The Development of Academic Self-Efficacy

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Current views of cognitive development stress that the construction of knowledge varies as a function of an individual's developmental level and experiences (Meece, 1997; Siegler, 1991). These views focus on changes in processing functions; for example, attention, encoding, retrieval, metacognition, use of strategies.

In similar fashion, contemporary motivation theories focus on the cognitive and affective processes that instigate, direct, and sustain human action. Researchers investigate the operation of such processes as goals, expectations, attributions, values, and emotions (Pintrich & Schunk, 1996).

In this chapter we focus on the development of one type of motivational process: perceived self-efficacy. Self-efficacy refers to beliefs about one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986, 1997). Much research shows that self-efficacy influences academic motivation, learning, and achievement (Pajares, 1996; Schunk, 1995).

Self-efficacy is grounded in a larger theoretical framework known as social cognitive theory, which postulates that human achievement depends on interactions between one's behaviors, personal factors (e.g., thoughts, beliefs), and environmental conditions (Bandura, 1986, 1997). Learners obtain information to appraise their self-efficacy from their actual performances, their vicarious experiences, the persuasions they receive from others, and their physiological reactions. Self-efficacy beliefs influence task choice, effort, persistence, resilience, and achievement (Bandura, 1997; Schunk, 1995). Compared with students who doubt their learning capabilities, those who feel efficacious for learning or performing a task participate

more readily, work harder, persist longer when they encounter difficulties, and achieve at a higher level.

Relation to Other Constructs

There are motivation constructs that seem conceptually similar to self-efficacy. Outcome expectations, the consequences expected from one's own actions, are related to self-efficacy beliefs but they are not synonymous. For example, an efficacious student may believe that she has the capability to learn mathematics. Nonetheless, she may also believe that despite her perceived capability she will not earn a good grade in mathematics class because the instructor does not like her.

Self-concept beliefs, one's collective self-perceptions that are formed through experiences with, and interpretations of the environment, and which are heavily influenced by reinforcements and evaluations by significant others (Shavelson & Bolus, 1982) also differ from self-efficacy beliefs. Whereas self-efficacy is concerned with judgments about capabilities, self-concept includes the feelings of self-worth that accompany competence beliefs (Pajares & Schunk, in press).

Self-efficacy also differs from effectance motivation, which is the motivation to interact effectively with one's environment and control critical aspects (White, 1959). In young children effectance motivation is diffuse and affects many interactions. With development it becomes more specialized and manifests itself in achievement behaviors in various school subjects. Like self-efficacy, effectance motivation includes perceived capabilities for influencing important aspects of one's life. Unlike self-efficacy, effectance motivation is a global construct and lacks self-efficacy's specificity.

The notion of perceived control also differs from self-efficacy. People who believe they can control what they learn and perform are more apt to initiate and sustain behaviors directed toward those ends than are individuals who hold a low sense of control over their capabilities (Bandura, 1997). Perceived control is generic; thus, it is meaningful to speak of perceived control over learning or performing and over outcomes. Further, perceived control is only one aspect of self-efficacy. Other factors that influence self-efficacy include perceptions of ability, social comparisons, attributions, time available, and perceived importance. People may believe they can control their use of learning strategies, effort, and persistence, yet still hold a low sense of self-efficacy for learning because they feel that the learning is unimportant and do not want to invest time in it.

Development of Self-Efficacy

Familial Influence on Self-Efficacy

Beginning in infancy, parents and caregivers provide experiences that differentially influence children's self-efficacy. Home influences that help children interact effectively with the environment positively affect self-efficacy (Bandura, 1997; Meece, 1997). Initial sources of self-efficacy are centered in the family, but the influence is bidirectional. Parents who provide an environment that stimulates youngsters' curiosity and allows for mastery experiences help to build children's self-efficacy. In turn, children who display more curiosity and exploratory activities promote parental responsiveness.

When environments are rich in interesting activities that arouse children's curiosity and offer challenges that can be met, children are motivated to work on the activities and thereby learn new information and skills (Meece, 1997). There is much variability in home environments. Some contain materials such as computers, books, and puzzles that stimulate

children's thinking. Parents who are heavily invested in their children's cognitive development may spend time with them on learning. Other homes do not have these resources and adults may devote little time to children's education.

