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Self-Efficacy, Attribution, and Outcome Expectancy Mechanisms in Reading and Writing Achievement: Grade-Level and Achievement-Level Differences

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This study examined grade- and achievement-level differences in 4th-, 7th-, and 10th-grade students' control-related beliefs and relations between students' beliefs and their reading and writing achievement. MANOVA results indicated grade- and achievement-level differences in self-efficacy, causal attribution, and outcome expectancy beliefs but no interaction between grade and achievement level. Canonical correlations identified a single dimension linking students' beliefs to achievement in both reading and writing. Quadratic relations to achievement were found for outcome expectancy and intelligence attributions. As grade increased, beliefs for reading were more highly related to comprehension skill relative to component skills, whereas beliefs for writing were more highly related to component skills relative to communication skills. At all achievement levels, a similar pattern of beliefs was related to achievement.

People's beliefs about their abilities to exercise personal control of important events in their lives are thought to play a major role in motivating the self-regulation of cognitive performance and learning (see Bandura, 1986; Schunk, 1991; Weiner, 1985; Zimmerman, 1989). Three particular control-related beliefs have received extensive theoretical formulation and empirical examination: (a) self-efficacy (Bandura, 1986; Schunk, 1991; Zimmerman, 1989), defined as confidence in one's capability for organizing and implementing the cognitive, behavioral, or social skills necessary for successful performance of a task; (b) causal attributions (Weiner, 1985), defined as one's judgments about the causality of success or failure in achievement situations; and (c) outcome expectancy (Bandura, 1986; Schunk, 1991), defined as beliefs about the contingencies between one's successful task performance and possible outcomes or the expectation that a behavior will result in particular outcomes. These beliefs are thought to play a foundational role in motivating behavior for tasks that require high levels of personal self-initiation and active self-regulation (see Bandura, 1986; Schunk, 1991; Zimmerman, 1989).

A growing body of research has shown that self-efficacy, causal attributions, and outcome expectancy are related to reading and writing achievement (Ehrlich, Kurtz-Costes, & Loridant, 1993; McCarthy, Meier, & Rinderer, 1985; Paris & Oka, 1986; Schunk & Rice, 1991; Schunk & Swartz, 1993; Shell, Murphy, & Bruning, 1989; Wagner, Spratt, Gal, & Paris, 1989). These relations, however, are affected by developmental and achievement-level differences in beliefs.

Previous studies have found that self-efficacy, causal attribution, and outcome expectancy beliefs undergo developmental change (Bandura, 1986; Hiebert, Winograd, & Danner, 1984; Paris & Oka, 1986; Schunk, 1991; Stipek, 1993; Weiner, 1985). Young children commonly (a) have inaccurate perceptions of causality (e.g., Stipek, 1993; Weiner, 1985), (b) overestimate the contingency between their behaviors and outcomes (Stipek, 1993), and (c) overstate their self-efficacy or ability (Paris & Oka, 1986; Stipek, 1993). Also, as children age, their beliefs increase in accuracy (Paris & Oka, 1986; Stipek, 1993). A particularly salient change in causal attributions has been identified. Young children tend to equate effort and ability as causes, whereas older children tend to see effort and ability as inversely related (e.g., Stipek, 1993; Weiner, 1985). As a result, young children tend to attribute success to effort more than do older children (Stipek, 1993).

In addition to developmental changes in beliefs themselves, developmental changes in the relations between beliefs and achievement have been identified. As children age, their beliefs become more highly related to achievement (Paris & Oka, 1986; Stipek, 1993; Wagner et al., 1989). Also, with increasing age, there are changes in the relations between specific beliefs and achievement. In particular, for older children, self-efficacy or perceptions of ability and achievement are more highly related to achievement (Bandura, 1986; Paris & Oka, 1986; Stipek, 1993), and attribu-

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tion of success to ability is more highly related to achievement relative to attribution to effort (Stipek, 1993).

Along with developmental differences, numerous studies have found differences between the self-efficacy, causal attribution, and outcome expectancy beliefs of high achievers and low achievers (Bandura, 1986; Ehrlich et al., 1993; Hiebert et al., 1984; Paris & Oka, 1986; Schunk, 1991; Stipek, 1993; Weiner, 1985). Compared with low achievers, high achievers tend to (a) have higher self-efficacy, (b) attribute causality for success more to internal causes (ability or effort) relative to external causes (luck, task difficulty, or help), and (c) have higher outcome expectancy (e.g., Bandura, 1986; Schunk, 1991; Stipek, 1993; Weiner, 1985). Also, beliefs have been found to be more strongly related to achievement for high achievers than for low achievers (e.g., Bandura, 1986; Ehrlich et al., 1993; Paris & Oka, 1986; Stipek, 1993).

Although both developmental and achievement-level differences in beliefs have been studied, the interaction between development and achievement has not been extensively examined. Because increased achievement is often associated with increasing age, particularly for subjects studied in school, achievement-related differences potentially could be an artifact of developmental differences. Conversely, developmental differences could be an artifact of increased competency as knowledge and skills are mastered. Studies have found independent effects for development and achievement on beliefs, however, suggesting that differences related to development are distinct from those related to achievement (e.g., Hiebert et al., 1984; Paris & Oka, 1986). Even if development and achievement have independent effects on beliefs, they still may interact. Hiebert et al. (1984) found that high-achieving third graders were more similar in causal attribution patterns to sixth graders than to their low-achieving peers, and Paris and Oka (1986) identified different regression equations for students of different ability levels across grade levels. These findings suggest possible interactions between development and achievement; however, there has been little direct empirical examination of possible interactions.

Previous studies (Ehrlich et al., 1993; Hiebert et al., 1984; Paris & Oka, 1986; Wagner et al., 1989) have examined primarily elementary and middle school children. Thus, there is only limited knowledge about how beliefs for reading continue to develop through high school and how achievement-level differences might interact with developmental differences in the higher grades. Also, few studies (e.g., Schunk & Swartz, 1993) have examined children's beliefs about writing. As a result, developmental or achievement-level differences in children's beliefs about writing have not been systematically examined. Studies examining adult, skilled participants have found that beliefs are less strongly related to achievement for writing than for reading (McCarthy et al., 1985; Shell et al., 1989); however, how this difference in the strength of the relations for reading and writing develops and whether this difference also occurs for persons at other achievement levels presently are not known.

Two factors that potentially affect the understanding of developmental and achievement-level differences in the relations between beliefs and achievement for reading and writing were identified by Shell et al. (1989). First, they found that for adult, skilled participants, there was a single canonical dimension linking beliefs to reading and writing achievement. This indicated generalized, reciprocal relations between beliefs and achievement across the two domains. Shell et al.'s findings are consistent with studies showing that reading and writing component skills are reciprocally related and exert generalized influences on each other's development (e.g., Shanahan, 1984; Shanahan & Lomax, 1986). These generalized, reciprocal relations across the two domains potentially could influence the development of the relations between beliefs and reading and writing achievement. Also, they could be different for children at different levels of achievement. No studies, however, have examined generalized relations across the two domains with children at different ages or with persons at different levels of achievement.

