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DETERMINANTS OF CHILDREN'S SELF-EFFICACY BELIEFS IN AN ACADEMIC ENVIRONMENT

by

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Abstract

Bandura proposed performance accomplishments and modeling as the most and second most important determinants of self-efficacy beliefs, respectively, with the effects of performance accomplishments being attenuated by locus of control beliefs. Using a sample of 304 standard four scholars, the predictive validity of these determinants was investigated in this dissertation. In study 1, the importance of performance accomplishments, modeling, locus of control and their interaction in predicting self-efficacy beliefs, was investigated. Modeling proved to be the only significant predictor variable, accounting for 28% of the variance in the data. In study 2, a number of environmental variables were investigated in conjunction with Bandura's proposed determinants. A regression analysis showed pupil participation in the classroom, a form of performance accomplishment, to significantly predict children's self-efficacy beliefs. These two studies indicated that the respective contributions of performance accomplishments and modeling to children's self-efficacy beliefs were in the same order of that proposed by Bandura. Possible explanations for the findings involved, firstly, the age difference between the present sample and the same peer sample to which the model was originally addressed. Secondly, the characteristics inherent in the teacher's position may be optimal in eliciting imitative behavior. However, Bandura's general proposals of performance accomplishments and modeling being critical determinants of self-efficacy beliefs, were supported in this research.

Determinants of Children's Self-Efficacy Beliefs

in an Academic Environment

The Cognitive Revolution

One of the clearest trends in contemporary psychology is the adoption of a cognitive perspective in general theory and research (Bandura, 1978; Dember, 1974; Mahoney, 1977a). This trend is very much in evidence in the field of 'behaviorism'.[1] Particularly in the last decade, a significant revision of 'environmental' or 'non-mediational' behaviorism--as typified by the statement that "a person does not act on the world, the world acts upon him" (Skinner, 1971, p. 161)--has evolved. Rather than emphasizing the importance of the environment per se, it is now recognized that the individual responds primarily to cognitive representations of its environment (Mahoney, 1977a; Meichenbaum, 1977).

A therapeutic perspective which adopts this conceptualization thus views maladaptive cognitive processes as partially responsible for pathological affect and behavior; and modification of these cognitive processes as a prerequisite for therapeutic improvement (Mahoney, 1977b). In accordance with this, the use of 'cognitive' treatment strategies, based on specific learning principles developed in laboratory research, has expanded. Such treatment strategies include Cautela's covert sensitization, covert negative reinforcement, covert reinforcement and covert extinction (1967, 1970a, 1970b, 1971); covert modeling (Kazdin, 1975); and imaginal systematic desensitization (Wolpe, 1974). In conjunction with the development of cognitive clinical techniques has been the discovery of the crucial role

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[1] There is no such thing as a monolithic system 'behaviorism'. This term, however, is used for heuristic purposes to refer to all those approaches which have arisen from and elaborated upon J.B. Watson's 'metaphysical' behaviorism. They have in common the aim of understanding human behavior by finding its overt/covert determinants through objective, scientific study, and the learning principles which have been the outcome of such research.

played by awareness in learning (Bandura, 1969; 1977a; Kanfer, Karoly & Newman, 1975). There has been a rapid extension of self-control self-management techniques which are thought to increase maintenance and generalization of clinical behavior change. These self-management techniques include self-administration of reinforcement contingencies (Bolstad & Kanfer, 1969; Drabman, 1973; Drabman & O'Leary, 1977; Epstein & Masek, 1978; Richards, O'Leary & Romanczyk, 1975); self-monitoring (Lovaas, 1977; Mahoney, 1974; Mahoney & Arnkoff, 1978); self-reinforcement (Bandura, 1976) and self-instruction training (Meichenbaum & Goodman, 1971; O'Leary, 1977; Watson & Tharp, 1972).

This growing recognition of cognitive factors has led to the formulation of cognitively-oriented theories that explain behavior in terms of the central processing of direct, vicarious and symbolic sources of information (Mahoney, 1974). However, rather than be a unifying trend in behaviorism lead to the virtual evaporation of overt behavior, Bandura proposes that the focus should be on the interplay among cognitive and behavioral "..... cognitive processes mediate changes and cognitive events are induced and altered most readily by experiences. Cognitive changes resulting from effective performance" (Bandura, 1977a, p. 191).

Focus on self-efficacy

This cognitive-behavior-environment interaction, or reciprocal determinism, is crystallized in a theory recently proposed by Bandura: namely perceived self-efficacy theory (1977a; 1977b).

Perceived self-efficacy is conceived as a common cognitive mediator modifying behavioral change (which includes efficacy expectations and outcome-contingency expectations). An efficacy expectation refers to "...the conviction that one can successfully execute the behavior required to produce the outcome" (Bandura, 1977a, p. 193). Cognitive processes that stem from perceived self-efficacy serve to create and strengthen these expectations of personal efficacy. As a person can perceive that certain behavior leads to certain outcomes without necessarily believing that he/she

himself/herself can master the behavior, response-outcome expectancies are differentiated. These expectancies refer to "the estimate that a given behavior will lead to certain outcomes" (Bandura, 1977a, p. 195).

The importance of the self-efficacy concept lies in its proposed effect on both the initiation and persistence of coping behavior. A person's belief in his/her own mastery might determine his involvement in activities judged to fall within his capabilities. Fear-provoking situations believed to exceed coping skills will in turn be avoided. Once behavior is initiated, efficacy estimations will affect how much effort will be expended. Given strong expectations of success, an individual will persist despite obstacles and aversive experiences. Mastery of such subjectively aversive experiences might then further reinforce a sense of personal efficacy, and aid him/her to ultimately overcome defensive behaviors. On the other hand, given low efficacy beliefs, coping behaviors will soon cease in the face of obstacles and the self-debilitating fears retained.

The importance placed on perceived self-efficacy in the above analysis, does not imply that these expectations are the necessary and sufficient conditions for coping behavior (Bandura, 1977a; Bandura, Adams & Beyer, 1977). Expectations alone will not produce the desired performance if the requisite competencies are lacking. Moreover, even imminent success will not necessarily produce the behavior. Yet, given sufficient capabilities and incentives, efficacy expectations are likely to be a major determinant of people's choice of activities, how hard they strive, and how long they will persist in their attempts.

In the social learning analysis, expectations of personal efficacy stem from four main sources of information. Experiences of personal mastery derived from performance accomplishments provide the most influential source of efficacy information. Success raises mastery expectations, while repeated failures lower them. Strong expectations

gained from repeated success generalize not only to decrease the impact of failure in a certain situation, but to other performance areas handicapped by irrational fears as well.

