6). The only evidence for a treatment effect is for choice in Experiment 3, and this effect is against expectations: students are more inclined to select a more demanding task (i.e., higher complexity or less support with same complexity) despite one or more errors in the task just completed with choice question (0.092, SD = 0.206) than without choice question (0.021, SD = 0.183).

Discussion. Although at the time of the conference we will have data on a longitudinal follow-up in Experiment 2, the current findings indicate that the choice question, perhaps when combined with feedback, may stimulate students to choose more challenging and sometimes too challenging learning tasks. Suggestions for future research will be discussed.