Second, Shell et al. (1989) found that for adult, skilled readers and writers, outcome expectancy had a quadratic curvilinear relation to reading and writing achievement. When curvilinearity is present, an exclusively linear model underestimates correlations. Therefore, if curvilinearity also exists in the relations between beliefs and achievement for children at different ages and achievement levels, previous studies that examined only linear relations (e.g., Ehrlich et al., 1993; Paris & Oka, 1986; Wagner et al., 1989) may have drawn inaccurate conclusions about the comparative strengths of the relations between self-efficacy, causal attributions, and outcome expectancy and reading or writing achievement. No examinations of curvilinearity, however, have been done with children of different ages or achievement levels.

A final consideration for understanding developmental and achievement-level differences is the multifaceted nature of reading and writing. Previous studies have tended to examine the relations between beliefs and single indicators of achievement, usually reflecting reading comprehension or overall writing quality (e.g., Ehrlich et al., 1993; Hiebert et al., 1984; McCarthy et al., 1985; Paris & Oka, 1986; Shell et al., 1989; Wagner et al., 1989). Reading and writing, however, involve multiple component skills (e.g., Shanahan, 1984; Shanahan & Lomax, 1986). For these different component skills, the relations between beliefs and achievement may be different across different grades and at different levels of achievement. Studies using a multivariate framework to examine the relations between beliefs and multiple component skills, however, have not been done.

The purpose of the present study was to examine the nature of grade-level and achievement-level differences in self-efficacy, causal attribution, and outcome expectancy beliefs for reading and writing and the relations between these beliefs and achievement in reading and writing. Specifically, we sought to clarify and extend the existing research literature by (a) examining students over a broader range of grades from elementary school through high school than has previously been studied, (b) testing for interactions between grade level and achievement, (c) examining beliefs

and achievement for both reading and writing to determine the cross-domain generality of beliefs and to identify any underlying dimensionality present in the relations between beliefs and achievement across grade and achievement levels, (d) testing for the presence of curvilinearity in the relations between beliefs and achievement, and (e) conducting the study using a multivariate approach.

Method

Participants

Participants were 364 students (155 boys, 193 girls, and 16 of unknown sex) from a midwestern public school system who volunteered to participate with the approval of their parents or guardians. The sample consisted of 105 fourth graders (43 boys, 59 girls, and 3 of unknown sex), 111 seventh graders (43 boys, 63 girls, and 5 of unknown sex), and 148 tenth graders (69 boys, 71 girls, and 8 of unknown sex). The students were predominantly White and from middle-class families, although students from families at all levels of socioeconomic status participated in the study.

Measurement of Belief Variables

Self-efficacy. The self-efficacy instruments for reading and for writing were adapted from the instruments reported in Shell et al. (1989) that were used with a college-age population. Each instrument contained two subscales: (a) a task subscale consisting of reading or writing tasks of varying difficulty and (b) a skill subscale consisting of component skills involved in reading or writing. The reading and writing tasks used were consistent with those used by Shell et al. but were adapted to better reflect the common types of reading and writing done by students in the grades studied. Also, because of concerns about possible fatigue and loss of attention during administration, particularly for fourth-grade students, the instruments were shortened.

For the reading task subscale, students were provided with the following five tasks: (a) "read a letter from a friend," (b) "read one of your textbooks," (c) "read the daily newspaper," (d) "read a book from the library," and (e) "read a magazine like *Newsweek*." For the reading skill subscale, students were provided with the following four component skills: (a) "know all the words on a page in one of your school books," (b) "know the meaning of plurals, prefixes, and suffixes," (c) "identify parts of speech," and (d) "understand the main idea of a story." For the writing task subscale, students were provided with the following five tasks: (a) "write down the rules for a game you like," (b) "write a letter to a friend," (c) "write a 2-page report for a class," (d) "write a 1-page summary of a book you read," and (e) "write a story about what you did on summer vacation." For the writing skill subscale, students were provided with the following four component skills: (a) "correctly punctuate a sentence," (b) "use correct parts of speech in your writing," (c) "use correct plurals, prefixes, and suffixes in your writing," and (d) "get your point across in your writing."

Because the subjective probability scale used by Shell et al. (1989) was considered to be too developmentally advanced for the students examined, particularly the 4th and 7th graders, a simpler response scale was developed and used in all grades. Students were asked to indicate how sure they were that they could do each task or component skill on a 5-point scale as follows: 1 (*I'm sure I can't*), 2 (*don't think I can*), 3 (*maybe I can*), 4 (*pretty sure I can*), and 5 (*I'm sure I can*). Self-efficacy scores were computed by calculating the mean scores for the items in each subscale. Coefficient alpha reliability estimates for the self-efficacy scales were .72 for the reading task subscale, .62 for the reading skill subscale, .69 for the writing task subscale, and .76 for the writing skill subscale.

Outcome expectancy. The outcome expectancy instruments for reading and for writing were adapted from the instruments reported in Shell et al. (1989). In separate instruments, students were asked to rate the importance of reading and writing for achieving six goals on a 5-point scale as follows: 1 (*not important at all*), 2 (*not very important*), 3 (*kind of important*), 4 (*pretty important*), and 5 (*very important*). Outcome expectancy scores were computed by calculating mean scores for each instrument. Five goals were the same for both instruments: (a) "getting a job when you are an adult," (b) "having a lot of friends," (c) "getting along with your parents," (d) "doing good in school," and (e) "going to college." The sixth goal for the reading instrument was "learning new things." The sixth goal for the writing instrument was "telling people things you know." Coefficient alpha reliability estimates for the outcome expectancy instruments were .50 for the reading instrument and .56 for the writing instrument.[1]

Causal attributions. Students' beliefs about the causality of success were assessed in separate instruments for reading and writing. In each, students were asked to rate the importance of six different causes (effort, ability defined as general intelligence, enjoyment, luck, task difficulty, and teacher help) for being a good reader or writer on a 5-point scale as follows: 1 (*not important at all*), 2 (*not very important*), 3 (*kind of important*), 4 (*pretty important*), and 5 (*very important*). Each rating score was used individually in the analyses, resulting in 12 causal attribution scores, 6 for reading and 6 for writing.

Measurement of Reading and Writing Achievement

California Achievement Test scores. Students' scores on the California Achievement Test (CAT; Forms C and D) were used as measures of reading and writing achievement. CAT standard scores were used for all measures. These scores are standardized on a continuous scale across all levels of the CAT, allowing direct comparison of scores from tests at different grade levels. Scores were obtained for Reading Comprehension, Reading Vocabulary, Language Mechanics, Language Expression, and Spelling.

Two of the CAT tests measure components of reading. The Reading Comprehension test measures three categories of comprehension: (a) literal comprehension (recall of facts), (b) interpretive comprehension (inferred meaning, character analysis, and figurative language), and (c) critical comprehension (author attitude or position and techniques of persuasion). The Reading Vocabulary test measures understanding of words with similar meanings, words with opposite meanings, and words with multiple meanings.