Bandura (1977a, 1977b) and Bandura, Jeffery and Gajdos (1975) point out, however, that the positive value of successful performance could be attenuated in several ways. Firstly, through discrimination processes: Depending on the safety margin in a fearful situation, successful performance is evaluated discriminatively. Success in a safe situation would not lead to modification of personal mastery beliefs. On the other hand, given success in a fear-provoking situation, efficacy estimations will increase. Attributional processes may further delineate the gains afforded from successful performance. Only if successful performance is attributable to his/her own efforts, will an individual's personal mastery expectations increase. Cognitive assessment of the difficulty level of the tasks will further affect the impact of performance accomplishment on perceived self-efficacy. Success at an easy task provides no basis for altering one's sense of personal efficacy. Mastery of a challenging task, however, provides such a basis.

While not as potent as direct mastery experiences, vicarious experiences provide a second source of information pertaining to efficacy expectations. Seeing others cope successfully with aversive situations, instills the expectation that the observer too can succeed in a similar situation, given similar persistence. However, because of the indirect nature of this source of information, it is likely to induce weaker and more fragile efficacy expectations.

Due to it being readily available, verbal persuasion is an oft used technique to influence human behavior. However, persuasion that situations which were too demanding in the past can now be mastered has no experien-

tial basis whatsoever. Thus, expectations of success instilled in this manner are highly susceptible to extinction in the face of any disconfirming evidence.

Finally, emotional arousal in a threatening situation provides a basis for formulating efficacy estimations. People rely partly on their state of physiological arousal in judging their anxiety and vulnerability to stress. As a high degree of arousal usually debilitates performance, individuals are apt to consider themselves more able to achieve success when not beset by tension and visceral arousal.

Self-Efficacy: Research and Criticisms

The relative recency of the self-efficacy theory delimits the amount of research pertaining to it. The research, undertaken mainly by Bandura and associates, is aimed at exploring the theoretical model proposed above (Bandura, 1977a; Bandura et al., 1975; Bandura & Adams, 1977; Bandura, Adams & Beyer, 1977).

The general format of the above research has been to expose snake phobic adults, severely debilitated by their fear, to a graduated series of performance tasks. These tasks require increasingly threatening interactions with a boa constrictor and/or corn snake. Ratings of fear/anxiety experienced during exposure to and performance of the tasks, as well as ratings of estimated success before and after task performance, were made by the subjects.

In a study by Bandura and Adams (1977) comparisons of efficacy expectations prior to and following treatment indicated that the extinction of anxiety aroused through symbolic desensitization, significantly enhanced self-efficacy beliefs regarding a snake threat. An analysis of the strength of efficacy estimations further indicated that the treatment increased the strength of these estimations. A second study reported by Bandura and Adams (1977) showed self-efficacy to be a better predictor of subsequent

performance than zero performance. In a study by Bandura et al. (1977), the desensitization programme involved graded interactions with a corn snake, subsequent to programme completion, subjects were given the opportunity for self-directed interaction with a red-tailed boa. These subjects experienced greater and more generalized fear reductions, as opposed to subjects who had undergone the programme without an opportunity for independent encounters with various snakes. This was thought to be due to an increased sense of personal mastery reported by the former.

Bandura (1977a), Barrera et al. (1975) and Bandura, Adams and Beyer (1977) compared participant modeling (i.e., observing a model perform a task then imitating the model's performance) and modeling (i.e., merely observing the model without attempting to perform any of the tasks). Analysis of the mastery expectations of the participant modeling and modeling only groups indicated the supremacy of directed mastery experiences in affecting estimations of personal efficacy.

A number of criticisms of the methodology and operations used in the above research to assess the assumptions of the self-efficacy model have arisen from Bowlby's (1973) comparison of self-efficacy and Valente-expectancy theory. The major criticism involves the exclusive application of the self-efficacy model to assess phobic behavior in restricted experimental situations. Bandura (1978a) indicates that this application is motivated largely by the "retrieval" nature of replication. While the effect of treatment procedures for other "psychological conditions" might be confounded by extra-therapeutic consistency with learned contexts, the snake phobic is unlikely to encounter the source of his/her fears, thus the internal validity of this research is maximized, thereby ensuring greater validity of the efficacy findings. The counter-argument, however, assumes an greater value by jeopardizing extreme internal validity for the purposes of external validity, thus rendering the results applicable to a wider

range of situations.

This internal-external validity argument is rendered somewhat meaningless by criticisms of typical psychological research, propogated by proponents of multidimensional research (Cooley, 1971; Kaplan & Litrownik, 1977; Kerlinger, 1973; Kerlinger & Pedhazur, 1973; Levin, 1976; Rotter, 1975). The traditional view of research studies the relationship between one independent variable and one dependent variable, then assesses the relationship between another independent variable and the dependent variable and, finally, attempts to combine the information obtained. This is typified in the self-efficacy research where, for example, the effects of performance accomplishments and vicarious learning on efficacy expectations are studied independently and then combined in the theory proposed by Bandura. However, such research ignores the complexity of the real world by ignoring the complex interaction of independent variables as they impinge on dependent variables.

A further source of experimental inadequacy is reflected in the statistical analysis employed in the self-efficacy research. The causal relationship between self efficacy estimations on the one hand, and performance accomplishments and vicarious experience on the other, is inferred from correlation-type data; namely, Pearson correlations and one-way analyses of variance. While there are different criticisms of the use of correlation-type data to support causal hypotheses, the general attitude towards this practice is negative: Birnbaum (1973, 1974) sees the danger of correlations--referred to as the "Devil's Advocate"--as the possibility of allowing even incorrect models to be supported by the data. Mayo (1977) regards a causal relationship inferred from such an analysis as reflecting the experimenter's confidence in the experimental design, rather than the nature of the data. Finally, Aronson and Carlsmith (1968) and Hamburg (1974) view the fundamental weakness of a correlational study to be its inability to allow causal inferences.

Borkovec (1978) criticizes the self-efficacy theory on conceptual grounds. He states that existing learning principles can adequately account for behavior change without recourse to unobservable cognitive events or excessive emphasis on "reactive anxiety conceptions of neurosis" (p. 1). However, in accordance with the metho-ological and statistical criticisms of the research held to support the self-efficacy theory, Borkovec (1978) is prepared to defer his conceptual criticisms in the face of adequate supporting research.

