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AUTHOR   Horn, Christy A.; And Others
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ABSTRACT
        A study examined how specific developmental levels of
cognitive ability affect the relationship between beliefs and
performance; how cognitive development levels affect reading and
writing performance; and how developmental level affects the
interactions between the reading and writing domains. Subjects, 150
undergraduates between the ages of 18 and 23, were measured for
cognitive developmental level, self-efficacy, causal attribution for
reading and writing success and failure, outcome expectancy, locus of
control, and reading and writing performance. Results indicated
differences between developmental classification (concrete,
transitional, formal) in the relationships between beliefs and
reading or writing performance, and indicated changes in the
regression models and the pattern of correlations between beliefs and
reading or writing at the developmental level. Results further
indicated differences between developmental classification in
performance in reading and writing, and the relationship between
reading and writing. Findings suggest that the specific cognitive
skills represented by formal operational thinking influence both the
magnitude of performance and beliefs and the structure of reading,
writing, and belief relationships. (MM)

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EFFECTS OF COGNITIVE DEVELOPMENT LEVEL ON THE RELATIONSHIPS BETWEEN

SELF-EFFICACY, CAUSAL ATTRIBUTION, AND OUTCOME EXPECTANCY AND

PERFORMANCE IN READING AND WRITING

Christy A. Horn

Duane F. Shell

M.T.H. Benkofske

University of Nebraska-Lincoln

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Effects of Cognitive Development Level On the Relationships Between

Self-Efficacy, Causal Attribution, and Outcome Expectancy and

Performance in Reading and Writing

Previous research has found that self-efficacy for reading and

writing, causal attributions for success and failure in reading and

writing, and outcome expectancies concerning the importance of reading

and writing for achieving goals are significantly related to reading and

writing performance (Bruning, Shell, & Murphy, 1987; Hiebert, Winograd,

& Danner, 1984; McCarthy, Meier, & Rinderer, 1985; Nicholls, 1979; Paris

& Oka, 1986; Shell, Murphy, & Bruning, 1989). Additionally, this

research has found that beliefs and performance for reading and writing

are canonically related through a single unde lying structure and that

the strengths of the belief – performance relationships and the

structure of the canonical relationship change across grade levels from

elementary school to college. This previous research has established

that the belief-performance relationship and the inter-relationships

between reading and writing undergo developm ntal change. The nature of

this change, however, has been examined only in respect to grade level

differences. Examination of the effects of developmental change in

specific cognitive processes has not been done.

The Piagetian model of cognitive development provides a framework

for examining how specific change in cognitive ability affects these

previously identified belief-performance relationships in reading and

writing. Additionally, within the Piagetian framework, cognitive level

has been found to be related to actual performance skill in writing and

reading; thus, cognitive developmental level may itself directly mediate

reading and writing performance. The purposes of this research project

were to (1) examine how specific developmental levels of cognitive ability affect the relationship between beliefs and performance, (2) examine how cognitive development levels affect reading and writing performance, and (c) examine how developmental level affects the interactions between the reading ar ' writing domains.

Method

Subjects were 150 undergraduate college students (Male = 29; Female = 121) between the ages of 18-23.

Measures

Cognitive developmental level was assessed using the Test of Logica! Thinking (TOLT). This test provides a score indicating which of three levels of cognitive development (concrete operations, transition, formal operations) the person has attained.

Self-efficacy was assessed by having subjects indicate their confidence on a scale of 0-100 for performing reading and writing tasks. The reading instrument contained two subscales: (a) reading and understanding 17 reading tasks (e.g., a novel, an introductory text book), and (b) performing 9 reading sub-skills (e.g., recognize parts of speech). The writing instrument contained two subscales: (a) completing 16 writing tasks (e.g., write a 15 page term paper), and (b) performing 8 writing sub-skills (e.g., correctly use parts of speech). Self-efficacy scores were computed by calculating subscale mean scores resulting in two self-efficacy scores each for reading and writing.

Causal Attribution for reading and writing success and failure was measured using a semantic differential scale. Separate scales were used for reading and writing and for success and failure attribution. On each scale, subjects were asked to choose which of two causes was more

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important and indicate the degree of difference. For each scale, scores
for the seven causes assessed were created by summing the pairwise
scores for each cause.

Outcome Expectancy was assessed by having subjects rate on a 7-
point Likert scale the importance of reading and writing for achieving
15 life goals. Outcome expectancy scores for reading and writing were
created by calculating the mean score of the 15 items in each scale.