Three of the CAT tests measure components of writing. The Language Mechanics test measures such skills as capitalization, adjective use, and punctuation. The Language Expression test measures students' skills related to written expression in the areas

[1] Although low, the coefficient alpha measure may have underestimated the reliability for the outcome expectancy scales because of the short scale length of six items and ceiling effects on the items "going to college" in both scales and "learning new things" in the reading scale. We remind readers that low reliability lowers power (Pedhazur, 1982); therefore, low reliabilities on these measures may have resulted in a failure to identify significant effects but could not have caused spurious effects to be found.

of (a) word usage, (b) sentence structure, and (c) paragraph organization. Although the test is designed to assess application of writing knowledge, no writing is done on the test. The Spelling test measures spelling using the phoneme–grapheme–morpheme approach.

Holistic writing score. Because the CAT does not contain a test where actual writing is done, a writing essay was used to obtain a performance-based measure of writing. For the essay, students were asked to complete the following writing task:

> Write two paragraphs describing your favorite TV program. In the first paragraph, name the program and write about who is in it, what they do in the program, and why they do the things that they do. In the second paragraph, write about why you like the show and why someone else would enjoy watching it.

Students were allowed as much time as they needed to complete the essay.

The writing essays were independently scored by one of the researchers and a second rater using the holistic scoring method described by Shell et al. (1989). The raters were unaware of each other's rating scores or students' identities, grade levels, or scores on other measures. Raters assigned subscores for the following five categories: realization, clarity, organization, quantity–density, and mechanics. Because Shell et al. (1989) reported range limitations with their 4-point scale, each subscore category was rated from 0 to 20. The five subscores were then summed, resulting in a total score ranging from 0 to 100. The final holistic writing score was computed as the mean score of the two raters. To facilitate comparison with the CAT standard scores, the holistic score was converted to a standard score with a mean of 500 and a standard deviation of 100.

Interrater reliability was assessed by correlating the scores of the two raters. A Pearson product–moment correlation of .74 was obtained between the scores of the two raters. This reliability estimate was consistent with the interrater reliability obtained by Shell et al. (1989) and was within the range of reliability estimates commonly obtained for holistic scoring reliabilities (.68 to .89) when adequate statistical methods are used, as reported by White (1985). Because the mean score of the two raters was used for analysis, the correlation between the raters is equivalent to a split-half estimate of the reliability of the mean rating. Using the Spearman-Brown formula, we estimated the reliability of the mean holistic score to be .85.

Achievement-Level Groups

Using a composite literacy score created by calculating the mean of the six reading and writing achievement scores, students were assigned to high-, average-, and low-achievement groups within their respective grades on the basis of cutoff scores at approximately the 70th and 30th percentiles. The actual separations for each grade were made near the cutoff scores at points where there were relatively large differences between consecutive scores. The resulting achievement groups were as follows: high achievement (n = 104; 38 boys, 62 girls, and 4 of unknown sex; 30 in Grade 4, 32 in Grade 7, and 42 in Grade 10); average achievement (n = 156; 64 boys, 85 girls, and 7 of unknown sex; 46 in Grade 4, 47 in Grade 7, and 63 in Grade 10); and low achievement (n = 104; 53 boys, 46 girls, and 5 of unknown sex; 29 in Grade 4, 32 in Grade 7, and 43 in Grade 10).

Procedures

Students were administered the instruments for self-efficacy, causal attribution, and outcome expectancy, and the writing task during their first (fall) semester of 4th, 7th, or 10th grade for the respective samples. For the 4th-grade sample, data were collected in the students' regular classrooms, and, for the 7th- and 10th-grade samples, data were collected in either the students' homeroom or study hall classrooms. Data collection was done by the classroom or homeroom teachers or by one of the researchers. The belief instruments were administered first and were followed by the writing task. Scores from the most recent administration of the CAT were obtained from school records.

Data Analysis

We conducted multivariate analyses of variance (MANOVA) analyses and canonical correlation analyses using the MANOVA procedure of SPSSPC, Version 3.1 (Norusis, 1988). Because gender differences in the beliefs studied have been identified in some studies but not others (e.g., Stipek, 1993; Wagner et al., 1989), a preliminary 3 × 3 × 2 (Grade × Achievement Level × Gender) MANOVA was conducted to determine whether there were gender differences that interacted with any other effect. The MANOVA revealed no significant interactions between gender and the other effects, although there was a significant gender main effect, Wilks's Λ = .86, Rao's $F(18, 313) = 2.93$, $p < .001$. Because gender did not interact with grade or achievement level, gender was collapsed across the other effects in all analyses.

Results

Means and standard deviations for the reading and writing achievement variables are provided in Table 1. MANOVA analyses with pairwise follow-up tests (as described by Levin, Serlin, & Seaman, 1994, and explained further in the next section) confirmed that all of these variables were significantly different for all pairs of grades and all pairs of achievement levels.

Analysis of Differences in Beliefs

Means and standard deviations for the belief variables are provided in Table 2. To examine grade-level and achievement-level effects on beliefs and to determine whether grade level and achievement level interacted, we conducted a 3 × 3 (Grade × Achievement Level) MANOVA with an alpha level of .05. Significant main effects were found for grade, Wilks's Λ = .56, Rao's $F(36, 676) = 6.37$, $p < .001$, and achievement level, Wilks's Λ = .71, Rao's $F(36, 676) = 3.59$, $p < .001$. The interaction effect was not significant, Wilks's Λ = .81, Rao's $F(72, 1331) = 1.02$, $p = .43$. These results indicated that there were (a) differences among 4th, 7th, and 10th graders that were consistent across ability levels and (b) differences among high, average, and low achievers that were consistent across grade.

To examine the significant main effects, we used follow-up tests based on Fisher's least significant difference procedure with a familywise alpha of .05 (see Levin et al., 1994). For the significant main effects for grade and achievement level, we determined which groups were significantly different by conducting pairwise multivariate Ho-

Table 1
Means and Standard Deviations for Reading and Writing Achievement Variables

Variable	All	Grade			Achievement		
		10th	7th	4th	High	Average	Low
Reading							
Comprehension							
M	573	648	575	465	623	576	520
SD	94	65	59	35	102	80	74
Vocabulary							
M	551	629	544	449	595	554	503
SD	92	71	47	31	105	78	74
Writing							
Writing score							
M	500	566	490	418	568	498	435
SD	100	84	87	62	94	86	80
Language mechanics							
M	586	641	591	501	638	581	540
SD	81	67	53	43	87	64	65
Language expression							
M	571	617	582	495	617	576	518
SD	74	61	53	42	73	63	54
Spelling							
M	576	634	576	494	636	571	524
SD	87	72	65	56	86	73	71

telling's T^2 tests with an alpha of .05. For each significant pairwise multivariate difference, we determined which individual variables contributed to the difference by conducting univariate t tests using a Bonferroni adjustment to control familywise alpha at .05 (see Table 2 for the exact Bonferroni p values). We conducted t tests on only those variables that had pairwise effect sizes (d) of .25 or larger. This was done because we wished both to reduce the number of comparisons done and to examine only those differences that were likely to have practical meaningfulness.