The Present Research

Bandura (1974) regards two methodologically different lines of research as necessary to secure a complete understanding of self-reinforcement. These involve, firstly, research into the acquisition and modification of performance standards for self-reinforcement. Secondly, research should assess whether self-administered consequences do, in fact, increase performance output. Extrapolating to perceived self-efficacy theory, this also indicates the need for two lines of research. One set of studies should be designed to assess whether self-efficacy beliefs are acquired from performance accomplishments, modeling, verbal persuasion and physiological arousal. A second set of studies should attempt to establish whether self-efficacy is a behavior change agent: i.e., is it critical to the initiation and maintenance of coping behavior?

Self-efficacy research to date (Bandura, 1977a; Bandura et al., 1975; Bandura & Adams, 1977; Bandura, Adams & Beyer, 1977) has concentrated on the latter. The aim of these studies has been to show that changes in snake phobics' avoidance behavior depend on creating and strengthening their expectations of personal mastery.

The present research, therefore, aims at assessing the determinants of self-efficacy beliefs, simultaneously taking cognisance of the methodological and statistical criticisms levelled at the available self-

assessment of these determinants. Firstly, the roles of performance and modeling in the acquisition of scholars' self-efficacy beliefs were investigated. In addition, locus of control, a performance accomplishment X locus of control interaction and a modeling X locus of control interaction were assessed in this first study. This research was then extended, and the effects of classroom environment on self-efficacy beliefs were investigated. This was conducted for two reasons: First, in recognition of the importance of the classroom environment from current research (Moos, 1974); and second, as it is deemed important to investigate whether other variables are not equally effective determinants of self-efficacy.

STUDY 1

The purpose of this first study was to establish the validity of the determinants of self-efficacy as proposed by Bandura (1977a, 1977b).

Barling's (1978) major criticism of the research forwarded to support the determinants of self-efficacy beliefs concerned the sole use of snake phobic subjects in controlled laboratory situations. However, Kazdin and Rogers (1978) maintain that if valid processes (or mechanisms of change in the case of self-efficacy) are identified in such analogue research, consistent findings should be produced when research is extended to achieve greater external validity: "Mechanisms of change would not be expected to differ depending upon who is treated, the precise circumstances of treatment, the therapist who provides the treatment, or other factors" (p. 115). In fact, consistent findings with different samples can only further validate the proposed model.

On the basis of the above, this study investigated whether the laboratory findings concerning the determinants of self-efficacy apply equally to a non-clinical sample of primary school children. The sample thus differed along two dimensions from the snake phobic subjects used in the self-efficacy research. Firstly, in terms of age, as subjects were now primary school children. Secondly, the children's self-efficacy beliefs now concerned a non-pathological behavior, namely, academic performance.

Definition and Measurement of Self-Efficacy Beliefs

Cooley (1971) emphasizes the importance of the definition and measurement of the dependent variable for the ultimate findings of any research. The use of a non-snake phobic sample and the lack of any standardized self-efficacy tests thus necessitated the formulation of an operational definition of self-efficacy so as to construct an appropriate instrument of measurement.

Bandura (1977a, 1977b) identifies efficacy expectations (i.e., the

subjective probability that a certain behavior can be mastered) and response-outcomes (i.e., the belief that a certain behavior leads to a certain outcome). The measures of efficacy expectations used in the studies with snake phobics involved subjects rating their anticipated success in performing graded tasks in a snake desensitization programme on a 100 point scale. The magnitude of efficacy expectations* was thus assessed by the total number of tasks the subjects expected to perform with a probability greater than 10. The strength of these estimations was indicated by adding the expectancy scores across tasks and dividing the sum by the total number of performance tasks (Bandura, 1977a, Bandura et al., 1975; Bandura, Adams & Beyer, 1977).

The present research was, however, predicated on the belief that a general self-efficacy expectation does not comprise only of efficacy expectations (which were used as the sole estimates of self-efficacy in the above studies). Any behavior is rendered irrelevant if isolated from the meaningful context, which is self-evident from reciprocal determinism, the hallmark of social learning theory:

> Behavior, interpersonal factors, and environmental influences all operate as interlocking determinants of each other... For example, people's efficacy and outcome expectations influence how they behave, and the environmental effects created by their actions in turn alter their expectations.
>
> (Bandura, 1978b, p. 346)

Thus, while an efficacy expectation provides an index of anticipated mastery over a certain behavior, the response-outcome belief involves the anticipated reward and thus the incentive for successful mastery of the particular behavior. Figure 1 indicates the perspective of self-efficacy taken in this research: An efficacy belief comprises of efficacy expectations and response-outcome beliefs.

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* Bandura (1977a, 1977b) indicates three dimensions along with efficacy expectations can vary. 'Magnitude' refers to the difficulty level of the task to which the efficacy expectation relates. 'Strength' indicates the intensity of the expectation, while 'generality' is an index of the range of situations to which the expectations apply.

Due to the importance placed on equally-weighted contributions of these two components to self-efficacy beliefs (a high level of self-efficacy can only be attained given high levels of efficacy expectations and response-outcomes) they are held to interact multiplicatively in the present study. Thus, a lowered self-efficacy level would necessarily result from a high response-outcome belief and a low expectation of mastery of the requisite behavior, and vica versa.

