

TITLE: Interest in the Domain of Science: Impact on Expository Science Text Self-Explanation Quality

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ABSTRACT: Topic interest may induce students to more actively engage in productive learning strategies. This research demonstrated that the self-explanation quality of students with little background science knowledge or lower reading ability were significantly influenced by their general interest in the domain of science.

SUMMARY: Interest in the Domain of Science: Impact on Expository Science Text Self-Explanation Quality

Topic interest is a relatively stable evaluative orientation (e.g., increased concentration and feelings of enjoyment) toward a domain or topic (Ainley, Hidi, & Berndoff, 2002; Schiefele, 1999). It has been speculated that individuals with greater topic interest may engage “deeper” learning strategies leading to enhanced learning (e.g., Alexander, Kulikowich, & Jetton, 1994). The current study, utilizing an automated reading strategy tutoring system called iSTART (see McNamara, Levinstein, & Boonthum, 2004), explores the degree to which individuals’ interest in the domain of science (IDS) influences their self-explanation quality (SEQ).

Method

Participants

The participants were 70 students from a suburban, mid-south high school.

Design & Procedure

The experiment was a within-subjects design (pretest-posttest) which consisted of three phases – pretest, training, and posttest – implemented on three separate days.

During the *pretest*, students were administered a *Prior Knowledge of Science (PKS)* test (10 questions) and a *Reading Ability (RA)* test (Gates-MacGinitie 7/9 form K). Lastly, the students typed self-explanations for one of the two counter-balanced science texts. The iSTART algorithm (McNamara, Boonthum, Levinstein, & Millis, in press) measured the *Self-Explanation Quality (SEQ)* (with a maximum score of three). *Science text A* was a 431-word, 26-sentence passage on the flight of birds, while *Science Text B* was a 403-word, 24-sentence passage on the behavior of bees. During the *training*, students progressed through the three main sections of the iSTART program: Introduction, Demonstration, and Practice. During the *posttest*, students again typed self-explanations for the other science text.

Results

All of the correlational analyses between SEQ and IDS had reading ability (RA) and prior knowledge of science (PKS) partialled out. For the *pretest* SEQs, the stepwise multiple regressions included RA, PKS, and IDS as independent variables and *pretest* SEQ as the dependent variable. For the *posttest* SEQs, the same analyses were used with the exception that *pretest* SEQ was added as an independent variable (see Table 1 for M, SD, r, and R² values).

There was a significant increase in SEQ from pretest to posttest, $t(69)=2.12, p<.05$. The correlation between IDS and *pretest* SEQ was significant. IDS accounted for 6.2% of the variance in *pretest* SEQ. There was a significant correlation between the IDS and *posttest* SEQ. IDS did not account for any additional variance in *posttest* SEQ over that accounted for by the RA, PKS, and pretest scores.

Table 1. Pretest and posttest Self-explanation Quality (SEQ) means, correlations between SEQ and Interest in Domain of Science (IDS), and unique variance (R^2) accounted for by IDS, for all participants and with tripartite splits on participants' reading ability (RA) and prior knowledge of science (PKS).

Type	SEQ M(SD)	SEQ:IDS Correlation (r)	IDS R^2
Pretest: Overall	1.81(.60)	$r(66)=.28^*$	6.2
Posttest: Overall	1.97(.66)	$r(66)=.21^*$	<i>n.s.</i>
Pretest: RA-Low	1.41(.49)	$r(21)=.56^{**}$	28.1
Posttest: RA-Low	1.63(.59)	$r(21)=.37^*$	<i>n.s.</i>
Pretest: RA-Intermediate	1.97(.59)	$r(18)=.09$	<i>n.s.</i>
Posttest: RA-Intermediate	2.09(.71)	$r(18)=.15$	<i>n.s.</i>
Pretest: RA-High	2.09(.50)	$r(19)=.23$	<i>n.s.</i>
Posttest: RA-High	2.22(.52)	$r(19)=.09$	<i>n.s.</i>
Pretest: PKS-Low	1.45(.56)	$r(19)=.45^*$	28.4
Posttest: PKS-Low	1.48(.12)	$r(19)=.25$	<i>n.s.</i>
Pretest: PKS-Intermediate	1.97(.59)	$r(22)=.30$	<i>n.s.</i>
Posttest: PKS-Intermediate	2.23(.59)	$r(22)=.07$	<i>n.s.</i>
Pretest: PKS-High	2.00(.50)	$r(17)=.06$	<i>n.s.</i>
Posttest: PKS-High	2.17(.55)	$r(17)=.34$	<i>n.s.</i>

Notes: * $p < .05$; ** $p < .01$.

Reading Ability

Student reading ability (RA) was examined via a tripartite split with students categorized according to their score on the *Gates-MacGinitie* Reading test (low = 0-26, intermediate = 27-34, high = 35-48).

Low Reading Ability. There was a significant increase in SEQ from pretest to posttest, $t(24)=2.33$, $p < .05$. The correlation between IDS and *pretest* SEQ was significant. IDS accounted for 28.1% of the variance in *pretest* SEQ. The correlation between IDS and *posttest* SEQ was significant. IDS did not account for any additional variance in *posttest* SEQ over that accounted for by the RA, PKS, and pretest scores.

Intermediate Reading Ability. There was no significant increase in SEQ from pretest to posttest. There were no significant correlations between IDS and *pretest* or *posttest* SEQ. IDS did not account for any additional variance for *pretest* or *posttest* SEQ.

High Reading Ability. There was no significant increase in SEQ from pretest to posttest. There were no significant correlations between IDS and *pretest* or *posttest* SEQ. IDS did not account for any additional variance for *pretest* or *posttest* SEQ.

Prior Knowledge of Science

Student prior knowledge of science (PKS) was examined via a tripartite split with students categorized according to their score on the PKS test (low = 0-51%, intermediate = 52-69%, high = 70-100%).

Low Prior Knowledge of Science. There was no significant increase in SEQ from pretest to posttest. The correlation between IDS and *pretest* SEQ was significant. IDS accounted for 28.4% of the variance in *pretest* SEQ. There was no significant correlation between IDS and *posttest* SEQ. IDS did not account for any additional variance in *posttest* SEQ over that accounted for by RA, PKS, and pretest scores.

Intermediate Prior Knowledge of Science. There was a significant increase in SEQ from pretest to posttest, $t(25)=2.30$, $p < .05$. There was a moderately significant correlation between IDS and *pretest* SEQ. IDS did not account for any additional variance in *pretest* SEQ. There was no significant correlation between IDS and *posttest* SEQ. IDS did not account for any additional variance in *posttest* SEQ.

High Prior Knowledge of Science. There was no significant increase in SEQ from pretest to posttest. The correlation between IDS and *pretest* SEQ was not significant. IDS did not account for any additional variance in *pretest* SEQ. The correlation between IDS and *posttest* SEQ was marginally significant. IDS did not account for any additional variance in *posttest* SEQ.

Discussion

This work provides evidence for the importance that interest in the domain of science can play in students' quality of self-explanations generated while reading expository science texts. This phenomenon was particularly pronounced for individuals with *low reading ability* or *low knowledge of science*. It is important to note that after iSTART self-explanation training, the SEQ for these students had significantly improved and was no longer as dependent upon their interest in science.

References

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