Grade-level differences in beliefs. The pairwise multivariate tests indicated significant differences between 10th and 7th graders, Hotelling's $T^2 = .19$, $F(18, 240) = 2.57$, $p < .001$; 10th and 4th graders, Hotelling's $T^2 = .99$, $F(18, 234) = 12.90$, $p < .001$; and 7th and 4th graders, Hotelling's $T^2 = .52$, $F(18, 197) = 5.69$, $p < .001$. Thus, each grade differed significantly from the other two grades. The results of the univariate follow-up tests for each belief variable are shown in Table 2. Fourth-grade students differed from both 7th and 10th grade students in a number of beliefs. Compared with both 7th and 10th graders, 4th graders had (a) lower task self-efficacy for both reading and writing, (b) higher ratings of effort as a cause of success for writing, and (c) higher ratings of intelligence as a cause of success for reading. Also, compared with 10th graders, 4th graders had higher ratings of luck as a cause of success for both reading and writing. Seventh-grade students differed from 10th-grade students only in having lower task self-efficacy. For task self-efficacy and attribution to luck, the results were the same for reading and writing. For attributions to effort and intelligence, the results were different for reading and writing; effort attributions were significant only for writing, and intelligence attributions were significant only for reading. There were similar trends in the means for effort attributions for reading and intelligence attributions for writing, but these were not significant.

Achievement-level differences in beliefs. The pairwise multivariate tests indicated significant differences between the high- and average-achievement groups, Hotelling's $T^2 = .18$, $F(18, 241) = 2.47$, $p < .001$; the high- and low-achievement groups, Hotelling's $T^2 = .69$, $F(18, 189) = 7.21$, $p < .001$; and the average- and low-achievement groups, Hotelling's $T^2 = .20$, $F(18, 241) = 2.73$, $p < .001$. Each achievement group, therefore, differed significantly from the other two achievement groups. The results of the univariate follow-up tests for each belief variable are shown in Table 2. High and low achievers differed substantially in their beliefs. Compared with low achievers, high achievers had (a) higher task and component skills self-efficacy for both reading and writing; (b) lower ratings of luck, task difficulty, and teacher help as causes of success for both reading and writing; (c) lower ratings of intelligence as a cause of success for reading; and (d) lower outcome expectancy for reading and writing. Average achievers tended to have scores between those of high and low achievers; however, they differed more from low achievers than from high achievers. Compared with low achievers, average achievers had (a) higher component skills self-efficacy for both reading and writing, (b) lower ratings of teacher help as a cause of success for both reading and writing, (c) lower ratings of task difficulty as a cause of success for reading, and (d) lower ratings of luck as a cause of success for writing. Compared with high achievers, average achievers had only lower task and component skills self-efficacy for both reading and writing. With small variation in attributions for intelligence, luck, and task difficulty, the results were similar for both reading and writing.

Table 2
Means, Standard Deviations, and Results of Pairwise Comparisons for Belief Variables

Variable	All	Grade			Achievement		
		10th	7th	4th	High	Average	Low
Reading							
Task efficacy							
M	4.61	4.84_{a}	4.63_{a}	4.26_{a}	$4.76_{a,b}$	$4.60_{a,1}$	$4.47_{b,1}$
SD	0.48	0.34	0.41	0.50	0.33	0.48	0.55
Skill efficacy							
M	3.99	3.99	3.98	4.01	4.26_{a}	3.99_{a}	3.73_{a}
SD	0.62	0.63	0.57	0.67	0.49	0.62	0.64
Outcome expect.							
M	4.30	4.24_{1}	4.29	4.39_{1}	$4.16_{a,1}$	4.33_{1}	4.39_{a}
SD	0.49	0.45	0.48	0.55	0.49	0.47	0.51
Attributions							
Effort							
M	4.45	4.39_{1}	4.35_{2}	$4.64_{1,2}$	4.46	4.44	4.44
SD	0.89	0.99	0.82	0.77	0.87	0.91	0.88
Intelligence							
M	3.80	3.66_{a}	3.67_{b}	$4.12_{a,b}$	3.58_{a}	3.73_{1}	$4.12_{a,1}$
SD	1.15	1.13	1.17	1.12	1.01	1.27	1.05
Enjoyment							
M	4.32	4.32	4.32	4.32	4.45_{1}	4.36	4.13_{1}
SD	0.96	0.90	1.02	0.98	0.85	0.94	1.06
Luck							
M	2.25	2.07_{a}	2.14_{1}	$2.60_{a,1}$	$1.87_{a,1}$	2.28_{1}	2.59_{a}
SD	1.27	1.19	1.20	1.38	1.02	1.25	1.42
Task difficulty							
M	2.38	2.45	2.38	2.29	$2.01_{a,1}$	$2.33_{b,1}$	$2.84_{a,b}$
SD	1.12	1.16	1.04	1.14	0.92	1.07	1.22
Teacher help							
M	3.27	3.35	3.14	3.29	3.13_{a}	3.12_{b}	$3.64_{a,b}$
SD	1.22	1.15	1.21	1.31	1.12	1.26	1.17
Writing							
Task efficacy							
M	4.53	4.70_{a}	4.53_{a}	4.31_{a}	$4.69_{a,b}$	$4.53_{a,1}$	$4.39_{b,1}$
SD	0.48	0.36	0.47	0.56	0.33	0.50	0.55
Skill efficacy							
M	4.20	4.24	4.15	4.19	4.46_{a}	4.20_{a}	3.94_{a}
SD	0.61	0.60	0.61	0.62	0.45	0.54	0.71
Outcome expect.							
M	4.07	4.04_{1}	4.02_{2}	$4.19_{1,2}$	3.94_{a}	4.06_{1}	$4.24_{a,1}$
SD	0.55	0.48	0.59	0.57	0.53	0.55	0.53
Attributions							
Effort							
M	4.39	4.31_{a}	4.26_{b}	$4.64_{a,b}$	4.37	4.38	4.43
SD	0.90	0.95	0.90	0.79	0.97	0.91	0.83
Intelligence							
M	3.89	3.86	3.79	4.03	3.69_{1}	3.90	4.08_{1}
SD	1.13	1.03	1.16	1.22	1.02	1.21	1.09
Enjoyment							
M	4.39	4.43	4.33	4.39	4.38	4.42	4.36
SD	0.83	0.85	0.88	0.75	0.78	0.89	0.80
Luck							
M	2.21	2.01_{a}	2.15_{1}	$2.55_{a,1}$	$1.85_{a,1}$	$2.15_{b,1}$	$2.67_{a,b}$
SD	1.26	1.18	1.18	1.37	1.01	1.18	1.44
Task difficulty							
M	2.73	2.69	2.81	2.69	$2.37_{a,1}$	$2.74_{1,2}$	$3.06_{a,2}$
SD	1.12	1.12	1.08	1.15	1.12	1.08	1.07
Teacher help							
M	3.26	3.40	3.14	3.18	3.14_{a}	3.10_{b}	$3.60_{a,b}$
SD	1.13	1.05	1.09	1.25	1.04	1.19	1.07