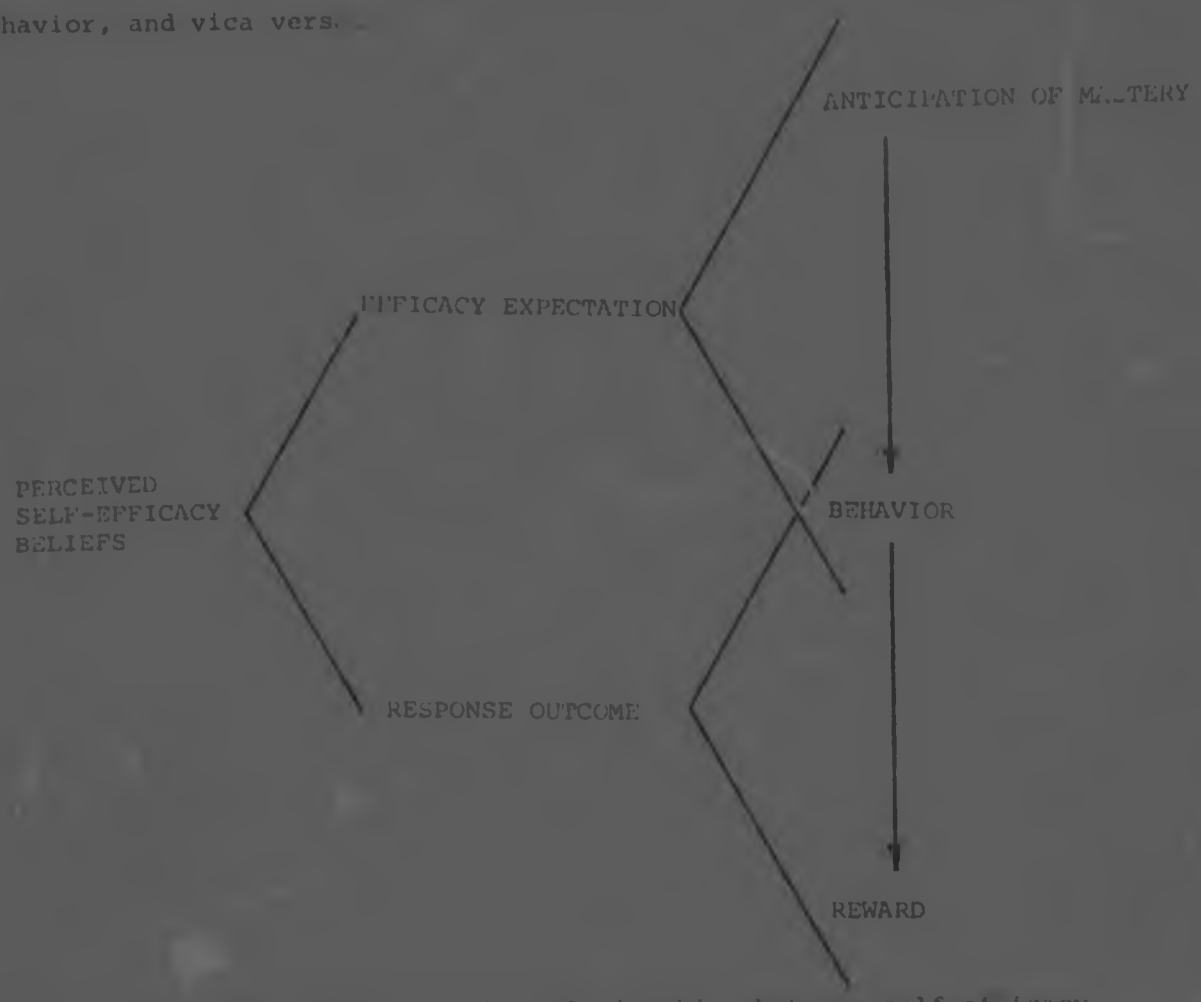


Fig. 1: Flow chart indicating the relationships between self-efficacy beliefs, efficacy expectations and response-outcomes.

This postulation resulted in the following practical implication: A self-efficacy scale had to be constructed to provide separate scores for efficacy expectation and response-outcome beliefs. These were then multiplied to provide a total index of self-efficacy estimations. Two factors motivated the use of the product of the efficacy and response-

outcome scores: firstly, the importance placed on equally-weighted contributions of these two beliefs to self-efficacy estimations; and secondly, the fact that the simple summation of a high and low score would produce a higher total than would the product of the scores.* A diminished self-efficacy belief would more accurately characterize the situation. (See apparatus section for further details on test construction).

Definition and Measurement of the Independent Variables

Given a practical conceptualization of the dependent variable, Isaac (1970) emphasizes the importance of defining the independent variables so as to allow for valid and reliable assessment.

Bandura (1977a, 1977b) proposed performance accomplishments, modeling, verbal persuasion and autonomic arousal as the determinants of self-efficacy. However, the research conducted by Bandura and his associates to empirically support these proposals has been limited to the contributions of performance accomplishments and modeling (Bandura, 1977a; Bandura et al., 1975; Bandura & Adams, 1977; Bandura, Adams & Beyer, 1977). Similarly, the present study was limited to an investigation of these determinants. The effects of verbal persuasion and autonomic arousal were not investigated since an adequate assessment of verbal persuasion would require some type of monitoring of this behavior, a procedure which could not be accommodated in this study. Furthermore, the role of autonomic arousal in the determination of self-efficacy was thought more applicable to autonomically-relevant behavior (such as the phobic behavior to which this model was originally addressed) rather than to children's academic behavior.

As stated at length in the previous section, performance accomplishments are regarded as most important in determining self-efficacy beliefs. Successful ones master expectations, while failures decrease their level. However, the effect of personal mastery experiences on mastery beliefs depends heavily on the individual's perceptions of the reasons for his/her

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* This situation would not apply if either the efficacy or response-outcome expectation assumed a value of zero.

success. Only success is seen as resulting from personal accomplishment or an internal locus of control (Lefcourt, 1966, 1976; Phares, 1976; Rotter, 1966), will it [illegible] performance accomplishment X attribution interaction gains support from the considerable research conducted regarding the locus of control attributions of scholars and their academic achievement (e.g., Brown & Strickland, 1972; Finch, Puzutti & Nelson, 1975; Otten, 1977; Solomon, Houlihan, Busse & Parelius, 1971).

Indices of performance accomplishment and locus of control were provided by end-of-year grade scores and achievement test scores, and the Intellectual Achievement Responsibility Questionnaire respectively (Crandall, Katkovsky & Crandall, 1965). Multiplication of these continuous variables provided an index of a performance accomplishment X locus of control interaction.

Vicarious experiences constitute the next most important source of [illegible] pertaining to self-efficacy beliefs. When seeing another individual execute a task successfully, the expectation might arise that the observer, too, might be able to perform the task successfully. A measure of vicarious experience was provided by establishing the self-efficacy of the school teachers most involved with the children. Two factors determined the choice of the teacher to assess modelling effects. Firstly, the central role fulfilled by the teacher in the classroom (Hamilton & Gordon, 1978; Meighan, 1978; O'Leary & O'Leary, [illegible]) importance is reflected in a host of research assessing the impact of, for example, the teacher's [illegible]ational goals and expectations of the child (Crano & Mellon, 1978; Halperin, 1976); teacher comments (Lobitz & Burns, [illegible] Stewart & White, 1976); teaching style (Domino, 1971; Johnson, [illegible] Johnson & Anderson, 1976; Kounin & Doyle; 1975; Kounin & Gump, [illegible] Scott, 1977) and teacher-student interaction and communication

(Firestone & Brody, 1975; Hudgins & Ahlbrand, 1970) on the child's academic performance, task involvement and perceptions of school. Secondly, the choice of the teacher as the model was motivated by research indicating which model characteristics facilitate vicarious learning. A prestigious or exemplary model has been found to affect an observer more than a model with no claims to prestige or power (Bandura, 1969; Bandura & Walters, 1963; Flanders, 1968); while research has demonstrated further that models who control resources of value to the child elicit a high rate of imitative behavior (Bandura, Ross & Ross, 1963; Grusec & Mischel, 1966; Hetherington & Frankie, 1967).