Locus of Control was measured with the Rotter Internal-External
Locus of Control Scale.

Reading performance was measured with the Degrees of Reading Power
test (DRP). This test provides a single score indicating level of
reading comprehension.

Writing performance was assessed using a holistically/analytically
scored writing sample with assessment of conventions, syntactic
maturity, style, and organization. Subjects were asked to write a
concise, organized essay explaining all the qualities and
characteristics of an excellent teacher.

Results and Discussion

Results, summarized in Tables 1 - 4, indicated differences between
developmental classification (concrete, transitional, formal) in (a) the
relationships between beliefs and reading or writing performance,
indicated by changes in the regression models (Table 1) and changes in
the pattern of correlations between beliefs and reading or writing
(Table 3) at each developmental level; (b) performance in reading and
writing (Table 2); and (c) the relationship between reading and writing
(Table 2). These findings suggest that the specific cognitive skills
represented by formal operational thinking influence both the magnitude

of performance and beliefs and the structure of reading, writing, and

belief relationships.

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Table 1
Regression Models

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change

Total Sample

Reading (N = 150)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Reading Component Efficacy	.446	.199	.199	36.84**
2	Writing Success Teacher (N)	.493	.243	.044	8.47**
3	Reading Success Ability (N)	.526	.277	.034	6.87**
4	Reading Success Skill	.555	.308	.031	6.46*
5	Writing Success Effort (N)	.575	.330	.022	4.79*
6	Reading Success Effort	.595	.354	.024	5.26*
7	Writing Success Skill	.610	.372	.018	4.10*

Writing (N = 148)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Writing Component Efficacy	.301	.091	.091	14.56**

Concrete Operations Group

Reading (N = 58)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Reading Component Efficacy	.626	.392	.392	36.09**
2	Writing Success Effort (N)	.707	.500	.108	11.84**

Writing (N = 57)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Writing Component Efficacy	.367	.134	.134	8.51**
2	Writing Failure Task Difficulty	.457	.209	.075	5.11*

Transition Group

Reading (N = 64)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Writing Success Teacher (N)	.397	.158	.158	11.62**
2	Writing Success Luck (N)	.486	.236	.078	6.23*

Writing (N = 63)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Writing Failure Teacher (N)	.301	.090	.090	6.06*

Formal Operations Group

Reading (N = 27)

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
1	Writing Success Luck (N)	.782	.612	.612	39.39**
2	Reading Component Efficacy	.875	.766	.154	15.75**
3	Reading Failure Skill	.914	.835	.070	9.71**
4	Writing Success Ability	.934	.872	.037	6.31*
5	Writing Failure Task Difficulty	.949	.898	.026	5.41*

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
Writing (N = 27)					
1	Writing Componert Efficacy	.534	.285	.285	9.99**
2	Writing Success Luck (N)	.765	.585	.299	17.31**
3	Writing Task Efficacy	.815	.664	.079	5.44*
4	Writing Failure Effort (N)	.876	.768	.104	9.84**
5	Writing Success Enjoyment (N)	.902	.813	.045	5.12*

Note. N = Negative Correlation.

$*p < .05$. $**p < .01$.

Table 2
Means and Correlations Between Reading and Writing
by Logical Thinking Classification

Reading Mean

Total Sample	Concrete	Transitional	Formal
55.59	51.50	57.31	60.52

Writing Mean

Total Sample	Concrete	Transitional	Formal
14.60	14.33	14.73	14.89

Reading – Writing Correlation

Total Sample	Concrete	Transitional	Formal
.40	.28	.42	.65

Table 3
Means and Correlations By Logical Thinking Classification

| | Mean | | | Correlation | | | | | |
| | | | | Reading | | | Writing | | |
Variable	Conc.	Trans.	Formal	C	T	F	C	T	F
Locus of Control	12.10	12.61	9.70	-.01	-.06	.02	-.07	.20	-.19