Parents who provide a warm, responsive and supportive home environment, who encourage exploration and stimulate curiosity, and who provide play and learning materials accelerate their children's intellectual development (Meece, 1997). Parents also are key providers of self-efficacy information. Parents who arrange for varied mastery experiences develop more-efficacious youngsters than do parents who arrange fewer opportunities (Bandura, 1997). Such experiences occur in homes enriched with activities and in which children have freedom to explore.

With respect to vicarious sources, parents who teach children ways to cope with difficulties and model persistence and effort strengthen children's self-efficacy. As children grow, peers become increasingly important. Parents who steer their children toward efficacious peers provide further vicarious boosts in self-efficacy.

Homes also are prime sources of persuasive information. Parents who encourage their youngsters to try different activities and support their efforts help to develop children who feel more capable of meeting challenges (Bandura, 1997). Self-efficacy suffers in homes in which novel activities are discouraged.

Peer Influence

Peers influence children's self-efficacy in various ways. One means is through model similarity. Observing similar others succeed can raise observers' self-efficacy and motivate them to perform the task if they believe that they, too, will be successful (Schunk, 1987). Conversely, observing others fail can lead students to believe that they lack the competence to succeed and

dissuade them from attempting the task. Model similarity is most influential for students who are uncertain about their performance capabilities, such as those lacking task familiarity and information to use in judging self-efficacy or those who have experienced difficulties and hold doubts (Bandura, 1986; Schunk, 1987). Model similarity is potent among children and adolescents because peers are similar in many ways and students at these developmental levels are unfamiliar with many tasks.

Peer influence also operates through peer networks, or large groups of peers with whom students associate. Students in networks tend to be similar to one another (Cairns, Cairns, & Neckerman, 1989), which enhances the likelihood of influence by modeling. Networks help define students' opportunities for interactions and observations of others' interactions, as well as their access to activities (Dweck & Goetz, 1978). Over time, network members become more similar to one another. Discussions between friends influence their choices of activities and friends often make similar choices (Berndt & Keefe, 1992).

Peer groups promote motivational socialization. Changes in children's motivational engagement across the school year are predicted accurately by their peer group membership at the start of the year (Kindermann, McCollam, & Gibson, 1996). Children affiliated with highly motivated groups change positively across the school year; those in less-motivated groups change negatively.

Steinberg, Brown, and Dornbusch (1996) tracked students from high school entrance until their senior year and found developmental patterns in the influence of peer pressure on many activities including academic motivation and performance. Peer pressure rises during childhood and peaks around grade 8 or 9 but then declines through high school. A key time of influence is roughly between ages 12 and 16, a time during which parental involvement in

children's activities declines. Steinberg et al. also found that students who begin high school with similar grades but who become affiliated with academically oriented crowds achieve better during high school than do students who become affiliated with less-academically oriented crowds.

Role of Schooling

The finding that self-efficacy beliefs tend to decline as students advance through school (Pintrich & Schunk, 1996) has been attributed to various factors, including greater competition, more norm-referenced grading, less teacher attention to individual student progress, and stresses associated with school transitions. These and other school practices can weaken academic self-efficacy, especially among students who are less academically prepared to cope with increasingly challenging academic tasks. Lock-step sequences of instruction frustrate some students who fail to grasp skills and increasingly fall behind their peers (Bandura, 1997). Ability groupings can lower self-efficacy among those relegated to lower groups. Classrooms that allow for much social comparison tend to lower the self-efficacy of students who find their performances inferior to those of their peers.

Students' involvement and participation in school depend in part on how much the school environment contributes to their perceptions of autonomy and relatedness, which in turn influence self-efficacy and academic achievement. Although parents and teachers contribute to feelings of autonomy and relatedness, peers become highly significant during adolescence. The peer group context enhances or diminishes students' feelings of belonging and affiliation (Hymel, Comfort, Schonert-Reichl, & McDougall, 1996).