Consequently, with his/her absolute authority over rewards and punishment (e.g., gold stars or staying after school), particularly in the more traditional authoritarian school, the teacher could/should be a most powerful model of self-efficacy beliefs.

Research has indicated further that observer characteristics affect the extent to which modeling occurs. Persons lacking in self-esteem (de Charms & Rosenbaum, 1960; Gelfand, 1962) or who are incompetent (Kanareff & Lanzetta, 1960) have been shown to be particularly prone to imitate successful models. This motivated the hypothesis that locus of control may attenuate not only the effect of performance accomplishments on self-efficacy beliefs, but that of modeling as well. Those individuals placing more importance on external criteria (such as the involvement of significant others or chance/fate) than their own competence, may gain more from vicarious experiences than would persons with an internal locus of control. Consequently, an index of a modeling X locus of control interaction was again provided by the multiplication of the individual scores attained.

The purpose of the first study was thus twofold:

(1) To assess whether performance accomplishments, modeling and locus of control beliefs affect self-efficacy estimations independently; and in the

order of importance proposed by Bandura.

(2) To assess whether performance accomplishments, modeling and locus of control interact in influencing perceived self-efficacy beliefs.

Method

Subjects

Subjects comprised 504 secondary four students attending six Brisbane urban schools in the Johannesburg area. Sample sizes drawn from the six different schools were as follows: School A--86 subjects; School B--126 subjects; School C--69 subjects; School D--30 subjects; School E--42 subjects; and School F--85 subjects. The total sample consisted of 249 females and 255 males. The age range of the subjects was 14 years 4 months to 16 years 3 months with a mean age of 15 years 7 months (SD = 4.89).

All the children's class teachers were also used as subjects in this study. The teacher sample consisted of six males and ten females. No further demographic data was obtained from the teachers as this may have constituted an unnecessary invasion of their privacy. Moreover, such information was of no importance contextually.

Apparatus

Self-efficacy scale. As there is a lack of any measures of self-efficacy other than those employed to assess the self-efficacy beliefs of snake phobics (Bandura, 1977a; Bandura et al., 1975; Bandura, Adams & Beyer, 1977), there had to be constructed to assess students' and teachers' efficacy expectations in an academic environment. Consequently, a children's self-efficacy scale was constructed, consisting of 20 items covering the areas of reading, spelling, arithmetic, homework, science, history, geography, language (Afrikaans)[1] and attention in class. Ten of

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[1] The second language of the subjects.

[illegible] items were [illegible] efficacy expectations:

[illegible] "I can do most of my teaching".

The [illegible] two [illegible] [illegible] [illegible]

[illegible] "I can do an [illegible] [illegible] [illegible] a fuzzy one teacher's

example [illegible] totally".

A few [illegible] [illegible] [illegible] [illegible] [illegible]

positive items [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] about

ten items.

Items [illegible] [illegible] [illegible] [illegible] [illegible]

Responses were [illegible] [illegible] [illegible] [illegible] [illegible]

'YES' = 4. A score of 2 was [illegible] [illegible] [illegible] [illegible] response,

or no response; while reversed scoring applied to negative items.

The construct validity of the [illegible] was investigated by a principal

components factor analysis with [illegible] [illegible] [illegible]. The

[illegible] [illegible] efficacy [illegible] loaded on two separate

factors, each with eigenvalues greater than one, both explaining more than

10% of the variance (see Table 1). Due to the independent nature of the

two sets of test items as indicated by the factor analysis, these were

treated as two separate tests [illegible] [illegible] [illegible]

[illegible]. However, the small number of items in the two tests [illegible]

[illegible] 'inadequate' items [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] items for [illegible] [illegible] [illegible] and [illegible]

[illegible] multiple correlation [illegible] [illegible] [illegible] similar

[illegible] of [illegible] items. Deletion of these items increased the value

of the reliability coefficient.

the items were formulated to assess efficacy expectations:
e.g., "I can do most of my homework correctly".
The remaining ten items incorporated response-outcome beliefs:
e.g., "I can do my arithmetic more easily if I follow the teacher's examples carefully".
A few items formulated in a negative manner were interspersed with positive items such as the above to avoid errors due to social desirability:
e.g., "If I don't listen carefully during lessons, I am confused about them later".
Items were answered on a 'NO', 'SOMETIMES', 'USUALLY', 'YES' basis. Responses were then scored on a 1 to 4 scale, 'NO' being scored as 0, and 'YES' as 4. A score of 2 was reserved for items with more than one response, or no response; while reversed scoring applied to negative items.

The construct validity of the scale was demonstrated by a principal components factor analysis with varimax rotation (Child, 1970). The response-outcome and efficacy expectation items loaded on two separate factors, each with eigenvalues greater than one, both explaining more than 10% of the variance (see Table 1). Due to the independent nature of the two sets of test items as indicated by the factor analysis, these were treated as two separate tests and subjected to split-half reliability checks. However, the small number of items in the two forms, eight in each after 'inadequate' items[4] had been removed, rendered reliability estimates inadequate (Anastasi, 1976). Thus the Spearman-Brown formula, given below was used to estimate the reliability coefficients while correcting for the small number of items.

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[4] Those items for which the products of the standard deviation and the squared multiple correlation were the lowest in comparison to similar products of other items. Deletion of these items maximized the value of the reliability coefficient.

Table 1

Principal Components Factor Analysis with
Varimax Rotation for the Children's Self-Efficacy Scale
(N = 104)

Item No.	Factor 1	Factor 2	Communality
2	0.62	0.11	0.43
4	0.50	0.05	0.29
5	0.64	0.15	0.45
6	0.58	-0.07	0.37
8	0.52	0.06	0.31
10	0.61	0.08	0.37
20	0.56	0.18	0.41
24	0.46	0.40	0.38
1	-0.03	0.47	0.22
3	-0.15	0.24	0.08
16	0.12	0.49	0.39
7	0.21	0.53	0.33
12	-0.09	0.47	0.43
9	.19	0.38	0.19
17	0.25	0.48	0.23
18	-0.03	0.56	0.31
23	.06	0.51	0.27
Eigenvalue	4.48	2.44	
% Variance	18.67	27.80	

Note: Only significant loadings are reported, or those loaded significantly on both factors.

$$r_{kk} = \frac{n r'_{ij}}{1 + (n - 1) r'_{ij}}$$

where r_{kk} = the estimated coefficient

r'_{ij} = the obtained coefficient

and n = the number of times the test is lengthened.