Reading

Variable	Conc.	Trans.	Formal	C	T	F	C	T	F
Task Efficacy	83.78	63.64	84.74	.42	.30	.19	.29	.20	.30
Component Efficacy	86.77	89.54	89.80	.63	.10	.36	.20	.12	.42
Outcome Expectancy	5.13	5.35	5.00	.15	.04	.00	.13	-.02	.12
Success Ability	8.50	7.31	7.59	-.30	-.08	.19	-.10	-.11	.11
Success Skill	6.81	7.16	7.93	.11	.04	.34	.13	-.06	.14
Success Effort	9.16	9.22	10.82	-.11	.11	.33	-.07	.10	.03
Success Enjoyment	8.40	8.69	9.22	-.14	.11	.00	.01	.00	-.25
Success Task	5.29	5.55	4.56	-.01	-.09	.04	.10	.09	-.02
Success Luck	.29	.34	.19	-.33	-.11	-.35	-.18	.05	-.43
Success Teacher	6.03	5.27	3.63	-.02	-.27	.34	.20	-.01	.32
Failure Ability	6.85	6.36	6.63	-.04	.12	.36	.06	.16	.39
Failure Skill	6.67	6.42	6.52	-.18	-.01	.49	.09	.07	.24
Failure Effort	8.52	9.11	10.52	.10	.01	.44	.12	.18	.06
Failure Enjoyment	6.50	7.81	7.56	-.06	.01	.01	.03	-.03	-.25
Failure Task	7.03	6.45	5.93	-.15	-.08	-.21	.08	-.12	-.12
Failure Luck	4.35	2.39	2.37	-.11	-.09	-.17	-.16	-.02	-.10
Failure Teacher	6.91	6.27	4.59	-.08	-.23	-.29	.05	-.14	-.23

Writing

Variable	Conc.	Trans.	Formal	C	T	F	C	T	F
Task Efficacy	73.71	77.88	78.61	.39	.12	.14	.34	.13	.11
Component Efficacy	81.60	86.87	86.73	.57	.09	.34	.37	.07	.53
Outcome Expectancy	4.95	5.24	4.82	.23	.05	-.07	.18	.04	-.13
Success Ability	9.00	8.55	8.93	-.10	-.10	.11	-.07	-.13	.18
Success Skill	7.72	8.23	9.04	.06	.11	.04	.04	-.08	-.04
Success Effort	10.33	9.73	9.74	-.38	.16	.26	-.23	.04	.02
Success Enjoyment	6.59	7.75	7.78	-.08	-.16	.26	.07	-.17	-.05
Success Task	4.90	5.41	4.48	-.29	-.15	.20	-.06	-.16	.14
Success Luck	.55	.42	.30	.06	-.30	-.78	.09	-.05	-.52
Success Teacher	5.93	4.94	3.67	-.12	-.39	.25	.10	-.05	.05
Failure Ability	7.35	7.34	7.74	-.03	-.07	.22	.12	-.19	.28
Failure Skill	6.69	6.81	8.15	.04	.05	.35	-.04	.24	.24
Failure Effort	8.31	8.80	10.00	-.01	.11	.21	.06	.02	-.03
Failure Enjoyment	6.03	7.09	6.19	-.19	-.02	.30	.01	-.13	.19
Failure Task	5.93	6.45	5.93	-.01	-.07	-.15	.28	-.25	.07
Failure Luck	4.79	2.22	2.48	-.05	-.05	-.14	-.12	-.08	.02
Failure Teacher	5.97	5.61	5.59	-.08	-.18	-.35	.14	-.30	-.20

Table 4
Correlations Between Original Variables and The First Canonical Variate

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Variable	Correlation
Dependent	
Reading Comprehension (DRP)	.96
Writing Conventions	.23
Writing Syntactic Maturity	.35
Writing Style	.26
Writing Organization	.54
Independent	
Reading	
Task Efficacy	.47
Component Efficacy	.56
Outcome Expectancy	.10
Success Ability	-.27
Success Skill	.18
Success Effort	.08
Success Enjoyment	.03
Success Task Difficulty	-.03
Success Luck	-.22
Success Teacher Practices	-.17
Failure Ability	.09
Failure Skill	-.03
Failure Effort	.22
Failure Enjoyment	.02
Failure Task Difficulty	-.19
Failure Luck	-.23
Failure Teacher Practices	-.27
Writing	
Task Efficacy	.46
Component Efficacy	.56
Outcome Expectancy	.17
Success Ability	-.09
Success Skill	.14
Success Effort	-.19
Success Enjoyment	-.03
Success Task Difficulty	-.24
Success Luck	-.17
Success Teacher Practices	-.32
Failure Ability	.03
Failure Skill	.19
Failure Effort	.15
Failure Enjoyment	-.07
Failure Task Difficulty	.00
Failure Luck	-.19
Failure Teacher Practices	-.22
TOLT	.63
Locus of Control (External Direction)	-.11