Transitional Influences

Periods of transition in schooling bring additional factors into play that affect self-efficacy. Eccles and her colleagues (Eccles & Midgley, 1989; Eccles, Midgley, & Adler, 1984) have reported that the transition to middle school brings several changes. Elementary students remain with the same teacher and peers for most of the school day, children receive much attention, and individual progress is stressed. Because many elementary schools typically feed into the same middle school and because students change classes, middle school students are exposed to peers whom they do not know. At this academic level, most evaluation is normative and there is less teacher attention to individual progress. The widely expanded social reference group, coupled with the shift in evaluation standards, requires that students reassess their academic abilities. As a consequence, perceptions of academic competence typically begin to decline during middle school (Harter, 1996; Midgley, Feldlaufer, & Eccles, 1989).

Developmental Changes in Self-Appraisal Skill

Self-appraisal skills improve with development. Most children are overconfident about what they can do. In self-efficacy research it is not uncommon for children to feel highly efficacious about accomplishing difficult tasks; even being provided with feedback indicating low performance may not decrease self-efficacy (Schunk, 1995). Less frequently, children underestimate their capabilities and believe that they cannot acquire basic skills.

The incongruence between children's self-efficacy and their actual performance may be due to various causes. Children often lack task familiarity and do not fully understand what is required to execute a task successfully. As they gain experience their accuracy improves. Children may be unduly swayed by certain task features and decide based on these that they can or cannot perform the task while ignoring other features. In subtraction, for example, children

may focus on how many numbers the problems contain and judge longer problems more difficult than those with fewer numbers, even when the longer ones are conceptually simpler. As their capability to focus on multiple features improves so does their accuracy.

Children also may have faulty knowledge about their performance capabilities. In writing, for example, it is difficult for children to know how clearly they can express themselves or whether their writing skills are improving (Schunk & Swartz, 1993). Teacher feedback—especially at the elementary level—is intended to encourage and stress what children do well. Children may believe they can write well when in fact their writing is far below normal for their grade level. As they grow, children gain task experience and engage more often in peer social comparisons, which improve the accuracy of their self-assessments.

The preceding discussion should not imply that younger children's self-appraisal skills cannot become more accurate. Instruction and opportunities to practice self-evaluation enhance accuracy of self-perception (Schunk, 1995). Instructional interventions that convey clear information about children's skills or progress raise efficacy-performance correspondence (Schunk, 1981, 1995).

Gender and Ethnic Differences in Self-Efficacy

Gender Differences

The relationship between gender and self-efficacy has been a focus of research. In general, researchers report that boys and men tend to be more confident than girls and women in academic areas related to mathematics, science, and technology (Meece, 1991; Pajares & Miller, 1994; Wigfield, Eccles, & Pintrich, 1996), despite the fact that achievement differences in these areas either are diminishing or have disappeared (Eisenberg, Martin, & Fabes, 1996). Conversely, in areas related to language arts, male and female students exhibit similar confidence despite the fact that the achievement of girls typically is higher (Pajares, in press).

Gender differences in self-efficacy are confounded by a number of factors. First, these differences often are nullified when previous achievement is controlled (Pajares, 1996). Boys and girls also have a tendency to adopt a differing stance when responding to self-efficacy instruments. Researchers have observed that boys tend to be more self-congratulatory in their responses whereas girls are more modest (Wigfield et al., 1996). A third confounding factor is related to the manner in which gender differences typically are assessed and reported. Students usually are asked to provide confidence judgments that they possess certain academic skills or can accomplish academic tasks. Differences in the average level of confidence reported are interpreted as gender differences in self-efficacy. Pajares and his colleagues asked elementary and middle school students to provide self-efficacy judgments in the traditional manner (confidence in possessing writing skills) but also to make comparative judgments regarding their writing ability versus that of other boys and girls in their class and school (Pajares, Miller, & Johnson, 1999; Pajares & Valiante, 1999). Although girls outperformed boys, girls and boys

reported equal writing self-efficacy. When students were asked whether they were better writers than their peers, however, girls judged themselves to be better writers than the boys.

Another confounding factor deals with the nature of the self-belief that may be undergirding those differences. Some researchers have argued that gender differences in social, personality, and academic variables may actually be a function of gender orientation—the stereotypic beliefs about gender that students hold—rather than of gender (Eisenberg et al., 1996; Hackett, 1985; Harter, Waters, & Whitesell, 1997; Matsui, 1994). Eccles's (1987) model of educational and occupational choice posits that cultural milieu factors such as students' gender role stereotypes are partly responsible for differences in course and career selection and in confidence beliefs and perceived value of tasks and activities. Pajares & Valiante (in press) found that gender differences favoring middle school girls in writing self-efficacy were nullified when gender orientation beliefs were controlled.