Using this formula, reliability coefficients of 0.71 for the response-outcome scale and 0.71 for the efficacy expectation scale were obtained.

Due to the suggestion that response-outcomes and efficacy expectations combine multiplicatively to form self-efficacy beliefs, an overall self-efficacy score was derived from the multiplication of the items on the response-outcome and efficacy expectation factors.

A self-efficacy scale for teachers was constructed along the same lines. This scale consisted of five efficacy expectation items:

e.g., "I can usually cope with disruptive pupils in a class"; and

five response-outcome items:

e.g., "My teacher enjoy lessons more if I present them in novel and interesting ways".

While negatively formulated items were again interspersed with positively formulated items to prevent any errors of interpretation:

e.g., "I have difficulty in maintaining discipline in classes".

Responses were again indicated on a 'NO', 'SOMETIMES', 'USUALLY', 'YES' basis and scored from 0 to 4. 'NO' being scored as 0 and 'YES' as 4. A score of 2 was assigned when items were omitted or when more than one alternative was indicated.

A principle components factor analysis (with varimax rotation) of this scale indicated that response-outcome and efficacy expectation items again loaded on two separate factors. These factors, both with eigenvalues greater than unity, respectively contributed 40% and 28% of the variance (see Table 4).

Table 7

Principal Components Factor Analysis with Varimax
Rotation for the Teacher Self-Efficacy Scale
(N = 304)

Item No.	Factor I	Factor II	Communality
22	0.49	-0.[illegible]	0.[illegible]
1	0.67	0.41	0.[illegible]
7	0.72	0.28	0.[illegible]
9	0.51	0.04	0.[illegible]
6	0.[illegible]	0.21	0.[illegible]
5	0.24	0.93	0.[illegible]
4	0.[illegible]	-0.[illegible]	0.[illegible]
10	-0.[illegible]	-0.[illegible]	0.[illegible]
8	0.12	-0.13	0.[illegible]
3	-0.[illegible]		0.43
Eigenvalue	3.27	2.48	
% Variance	30.[illegible]	20.[illegible]	

Note. Only significant factors are reported.
Item 3 loaded significantly on both factors.

Reliability checks of the two sets of items loading on the two factors were somewhat meaningless due to the small number of items (8 items each when 'ineligible' items had been removed). The above Spearman-Brown formula was then used to assess the reliability of the complete scale, while correcting for the small number of items. Simulating a twenty-item test, the resulting reliability coefficient was 0.79. A total self-efficacy score for teachers was gained by calculating the factor loadings on the respective response-outcome and efficacy expectation factors.

(copies of the self-efficacy scales for children and teachers appear in Appendix A).

Measures of academic achievement. Academic achievement was assessed via two measures:

(1) Grade averages obtained at the end of the previous year.

(2) The spelling and arithmetic subtests of the Wide Range Achievement Test (Jastak & Jastak, 1965).

The Wide Range Achievement Test (WRAT) consists of three subtests--reading, spelling and arithmetic. Each subtest is divided into two levels: Level I is designed for use with children between the ages of 5 years 0 months and 11 years 11 months, while level II is geared towards all persons from the age of 12 years 0 months.

In the present research, only the arithmetic and spelling subtests of the WRAT were administered as these are suitable for group administration. The Level I forms of these subtests were used due to the necessity of only one form being used for purposes of comparison. While the age limit of 11 years 11 months was exceeded in 60 of the cases, this fine was more appropriate as 97% of the sample fell within this age range.

An overall score of academic performance was gained by adding the spelling and arithmetic test scores. Grade averages were excluded from this score, as a large number of these values were missing ($n = 12$) and would result in the exclusion of these cases in a regression analysis if to be assessed later. However, a correlation of .84 between the two WRAT scores and grade averages indicated that the former alone would be a reliable estimate of academic achievement.

The Intellectual Achievement Responsibility Questionnaire (Crandall et al. 1965). The Intellectual Achievement Responsibility Questionnaire (IARQ) measures children's beliefs regarding the perception of internal

versus external control of reinforcement responsibility, or locus of control, in intellectual-academic achievement situations. Each item consists of 14 forced-choice items. Each item describes either a positive or a negative achievement experience. It is followed by two alternatives, the one giving responsibility for the experience to the child, the other to someone else in the child's immediate environment, e.g., teacher, parent or peer.

For example:

"If a teacher passes you to the next standard, would it probably be

a. because she likes you, or

b. because of the work you did."

An equal number of positive and negative achievement experiences are described, due to the belief that the dynamics in ascribing responsibility for negative or upward positive experiences, differ. The questionnaire thus not only yields a total achievement responsibility score (I), but also the subscales which respectively measure responsibility for positive events (I^+) and negative events (I^-). Crandall et al. (1965) and Felker and Thawyck (1971) give scores, however, that these latter two subscales refer to two different 'personality dimensions', thus rendering the total I score meaningless. In accordance with this finding, the I^+ and I^- scores were used independently to assess internality/externality in this research.

Procedure

The data for this exploratory research was gained from a battery of selected tests in general self-efficacy and its proposed determinants. The tests were administered to scholars and their class teachers.

The test battery for the scholars included the following:

-- General information index, age, sex, school

-- Spelling and arithmetic subscales of the Kids Range Achievement Test

-- Self-efficacy scale

A self-efficacy scale was administered to the teachers.

The testers--three postgraduate psychology students--familiarized themselves with the test battery and an accompanying instruction sheet before the testing period. (See Appendices A and B for copies of the tests used and accompanying instructions respectively). Instructions included the tester introducing himself/herself to the class, information given to the students regarding the research programme, and the standard instructions associated with the tests comprising the test battery. Emphasis was placed on reassuring the children of the confidentiality* of their answers. The importance of reading through all the test items with the subjects was further emphasized. This was done to ensure that the subjects completed all the test items and to prevent 'fast' readers from attempting the next test in the battery, before adequate instructions had been given. Finally, this was aimed at helping 'slow' readers to complete the test in the time allotted by the principal.

The test battery was administered to the subjects in their respective classrooms in their respective schools, during school hours. The classes, three standard four classes in each school, were tested simultaneously by the three testers. The teachers were not present during the testing session at four schools; two, however, they were present on instruction of their principals. Nonetheless, the effect of the teachers' presence was minimal due to their not being involved in the testing whatsoever. On the contrary, their only participation was an occasional disciplinary comment when the class became too rowdy.

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* The children were told that their teachers would not get hold of their responses even though they had to supply their names.