Note. Within each grouping of grade or ability level across rows, means with the same alphabetic subscript differ significantly at the following Bonferroni adjusted p values for pairwise tests of variables with effect size (d) greater than .25: Grades 4 and 7, $p < .006$; Grades 4 and 10, $p < .006$; Grades 7 and 10, $p < .025$; low and average achievement, $p < .005$; low and high achievement, $p < .003$; average and high achievement, $p < .006$. Within each grouping of grade or ability level across rows, means with the same numeric subscript have pairwise effect sizes (d) greater than .25 and differ at $p < .05$ with no Bonferroni adjustment.

Analysis of the Relations Between Beliefs and Achievement in Reading and Writing

Examination of quadratic curvilinearity. To test each belief variable for quadratic curvilinearity, we used a multivariate equivalent to a powers approach in regression. For each belief variable, two canonical analyses were done on the total sample. First, the original belief variable was canonically correlated to the set of reading and writing achievement variables to establish the baseline linear relation. Second, the original belief variable (linear component) and its square (quadratic component) were canonically correlated to the same set of achievement variables to identify the quadratic curvilinear relation. The results of these two analyses were then compared to determine whether the quadratic canonical correlation was meaningfully higher than the linear-only correlation, on the basis of the significance of the quadratic relation and the increase in explained variance due to the addition of the quadratic component.

From these analyses we identified four variables as having meaningful quadratic curvilinear relations to achievement: reading outcome expectancy, writing outcome expectancy, reading attribution to intelligence, and writing attribution to intelligence. For these four beliefs, the linear canonical correlations were .24, .25, .30, and .17, respectively, and the quadratic canonical correlations were .37, .31, .38, and .28, respectively. The increase in explained variance was 7.5%, 3.6%, 5.2%, and 5.2%, respectively. The quadratic curvilinear trends for each variable were computed from the canonical coefficients. For outcome expectancy for both reading and writing, higher ratings were associated with higher achievement up to a rating of approximately 4, beyond which, higher ratings were associated with lower achievement. For attributions to intelligence for both reading and writing, higher ratings were associated with higher achievement up to a rating of approximately 3, beyond which, higher ratings were associated with lower achievement.

The quadratic analyses were done with the total sample. However, we did examine the extent to which similar results occurred in each grade- and achievement-level group. Because of reduced sample size in the specific groups, correlations of the magnitudes identified for these variables (.20 to .40) were not always significant at the conventional alpha level of .05; however, for all four beliefs, the comparisons between the quadratic and linear analyses produced results similar to those obtained for the total sample. For both outcome expectancy variables and reading attributions to intelligence, there were increases in the canonical correlations of .04 or greater in five of the six groups and increases in explained variance of 2.5% or greater in four or more of the six groups. For writing attributions to intelligence, there was an increase in the canonical correlation of .05 or greater and an increase in explained variance of 2.5% or greater in three of the six groups. Also, the quadratic trends computed from the canonical coefficients for each specific grade- and achievement-level group were similar to the trend obtained for the total sample.

The quadratic curvilinear relation is represented by the combination of both the linear (original variable) and quadratic components (the square of the variable). Because canonical analysis does not provide a way to link these two components together so that a single structure coefficient is obtained for the combined effect, we used an approach similar to that of Shell et al. (1989) to obtain a single value for the quadratic curvilinear relation in subsequent canonical analyses. Predicted scores for reading outcome expectancy, writing outcome expectancy, reading intelligence attributions, and writing intelligence attributions were computed from the canonical coefficients obtained from their respective quadratic canonical analyses. These predicted scores then were used in place of the original variables in all subsequent canonical analyses. We used the canonical coefficients from the analyses done with the total sample because these would be more stable than those obtained in each grade- and achievement-level group because of the larger sample size. We also felt that the use of a common predicted score in all analyses would facilitate comparisons across different groups. We verified that the predicted scores based on the total sample were accurate representations of the specific quadratic relations in each grade and achievement group by comparing, in each group, (a) the results of a canonical analysis done with the common predicted scores and (b) results obtained from an analysis done with predicted scores based on the canonical coefficients obtained for that specific group. These comparisons indicated that, in all groups, the magnitude of the overall canonical correlation and variable loadings for all variables were equivalent.

Canonical analyses. To examine how the relations between beliefs and achievement changed as a function of grade level and achievement, canonical correlation analyses were conducted for each grade (10th, 7th, and 4th) and each achievement group (high, average, and low). For the canonical analyses, the reading and writing achievement variables constituted the dependent variable set, and the self-efficacy, attribution, and outcome expectancy belief variables constituted the independent variable set.

The results of the canonical analyses are summarized in Table 3. In all groups, a single-dimensional canonical relation was identified. Like the findings of Shell et al. (1989), this suggests that beliefs and achievement in reading and writing were linked by a single underlying dimension. The effects of entering outcome expectancy and attributions to intelligence in quadratic form can be determined by comparing (a) the results obtained with all variables in linear form and (b) the results obtained with the four variables entered as quadratic predicted scores. In all groups except 7th grade, there was an increase in the explained achievement variance (R_c^2) of 3% to 4% when the quadratic predicted scores were used, suggesting that inclusion of the quadratic components for the four variables resulted in meaningful increases in explained achievement variance.

In the low-achievement group, two significant ($p < .05$) canonical correlations were found; however, the average variance in the achievement variable set accounted for by the second canonical variate was extremely low (6.7%),

Table 3
Summary Statistics for Canonical Correlation Analysis

Group	R_c	R_c^2	Wilks's Λ	Rao's F	df	p	Average variance[a]
10th grade							
Linear	.63	.39	.366	1.27	108, 718	.04	.53
Quadratic	.66	.43	.310	1.51	108, 718	.001	.54
7th grade							
Linear	.64	.41	.280	1.16	108, 506	.15	.35
Quadratic	.64	.41	.279	1.17	108, 506	.14	.39
4th grade							
Linear	.67	.44	.259	1.16	108, 471	.15	.39
Quadratic	.70	.48	.234	1.26	108, 471	.06	.42
High achievement							
Linear	.79	.62	.143	1.74	108, 466	<.001	.73
Quadratic	.82	.66	.131	1.84	108, 466	<.001	.73
Average achievement							
Linear	.69	.47	.291	1.70	108, 764	<.001	.62
Quadratic	.72	.51	.250	1.94	108, 764	<.001	.62
Low achievement							
Linear	.78	.61	.114	1.98	108, 466	<.001	.59
Quadratic	.80	.64	.102	2.11	108, 466	<.001	.59

[a] Average of the squared structure coefficients (loadings) for the achievement variable set.

suggesting that the second canonical variate did not provide a good representation of the achievement variables. Also, redundancy analysis (Pedhazur, 1982) indicated that the second canonical correlation accounted for no meaningful, nonredundant variance in the set of achievement variables. As a result, we retained only the first canonical correlation for analysis. The canonical correlations for the 4th-grade and 7th-grade groups did not achieve significance at the $p <$ .05 level. In both groups, however, the magnitude of the canonical correlation, the Wilks's Λ, the average variance in the achievement variable set accounted for by the canonical variate, and the results of redundancy analysis were consistent with those of the other grade and achievement groups. We therefore used the 4th- and 7th-grade results in subsequent analyses, with the caution that structures of the canonical relations for these grades may be less stable than those of other groups.