Gender differences are related to developmental level. There is little evidence for differences in self-efficacy among elementary-aged children. Differences begin to emerge following children’s transition to middle or junior high school (Eccles & Midgley, 1989; Wigfield, Eccles, MacIver, Reuman, & Midgley, 1991; Wigfield et al., 1996), with girls typically showing a decline in self-efficacy beliefs.

Among adolescents, gender differences in self-efficacy should not be expected when students receive clear performance information about their capabilities or progress in learning. Schunk and Lilly (1984) had students in Grades 6 and 8 judge self-efficacy for learning a novel mathematical task, after which students received instruction, practice opportunities, and performance feedback. Although girls initially judged self-efficacy for learning lower than did boys, following the instructional program girls and boys did not differ in achievement or self-

efficacy for solving problems. The performance feedback conveyed to students that they were learning and raised girls' self-efficacy to that of boys.

Social cognitive theory does not endow either gender or gender self-beliefs with agentic and motivating properties (Bussey & Bandura, 1999). Researchers have observed that students typically view such areas as mathematics, science, and technology as male domains (Eisenberg et al., 1996). In these areas, a masculine orientation is associated with confidence and achievement because masculine self-perceptions are imbued with the notion that success is a masculine imperative (Eccles, 1987; Hackett, 1985). Language arts typically is associated with a feminine orientation because writing is viewed by most students as a female domain. A feminine orientation is associated with motivational beliefs related to success in writing. One challenge before educators is to alter students' views of academic subjects so that they are perceived as relevant and valuable both to girls and boys.

Ethnic Differences

Relative to gender differences, much less research has been done on ethnic differences. Although some research shows that minority students hold lower perceptions of competence than nonminority students, much of the research has confounded ethnicity with social class by comparing middle-class white children with lower class minority children (Graham, 1994; Pintrich & Schunk, 1996).

Graham (1994) disentangled this confound by conducting a review of published research on African American students and their achievement motivation. She found little support for the notion that African Americans have lower perceptions of competence than do White students, once socioeconomic status is controlled. In fact, African Americans often maintain a sense of optimism even in the face of social and economic disadvantage. Graham also found evidence

that, even though the expectations of African Americans are high, they often fall short of their performances. We noted earlier that such incongruence often is found in self-efficacy research, especially among children. Whether this incongruence is substantially different from that found among nonminority students requires further research.

Self-Efficacy for Learning and Achievement

Table 1 portrays a model of how self-efficacy operates in learning and achievement situations. At the outset of an activity, students differ in their self-efficacy for learning as a function of their prior experiences, personal qualities, and social supports. The latter includes the extent that parents and teachers encourage them to learn, facilitate their access to resources necessary for learning, and teach them self-regulatory strategies that enhance skill acquisition and refinement. Parents' academic aspirations for their children influence their children's academic achievements both directly and indirectly by influencing children's self-efficacy (Bandura, Barbaranelli, Caprara, and Pastorelli, 1996).

As they engage in activities, students are affected by personal (e.g., goal setting, information processing) and situational influences (e.g., rewards, teacher feedback) that provide students with cues about how well they are learning. Self-efficacy is enhanced when students perceive they are performing well or becoming more skillful. Lack of success or slow progress will not necessarily lower self-efficacy if learners believe they can perform better by expending more effort or using more effective strategies (Schunk, 1995).

Research on Self-Efficacy

Educational Correlates of Self-Efficacy

A wealth of research findings indicate that self-efficacy correlates with achievement outcomes (Bandura, 1997; Pajares, 1996; Schunk, 1995). Self-efficacy also correlates with

indexes of self-regulation, especially use of effective learning strategies. Self-efficacy, self-regulation, and cognitive strategy use are positively intercorrelated and predict achievement (Pintrich & De Groot, 1990). Students with high self-efficacy for successful problem solving display greater performance monitoring and persist longer than do students with lower self-efficacy (Bouffard-Bouchard, Parent, & Larivee, 1991). Writing self-efficacy correlates positively with students' goals for course achievement, satisfaction with potential grades, and actual achievement (Zimmerman & Bandura, 1994).