[illegible] selected a random combination [illegible] of each plot to the reactors before the [illegible] reacting mixture. Due to varying combinations, they were [illegible] the ratios of [illegible] the most white [illegible] were being [illegible] a [illegible] and retained the rejected [illegible] were [illegible].

Statistical Analysis. The major statistical analysis of this study involved multiple regression (Darlington, 1968; Pedhazur & Tetenbaum, 1971). This procedure investigates the contribution made by more than two independent variables, X_i, to a dependent variable, Y. Specification of these relationships takes the format of a linear function between the dependent and independent variables:

$$Y' = A + B_1X_1 + B_2X_2 + \ldots + B_kX_k$$

where Y' is the estimated value of the dependent variable, Y;

A is the y-intercept of the regression line;

B_i is the regression coefficient; and

X_i the value of the independent variable.

The A and B_i coefficients are selected according to the least squares principle, which implies that the sum of the squared residuals $(y-y')^2$ is minimized.

Using a general linear model, a major assumption to be met before performing a multiple regression analysis is that the relationship between the dependent and independent variables should be linear. A test of linearity was thus conducted (cf. Nie, Hull, Jenkins, Steinbrenner & Bent, 1975). This follows a one-way analysis of variance procedure in which the between sum of squares is partitioned into a regression sum of squares and a deviation from linearity sum of squares. The linear component comprises that portion of the sum of squares which the independent variable accounts for when a standard linear regression model is applied to the data. The remaining portion of the between sum of squares comprises the non-linear

[illegible] Investigation of the form of linearity involves not only the F statistic provided by the above, but also the $\underline{r}^2$ statistic, which is an index of the amount of linear variance in the dependent variable explained by the independent variable. Furthermore, an eta-squared statistic is provided which indicates the total amount of linear and non-linear variance explained by the [illegible] variable. The difference between $\underline{E}^2$ and $\underline{r}^2$ squared thus provides a [illegible] of the non-linear [illegible] of the variance explained.

Given the significance of the deviation from linearity sum of squares and a substantial proportion of non-linear variance explained by a certain independent variable, the variable can be transformed to make the [illegible] or [illegible] linear. In this approach, called polynomial regression, successive powers of a predictor variable are inserted into the equation along with the original predictor. The general form of a polynomial regression equation with only one independent variable is as follows:

$$Y' = A + B^1 x + B^2 x^2 + \ldots + B^k x^k$$

is the simplest possible equation which adequately describes the relationship is found, it is best to test the null hypothesis that higher polynomials are not significant. This is achieved by entering the polynomials into the regression analysis in order: first, the original variable, the squared variable in the second step, the cubed variable in the third step, and so forth. Increases in $\underline{R}^2$ and significant $\underline{F}$ tests at each successive step indicate which [illegible] term would provide the best solution to the equation (cf. Blalock, 1972; Cohen & Cohen, 1975; Kim & Kohout, 1975; Nie et al., 1975, pp. 334-340).

The ordered inclusion of independent variables into the regression analysis referred to above, was also the procedure employed to investigate the interrelationship between self-efficacy, performance accomplishments, anxiety and locus of control.

This procedure, stepwise-analysis with hierarchical inclusion of variables, differs from the more commonly used forward stepwise inclusion method (Anderson, 1970). In the latter procedure, the first predictor selected for the analysis is the one that correlates the highest with the dependent variable. The next predictor selected is the one that, in combination with the first, best predicts the dependent variable. In the present analysis, the addition of successive predictors followed an a priori order determined by Bandura's perceived self-efficacy theory (Bandura, 1977a, 1977b). This choice of the hierarchical regression rather than the forward stepwise inclusion method was motivated by the purpose of the study: To establish whether the predictors follow the order proposed by Bandura. A further advantage of the hierarchical inclusion of variables is that the effect of each independent variable is adjusted only for those variables preceding it and deemed more important. This minimizes the possibility of main effects cancelling out the effects of one another (Overall & Spiegel, 1969).

Two hierarchical regression analyses were conducted. Firstly, the validity of the proposed determinants of self-efficacy was assessed, by entering them into the regression analysis in the following order: First, performance accomplishments; second, modeling effects; and third, locus of control. The second analysis involved the introduction of interaction terms into the equation: Performance accomplishments X locus of control and modeling X locus of control. These terms were introduced successively after the main effects. An interaction could thus only be significant if it explained a substantial proportion of the variance, as the variance explained by the main effects had been controlled for by their prior inclusion.

A number of methods such as beta weights, unstandardized regression weights and meaningfulness are available to assess the effect of the

independent variable, X_1, on the dependent variable, Y (Darlington, 1968; Cohen & Cohen, 1975; Pedhazur, 1973). However, the following method of interpretation was employed in this analysis: Each new variable or interaction added to the analysis had to account for a significant increase in the variance already explained by preceding variables for it to be considered a determinant of self-efficacy.

Results

Tables 3 and 4 report the results of linearity tests conducted between the dependent variable, self-efficacy, and the independent variables, modeling and locus of control for positive events.[A]

Table 3

Test for Linearity of Relationship between Self-Efficacy and Modeling

Source of Variation	df	Sum of Squares	Mean Square	F
Between groups	4	7.13	1.45	3.77*
Linearity	1	1.01	1.01	1.31
Deviation from Linearity	3	6.80	2.13	4.85*
	η = 0.48	η^2 = 0.00		
Within groups	500	474.51	0.65	
	eta = 0.13	eta^2 = 0.35		
Total	504	481.64		

* $p < .01$

[A] This refers to a group of control subscore obtained from the positive items of the Intellectual Achievement Responsibility Questionnaire (IAR2). This subscore was analyzed independently of the IAR2 subscore provided by negative items of the test, as these scores have been found to refer to different 'personality constructs' (Crandall, Katkovsky & Crandall, 1965; Nowicki & Strickland, 1973).

From Table 4 it is evident that modeling accounts for a significant proportion of the deviation from zero-order sum of squares ($F = 4.91$, $p < 0.01$), whereas not significantly accounted for by any linear variation. Inspection of the $\underline{r}^2$ (0.04) and eta^2 (0.02) statistics indicate that the 2% of variance in self-efficacy scores explained by modeling, contributes only non-linear variance.

A similar inspection of Table 4 indicates that level of control for positive events (mastery) does not account significantly for the linearity sum of squares ($F = 2.85$, $p < 0.01$). The difference between $\underline{r}^2$ and eta^2 (0.02 - 0.00) shows that the non-linear proportion of the variance established by mastery constitutes 2% of the total variance.