The structure of the identified dimension is described by the correlations between the original variables and their respective canonical variates (the structure coefficients or loadings). These loadings describe the nature of the canonical relation between beliefs and achievement and are provided in Table 4.

Grade-level differences in the relation between beliefs and achievement. With the exception of spelling and language mechanics in the 7th grade, all achievement variables had loadings above .40, indicating that the canonical variates in each grade provided a good representation of students' reading and writing achievement. All belief variables except attributions to effort and enjoyment had meaningful loadings (above .30) in at least two grades, with reading and writing beliefs having nearly equivalent loadings.

For all grades, the basic structures of the canonical relations were similar. Higher reading and writing achievement were related to (a) higher self-efficacy for both tasks and skills, (b) the curvilinear pattern of attribution to intelligence, (c) lower attribution to external causes, and (d) the curvilinear pattern of outcome expectancy. There were, however, some differences across grades. For achievement, there was an increase in the predictability of reading comprehension as grade increased. Also, there was a drop in the predictability of the holistic writing score in 10th grade. Vocabulary, language mechanics, and spelling all were more poorly predicted in 7th than in either 10th or 4th grade. For beliefs, there was a decrease in the contribution of self-efficacy for reading in 10th grade, although this may have been related to ceiling effects on the efficacy ratings in 10th grade (M = 4.84 out of 5.0). Also, attributions to intelligence for both reading and writing and to teacher help for reading did not contribute as strongly in 7th grade as in either 10th or 4th grade. In 4th grade, attributions to task difficulty and teacher help for writing did not contribute.

Achievement-level differences in the relation between beliefs and achievement. All achievement variables had loadings above .57, indicating that the canonical variates at each achievement level provided a good representation of students' reading and writing achievement. Only a small number of belief variables contributed to the relations. Self-efficacy beliefs for tasks had loadings above .60 for reading and above .40 for writing in all groups; attributions to intelligence and attributions to luck for both reading and writing had loadings above .30 in at least two groups; and outcome expectancy had loadings above .50 for reading in two groups and above .40 for writing in one group. Although the number of belief variables contributing to the canonical relations was small, the relation of the belief variable set to achievement was high in all achievement-level groups (see Table 3, column 1). The pattern of loadings was similar for both reading and writing beliefs, although the loadings for task self-efficacy and outcome expectancy were somewhat higher for reading than for writing. Also, the loadings for task self-efficacy were con-

Table 4
Correlations Between Variables and Their Respective Canonical Variates

Variable	Grade			Achievement		
	10th	7th	4th	High	Average	Low
Achievement variables						
Reading						
Comprehension	.97	.76	.58	.94	.86	.92
Vocabulary	.77	.58	.75	.93	.77	.90
Writing						
Writing score	.47	.73	.75	.59	.75	.61
Language mechanics	.70	.36	.56	.83	.79	.84
Language expression	.85	.83	.76	.92	.91	.70
Spelling	.53	.28	.41	.86	.60	.57
Belief variables						
Reading						
Task efficacy	.24	.59	.58	.70	.71	.64
Skill efficacy	.33	.45	.65	−.10	−.08	.05
Outcome expectancy[a]	.45	.58	.39	.27	.51	.51
Causal attributions						
Effort	−.02	.12	.18	−.20	−.12	−.18
Intelligence[a]	.63	.17	.37	.39	.33	.28
Enjoyment	.16	.17	.29	−.20	.06	−.07
Luck	−.38	−.44	−.42	−.18	−.31	−.33
Task difficulty	−.43	−.55	−.37	.20	−.17	.19
Teacher help	−.36	−.04	−.41	−.02	.04	.01
Writing						
Task efficacy	.40	.39	.56	.44	.52	.47
Skill efficacy	.54	.71	.42	.14	.05	.10
Outcome expectancy[a]	.30	.46	.35	.10	.48	.28
Causal attributions						
Effort	−.16	−.01	.14	−.27	−.16	−.06
Intelligence[a]	.38	.24	.41	.31	.18	.34
Enjoyment	.02	.03	.10	−.03	.03	.15
Luck	−.53	−.54	−.41	−.21	−.43	−.38
Task difficulty	−.46	−.39	−.14	−.07	−.14	.16
Teacher help	−.37	−.30	−.19	.13	−.08	.02

[a] Variable was entered as a quadratic predicted score.

sistently higher at all achievement levels than the loadings for either outcome expectancy or attributions, indicating that these self-efficacy beliefs were more strongly represented in the canonical relation.

The structures of the canonical relations were similar for the low- and average-achievement groups but differed for the high-achievement group. For the low- and average-achievement groups, higher reading and writing achievement were related to (a) higher self-efficacy for tasks, (b) the curvilinear pattern of attribution to intelligence, (c) lower attribution to luck, and (d) the curvilinear pattern of outcome expectancy. For the high-achievement group, higher reading and writing achievement were related only to higher self-efficacy for tasks and the curvilinear pattern of attribution to intelligence. There also were some other differences across the achievement levels. For achievement, writing variables, except for language mechanics, tended to be more poorly predicted in the low-achievement group than in either the average- or high-achievement groups. There also was an increase in the predictability of the holistic writing score and a decrease in the predictability of *reading variables* in the average group relative to the high and low groups. For beliefs, attribution to intelligence for writing did not contribute to the relation for the average group.

Discussion

Grade-Level and Achievement-Level Differences in Beliefs

The results help clarify the nature of grade-level and achievement-level differences in beliefs for reading and writing. Significant main effects were found for both grade and achievement, indicating that there were differences in beliefs related to both of these factors. However, no significant interaction was found, indicating that the grade-level differences were distinct from the achievement-level differences. These findings suggest that the beliefs characteristic of particular levels of achievement are not simply reflections of students' age or grade level, and the beliefs characteristic of particular ages or grade levels are not merely artifacts of knowledge and skill mastery. This implies that the beliefs and subsequent motivation of low-achieving readers or writers are not necessarily the same as those of

younger readers and writers, even if the performance of low achievers is similar to that of younger students.