Predictive Utility of Self-Efficacy

The predictive utility of self-efficacy has also been tested using causal models. Schunk (1981) employed path analysis to reproduce the correlation matrix comprising long-division instructional treatment, self-efficacy, persistence, and achievement. The most parsimonious model showed a direct effect of treatment on achievement and an indirect effect through persistence and self-efficacy, an indirect effect of treatment on persistence through self-efficacy, and a direct effect of self-efficacy on achievement and persistence. Mathematics self-efficacy has been found to be a better predictor of mathematics performance than mathematics self-concept, math anxiety, perceived usefulness of mathematics, or prior experience (Pajares & Miller, 1994, and it has as powerful a direct effect on mathematics performance as does mental ability, a variable often presumed to be the strongest predictor of academic achievement (Pajares & Kranzler, 1995). Self-efficacy affects achievement directly and indirectly through its influence on goals (Zimmerman & Bandura, 1994).

Instructional variables affect self-efficacy in part through the intervening influence of attributions. Schunk and Gunn (1986) examined the effects on changes in children's division achievement due to use of strategies, attributions, and self-efficacy. Achievement was influenced

by use of effective strategies and by self-efficacy. The strongest influence on self-efficacy were ability attributions for success.

Effects of Instructional Practices on Self-Efficacy

Research in diverse settings has explored the effects of instructional and other classroom processes on self-efficacy. There is evidence in support of the hypothesized relations shown in Table 1 across grade levels, academic areas, and student's academic ability (Pajares, 1996; Schunk, 1995). Processes beneficial for developing self-efficacy include proximal and specific learning goals, strategy instruction and verbalization, social models, performance and attributional feedback, and performance-contingent rewards (Schunk, 1995). These processes inform students of their capabilities and progress in learning, and this information motivates students to continue to perform well.

Goal setting and self-efficacy are powerful influences on academic attainments (Zimmerman, Bandura, & Martinez-Pons, 1992). Learning goals that are specific, short-term, and viewed as challenging but attainable enhance students' self-efficacy better than do goals that are general, long-term, or not viewed as attainable. Students believe that they can attain the former goals, which offer clear standards against which to gauge progress. As students work on tasks, they compare their progress against their goals. The perception of progress strengthens self-efficacy and motivates students to continue to improve (Schunk, 1995). Providing students with a strategy that helps them succeed can also raise self-efficacy. Students who believe they have the means for performing successfully are apt to feel efficacious about doing so. As they work on tasks and apply the strategy, they note their progress, which strengthens their self-efficacy. Having students verbalize the strategy as they apply it—especially in the early stages of learning—also raises self-efficacy because the verbalization directs students'

attention to important task features, assists strategy encoding and retention, and helps them work systematically (Schunk, 1995).

Observing models demonstrate applications of skills raises students' self-efficacy for learning as well as achievement (Schunk & Hanson, 1985; Schunk, Hanson, & Cox, 1987). Modeled displays convey to observers that they are capable of learning. Students are likely to believe that if they follow the same sequence of steps they too will be successful. As we explained earlier, perceived similarity between models and observers is critical, especially for learners who may doubt their capabilities. In the early stages of learning, coping models may raise efficacy better than mastery models. Coping models initially have difficulty but work diligently, apply strategies, and gradually improve their performances. Mastery models perform flawlessly from the outset. Especially among students who often have trouble learning, coping models are perceived as more similar in competence and thus can have stronger impact on observers' self-efficacy (Schunk, 1995).

Feedback is a persuasive source of self-efficacy information. Performance feedback informs learners of goal progress, strengthens self-efficacy, and sustains motivation. Attributional feedback links outcomes with one or more attributions (perceived causes). In the early stages of learning, effort feedback is highly credible to students (e.g., "You got it right because you worked hard."). As skills improve, switching to ability feedback (e.g., "You are good at this.") may be more credible and have stronger influence on self-efficacy (Schunk, 1995).

As students work on tasks, they learn which actions result in positive outcomes, and this information guides future actions. Anticipation of desirable outcomes motivates students to persist. Rewards enhance self-efficacy when they are linked with accomplishments and convey

that students have made progress in learning. In contrast, rewards offered for task participation do not convey progress information (Schunk, 1983). Performance-contingent rewards and proximal goals raise children's self-efficacy equally well during mathematics learning, but combining rewards with goals lead to the highest self-efficacy and achievement (Schunk, 1984). This is likely because performance-contingent rewards and proximal goals each provide information to learners about their progress.

Much has been written about the deleterious effect on students' intrinsic interest of offering rewards for performing enjoyable tasks (Lepper, Sethi, Dialdin, & Drake, 1997). Less has been written about how students develop interest. The development of interest depends in part on enhanced self-efficacy. Proximal goals promote children's self-efficacy and intrinsic interest (Bandura & Schunk, 1981). Instructional practices should raise interest when they inform children they are making progress in learning and raise their self-efficacy.

Future Research Directions

The research findings we have described make it clear that self-efficacy affects motivation and achievement in children and adolescents. Additional research is required. In this section we suggest some directions especially relevant to these developmental levels.

Generality of Self-Efficacy

Research is needed on the extent that self-efficacy beliefs generalize from one domain to another and whether such generalization varies as a function of development. Self-efficacy typically is defined as perceived capabilities within specific domains (Bandura, 1997; Pajares, 1996). Although most researchers have not investigated whether self-efficacy generalizes beyond specific domains, there is some evidence for a generalized sense of self-efficacy (Smith, 1989).

We might expect some generality of self-efficacy from one educational domain to another. Students' initial self-efficacy for learning is affected by their aptitudes, prior experiences, and social supports (Schunk, 1995; see Table 1). Children who generally perform well in mathematics should have higher self-efficacy for learning new content than those who have had learning difficulties. Self-efficacy might generalize to the extent that the new domain builds on prior skills (e.g., self-efficacy for subtracting and multiplying may transfer to long division).

There even could be generalization across dissimilar domains to the extent that students believe the two domains share skills. Thus, students who believe that writing term papers and preparing science projects involve planning and organizing and who feel efficacious about planning and organizing may have high self-efficacy for performing well on their first science project. From a developmental perspective, we might predict that this tendency to generalize would increase with cognitive development and experience because older students could determine the prerequisites of the new domain and would draw on prior knowledge, but research is needed.

Self-Efficacy Outcomes

Future research needs to investigate how self-efficacy relates to its outcomes as a consequence of development. Bandura's (1986) point that self-efficacy influences choice of activities, effort, and persistence is seen most clearly in contexts in which behavior reflects performance of previously learned skills (e.g., engaging in feared activities). In academic settings, the influence of self-efficacy on these motivational indexes is complex.

The early school grades are skill oriented. Teachers assign tasks that they expect all students to master. Children's self-efficacy generally is high and they often overestimate their

capabilities (Pajares, 1996). Choice of activities is not a good index because students rarely get to choose the learning activities in which they engage.

Persistence also presents problems. Students typically persist on activities not necessarily because of high self-efficacy but rather because the teacher keeps them on task. Educational research has yielded inconsistent results on the relation of self-efficacy to persistence (Schunk, 1995). A positive relation may be found in the early stages of learning when greater persistence leads to better performance. As skills develop students should require less time to complete a task, which means that self-efficacy will relate negatively to persistence. With development, children are better able to determine how much persistence may be necessary to succeed. Thus, self-efficacy may predict persistence better at the higher grades. This issue needs to be explored during academic learning.

The same concerns apply to effort. Although learning problems begin to appear in the early grades, most children master the basic skills. Effort should be a more reliable outcome of self-efficacy with development, but research during academic learning is needed.

Technology Self-Efficacy

With the explosion of technology in schools research is needed on how students develop self-efficacy for learning to use technology. Although children and adolescents are increasingly more technologically competent, there remains wide variability among students.

As with other skills we should expect that performance attainments, vicarious experiences, and persuasive communications would influence self-efficacy in the context of sound instruction. Some questions that need to be addressed are: Do children benefit more from mastery experiences? Does exposure to technologically competent peer models enhance

adolescents' self-efficacy? How can technology be integrated across the curriculum to promote self-efficacy at different developmental levels?

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Table 1

Self-Efficacy for Learning and Achievement

	Pretask	**Task Engagement**	**Posttask**
Personal Qualities		Personal influences	Motivation
Prior Experience	Self-Efficacy		
Social Support		Situational influences	Self-Efficacy