Grade-level changes and achievement-level differences were similar for reading and writing beliefs. This suggests, consistent with research indicating that reading and writing skills codevelop (e.g., Shanahan, 1984; Shanahan & Lomax, 1986), that beliefs about reading and beliefs about writing follow similar developmental courses. Also, this indicates that the patterns of beliefs typical of high- or low-achieving writers are similar to those of high- or low-achieving readers.

Grade-level differences in beliefs. The present study provided an important extension to the previous research concerning the development of children's motivational beliefs (e.g., Hiebert et al., 1984; Paris & Oka, 1986; Stipek, 1993; Wagner et al., 1989) by continuing the examination of grade-level differences through high school. The results indicated that not only were there no significant differences between 7th and 10th graders in outcome expectancy and causal attribution beliefs, but there were no effect sizes of .25 or greater. These findings suggest that by junior high school, children have developed generally stable perceptions of causality and outcome expectancy that undergo little subsequent change through high school.

The only significant differences in either causal attributions or outcome expectancy beliefs found between 4th and 7th graders were for causal attributions to effort and intelligence. These beliefs have received the most emphasis in discussions of developmental change in causal attributions (e.g., see Stipek, 1993; Weiner, 1985), and our findings substantiate that the changes in causal beliefs that occur in the late elementary grades primarily involve changes in perceptions of the importance of effort and intelligence or ability. For both effort and intelligence, the ratings of their importance were lower for 7th than for 4th graders. These results are consistent with those of previous studies (e.g., see Hiebert et al., 1984; Stipek, 1993). Decreases in children's attribution to effort and ability have been interpreted as indicating that these beliefs become more accurate as children age because the high ratings younger children give to these causes are thought to overstate their likely actual causal influence (e.g., see discussion in Stipek, 1993). Our results, therefore, also can be interpreted as indicating that children in late elementary school are continuing to develop increased accuracy in their beliefs about the causal role of effort and intelligence in reading and writing.

Attributions to luck had a somewhat anomalous pattern of differences. Although 10th graders significantly differed from 4th graders, 7th graders did not significantly differ from children in either of the other grades. However, the effect sizes (see Table 2) between 7th and 10th grade were much smaller (.06 for reading and .12 for writing) than the effect sizes between 7th and 4th grade (.35 for reading and .31 for writing). The pattern of effect sizes and direction of differences (lower ratings in higher grades) were similar to those found for effort and intelligence attributions suggesting that luck attributions follow a course of development similar to effort and intelligence attributions. The failure to find a significant difference between 4th and 7th grade, however, indicates a need for further examination of the development of luck attributions.

Although outcome expectancy beliefs did not differ significantly between any of the three grades, there were effect sizes above .25 between 4th and 10th graders for reading and between 4th and both 7th and 10th graders for writing (see Table 2). These patterns were similar to those identified for effort, intelligence, and luck attributions, suggesting possible grade-level differences in outcome expectancy beliefs similar to those found for these attributions. Our results cannot confirm the presence of these differences, but they do suggest that further study of the development of outcome expectancy beliefs is warranted.

Self-efficacy beliefs exhibited a different pattern of grade-level differences from causal attribution and outcome expectancy beliefs. Unlike these beliefs, task self-efficacy was significantly higher at each successive grade level. Bandura (1986) has proposed that the development of higher self-efficacy is directly associated with improvement in actual cognitive and behavioral skills and, therefore, can be expected to continue to develop as long as these skills are developing. Our findings support Bandura's claim, because the grade-level increase in task self-efficacy through high school mirrored a grade-level increase in students' actual reading and writing skills (Table 1). Interestingly, grade-level differences occurred only for task self-efficacy; the scores for component skills self-efficacy were basically the same in each grade. This suggests that the aspect of self-efficacy that develops across grades is belief in the capability of successfully reading various types of materials and successfully communicating in various formats rather than belief in the capability of doing specific reading or writing skills.

Achievement-level differences in beliefs. Consistent with previous studies (Bandura, 1986; Hiebert et al., 1984; Schunk & Rice, 1991; Schunk & Swartz, 1993; Weiner, 1985), we found substantial differences between the beliefs of high and low achievers. The large number of belief differences identified suggests that belief differences between high and low achievers are pervasive, encompassing all aspects of belief about personal control. Relative to high achievers, low achievers exhibited a potentially dysfunctional belief pattern of ascribing higher outcome expectancy to reading and writing while simultaneously expressing lower self-efficacy for their reading and writing and ascribing higher causality to factors that are external or uncontrollable. As noted in previous formulations of the effects of beliefs (e.g., Bandura, 1986; Schunk, 1991; Stipek, 1993; Weiner, 1985), this pattern of beliefs can have a strong negative impact both on motivation and on feelings of self-worth.

The scores of average achievers fell between those of high and low achievers, but their beliefs generally were more like those of high achievers. As with the differences found between 10th and 7th grade, the primary difference between high and average achievers was in self-efficacy. This substantiates previous findings that self-efficacy beliefs are strongly linked to achievement and achievement-level differences (Bandura, 1986; Schunk, 1991; Schunk &

Rice, 1991; Schunk & Swartz, 1993). Also, there were nonsignificant effect sizes above .25 between high and average achievers for both luck and task difficulty (see Table 2), suggesting a need for further research on whether beliefs about external causality also play a role in differentiating high and average achievers.

As previously has been found (e.g., Hiebert et al., 1984; Weiner, 1985), low achievers thought that effort was as important as average and high achievers thought. Low achievers, however, simultaneously ascribed causal influence to a greater number of external and uncontrollable causes. These findings suggest that low achievers may have a more contingent causality for effort. In essence, effort will cause success if "the task is easy enough," "I receive enough help," "I am lucky," or "I am smart enough." If any of these other causal conditions are not met, the positive effects of attribution to effort could be undermined. As Stipek (1993) notes, this contingent causality may, in fact, be real for low achievers, because they tend to experience more tasks that are beyond their reading and writing skill level and may receive more teacher help. Thus, effort may not help these students succeed unless other conditions are met. This suggests that to maintain positive attributions to effort and positive motivation among low achievers, reading and writing tasks need to be structured so that low achievers can achieve success through their efforts.

Relation Between Beliefs and Achievement

The results confirmed the importance of examining the two factors first identified by Shell et al. (1989): (a) generalized across-domain dimensionality of beliefs and achievement and (b) quadratic curvilinearity in the relations between beliefs and achievement. A single underlying canonical dimension linking beliefs and achievement was found for all grades and achievement levels, indicating that beliefs and achievement in the domains of reading and writing have a generalized reciprocal relation to each other. The pervasiveness of these findings across grade and achievement levels suggests that this dimensionality is a fundamental property of the relations between beliefs and achievement in reading and writing. This indicates that consideration of possible reciprocal influences from beliefs in both domains will be necessary for full understanding of the motivational influences of beliefs on reading or writing. Also, approaches to literacy instruction that emphasize the connections between reading and writing may be able to use the reciprocal relations of beliefs to achievement in the two domains to enhance motivation for both reading and writing.

The quadratic curvilinear trends identified for reading and writing outcome expectancy and reading and writing intelligence attributions suggest that there is a ceiling effect on the positive contributions of these variables to motivation and achievement. Attributing either too little or too much causal influence to intelligence or having either too low or too high outcome expectancy appears to be associated with lower achievement and may be associated with lower motivation as well. Only at moderate levels do there appear to be positive contributions from these beliefs. This suggests caution in how attributional and outcome expectancy feedback are delivered in classrooms. Feedback that over- or understresses either the importance of intelligence in student achievement or the contingencies between reading and writing and the attainment of life goals may have negative motivational and achievement consequences. These findings also suggest that previous studies, in which only linear relations were examined (e.g., Ehrlich et al., 1993; McCarthy et al., 1985; Paris & Oka, 1986), have likely underestimated the contributions of these beliefs to explaining variance in achievement.

Grade-level changes in the relations between beliefs and achievement. Unlike previous studies (e.g., Paris & Oka, 1986; Wagner et al., 1989), neither the strength of the relation between beliefs and achievement nor the pattern of beliefs predictive of higher achievement differed substantially across grades. In all three grades, beliefs accounted for similar amounts of variance in achievement (Table 3). Also, although there were some differences in the magnitudes of the loadings for specific beliefs, in all grades the overall structures of the canonical dimension for beliefs were similar. Higher achievement was associated with higher self-efficacy, lower attribution to external causes, and the curvilinear patterns of attribution to intelligence and outcome expectancy. These findings indicated that there were no major grade-level changes in either the types of beliefs that were related to higher achievement or the strength of the relations between these beliefs and achievement for the domains of reading and writing. Additionally, counter to the findings of Shell et al. (1989) that beliefs were less strongly related to writing than to reading, there was equivalent prediction of reading and writing achievement in all grades.

The differences between the findings in the present study and those of previous studies appear to be due to the multivariate assessment of reading and writing achievement that we used. Although beliefs predicted similar overall levels of achievement variance in all grades, the particular reading and writing variables that were best predicted changed. Specifically, there was a difference between reading and writing in the predictability of higher order comprehension or communication skills versus component subskills. Reading comprehension became better predicted relative to vocabulary across grades, whereas the holistic writing score was more poorly predicted relative to language mechanics, language expression, and spelling in 10th compared with 4th grade. These trends suggest that, as students age, their beliefs for reading become more predictive of higher order comprehension skills, whereas their beliefs for writing become more predictive of component subskills.

These trends may be an artifact of literacy instruction. Instruction in reading and writing tends to shift from a focus in the early grades on development of reading and writing component subskills to a focus in the higher grades on use of reading and writing as tools for learning or expressing ideas. Thus, in elementary school, students' views of themselves as a reader or writer and their beliefs about reading

and writing may be based on an evaluation of how well they execute component subskills, whereas in high school, students' views and beliefs may be based more on an evaluation of how well they comprehend what they read and whether they communicate effectively in their writing.

The shift in instructional focus, however, may differ somewhat for reading and writing. By high school, there is little direct emphasis on or assessment of reading component subskills. For example, except for special remedial classes, there are no courses devoted to teaching reading per se, and students do not practice specific reading subskills in their courses. Student reading is done primarily in subject matter classes for the purpose of learning. However, there still may be courses in writing, such as composition or creative writing, that include writing skill components. Also, in addition to comments on content, teacher feedback on students' written work is likely to include comments about spelling, mechanics such as punctuation and grammar, and proper word use or phrasing, and these may compose a substantial part of students' grades. Thus, even in high school, students may continue to hold a view of good writing that includes an emphasis on component skill proficiency. This would account for their beliefs about writing being more related to component subskills relative to higher order communication skill. More study, however, is needed to determine how instructional experiences influence the development of students' beliefs about reading and writing and the relations between these beliefs and achievement.

Achievement-level differences in the relations between beliefs and achievement. In the high-achievement group, higher achievement was related only to higher self-efficacy and the curvilinear trend for attributions to intelligence, whereas at the other achievement levels, achievement also was related to lower attributions for luck and the curvilinear trend for outcome expectancy. These results, like those of previous studies (e.g., Bandura, 1986; Schunk, 1991; Stipek, 1993), confirm the importance of self-efficacy beliefs and beliefs about ability for motivating and sustaining achievement. The findings also suggest that self-efficacy and causal beliefs about intelligence may be especially potent for identifying individual differences in motivation and achievement for those at higher achievement levels.

The results substantiate the importance of maintaining positive motivational beliefs even when achievement is low. Among low achievers, those who had (a) higher self-efficacy, (b) more positive outcome expectancy, (c) a realistic, moderate view of the causal influence of intelligence, and (d) lower attribution to luck as a cause of success had higher achievement. Placing special emphasis on fostering more positive patterns of these beliefs in instruction and other interventions designed for low achievers, therefore, may be useful for enhancing motivation.

The finding that outcome expectancy was not related to achievement for high achievers suggests that beliefs about outcome contingencies may play a smaller role in the motivation of high achievers. As defined in the present study, outcome expectancy reflects the importance of reading and writing as means for achieving other ends or goals (e.g., see Bandura, 1986; Stipek, 1993). As suggested by high achievers' lower ratings of outcome expectancy (Table 2), this type of tool or utility value may be less important for high achievers than other more intrinsic motivations. It seems reasonable that persons who read or write very well would be more likely to derive intrinsic satisfaction from these activities or derive intrinsic motivation from their competency (see Stipek, 1993, for a complete discussion of these topics). Thus, the attainment of other outcomes may be less motivating for high achievers, although more study is clearly needed to substantiate this speculation.

Conclusions and Directions for Future Research

The results suggest that self-efficacy, causal attribution, and outcome expectancy beliefs exert potentially important motivational influences on children's reading and writing. Consideration of these possible influences is necessary, therefore, for full understanding of how reading and writing skills develop and for the creation of effective reading and writing instruction.

Although beliefs are related to reading and writing achievement, beliefs themselves cannot directly cause achievement. The next research step needs to be examination of how beliefs affect the cognitive processes that are causally related to achievement. Schunk and Swartz (1993) and Schunk and Rice (1991) have found that self-efficacy is associated with the use of specific reading and writing strategies. Their research, however, constitutes only a beginning of this examination. Also, because self-efficacy, causal attribution, and outcome expectancy beliefs presumably exert their influence by affecting motivation (e.g., see Bandura, 1986; Schunk, 1991; Stipek, 1993; Weiner, 1985; Zimmerman, 1989), there is a need to examine more directly how beliefs relate to measures of motivation such as effort and persistence and how these motivational influences subsequently affect and are themselves affected by the strategies and knowledge used during reading and writing. Finally, there are additional beliefs (e.g., see Schunk, 1991; Stipek, 1993), such as goals for reading and writing or attributions to factors such as strategy use, that need to be examined and integrated with those considered in our study.

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