Table 4

Test for linearity of relationship between self-efficacy and level of mastery treatment

source of variation	df	sum of squares	mean squares	$\underline{F}$
between groups	3	6.61	1.20	4.91*
linearity	1	0.69	0.69	2.85
deviation from linearity	2	5.38	2.69	9.92*
	$\underline{r}$ = 0.04	$\underline{r}^2$ = 0.00		
within groups	60	121.49		
	eta = 0.14	eta^2 = 0.02		
total	63	337.28		

* $\underline{F}$ = 0.01

Similar tests for linearity were conducted between self-efficacy and the remaining two independent variables, performance accomplishments and level of control for negative events (vicarious). The relationship between these

two independent variables and self-efficacy were shown to be linear, as neither explained a significant proportion of the deviation from linearity sum of squares ($p > 0.05$). Furthermore, the percentages of nonlinear variance explained by the predictor variables, as indicated by $eta^2 - r^2$, were respectively .01 for Imagery and .01 for Performance Accomplishments.

Due to the curvilinear relationships between self-efficacy and modality and locus of control for positive events, a regression analysis with cubic term inclusion was performed to assess which of the polynomial terms of these two independent variables significantly predict self-efficacy. The results of this analysis are reported in Table 5. As mentioned in the section, "Statistical Analysis", a variable entering the regression equation had to account for a significant increase in the variance already explained by preceding variables for it to be considered a determinant of self-efficacy beliefs. From the upper portion of Table 5, it is evident that the linear, quadratic and cubic variables of the predictor variable all accounted for a significant increase in R^2. The linear component of Positive Outcomes/Self accounted for 12% ($p < 0.01$) of the variance in self-efficacy scores, whereas the quadratic component explained 11% ($p < 0.01$). The cubic component of Positive Outcomes/Self explained 1% of the variance ($p < 0.01$). The quadratic component for Imagery ($p < 0.01$) while the cubic component explained 1% of the variance in the dependent variable ($p < 0.01$). All F-values were significant ($p < 0.01$) in all cases.

The lower section of Table 5 reports the regression analysis conducted with the higher polynomial terms. The linear component of Imagery accounted for none of the variance in self-efficacy scores, whereas the quadratic component explained 01% of the variance. The corresponding F-value (355.86) was highly significant ($p < 0.01$). The cubed polynomial, Imagery, was not included in the analysis at the tolerance level (i.e., the proportion of variance not explained by the independent variables already in the equation) insufficient for further consideration.

Table 6 is a summary of the results of the final regression analysis in which the independent variables (plus all significant polynomial terms)

Table 5

Regression Analysis to Determine which Polynomial Terms Best Predict Self-Efficacy

Polynomial term entering equation	Step	Multiple R	Increase in R^2	F
Modeling	1	0.15	0.02	11.20*
$Modeling^2$	2	0.38	0.12	70.59*
$Modeling^3$	3	0.53	0.14	97.93*
IARQpos	1	0.15	0.00	0.11
$IARQpos^2$	2	0.66	0.43	355.86*
$IARQpos^3$	Tolerance level insufficient for ther computation			

* $p < 0.01$

and interaction terms[1] were entered into the equation in a predetermined order. The step in which each variable was entered into the equation, as well as the multiple R, the increase in R^2 accounted for by each of the independent variables and the corresponding F-values, are reported in Table 6.

Inspection of the analysis of the main effects shows that only the modeling terms, entered in steps 2 through 4, predicted self-efficacy significantly: The increases in R^2 provided by the quadratic and cubed modeling components, 12% and 14% respectively, are significant as these terms enter the equation (modeling^2: F = 65.10; modeling^3: F = 90.11) as well as in the final equation (F-values 90.17 and 53.29 respectively).

[1] The three significant modeling polynomials, plus the IARQpos and IARQneg alternatives for locus of control, provided a large range of variations to assess the performance X locus of control and modeling X locus of control interactions. Cohen (1968), however, advises against the use of a large number of interactions which increase the degrees of freedom and thus bring about an increased risk of spuriously significant results. Thus,

However, the linear modeling component, explaining 25% of the variance, was only significant as it entered the equation (F = 10.19). Neither performance accomplishments entered in step 1, nor the positive or negative locus of control subscores entered in steps 5 and 6 respectively, accounted for a significant proportion of the variance in the dependent variable.

Table 6

The Determinants of Self-Efficacy: Summary of a Hierarchical Regression Analysis

Independent variable entering equation	Step	Multiple R	Increase in R^2	F	
				To enter equation	In final equation
Main effects					
Performance	1	0.021	0.000	0.21	0.25
Modeling	2	0.148	0.021	10.19*	1.69
Modeling^2	3	0.278	0.121	65.10*	90.17*
Modeling^3	4	0.533	0.140	90.31*	53.29*
IARQpos^2	5	0.535	0.003	1.62	0.32
IARQneg	6	0.537	0.002	1.98	0.87
Interaction effects					
Performance x IARQpos^2	7	0.537	0.000	0.08	0.15
Modeling x IARQpos^2	8	0.552	0.017	10.90*	10.91*

* $p < 0.01$

The interaction effects, performance X locus of control and modeling X locus of control, were entered into the equation in steps 7 and 8. While

IARQpos^2 and modeling^3 were chosen to represent modeling and locus of control when assessing interaction effects, as these terms explain more variance in the self-efficacy data than do their alternatives.

the performance X locus of control interaction did not account for a significant increase in R^2, the modeling X locus of control interaction explained 1.7% of the variance in the self-efficacy data ($F = 10.91$). All the F values mentioned in the above description of Table 6 were significant ($p < 0.01$).

Discussion

Bandura (1977a, 1977b) proposed performance accomplishments to be the most important source of information from which self-efficacy beliefs can be derived, with modeling the second most important source of such information. However, the results reported in the previous section do not support these proposals. Performance accomplishments were not found to explain a significant proportion of variance in self-efficacy data. In fact, R^2, an index of the amount of variance in the dependent variable explained by the independent variable, had a value of zero. Modeling on the other hand, explained (significantly) a larger proportion of the variance. Combining the R^2 changes accounted for by the quadratic and cubic polynomials, 2[illegible] of the variance in self-efficacy scores was explained by modeling. This figure increased to 28% when the linear modeling component was added, though this component was only significant on entering the analysis, not in the final equation.

Bandura proposed further that the effects of performance accomplishments are attenuated by attribution or locus of control, as these beliefs indicate the factors responsible for success/failure. This proposal was not supported in the analysis of the contribution of locus of control beliefs to self-efficacy as a main effect. Neither the positive nor the negative subscores provided by the Intellectual Achievement Responsibility Questionnaire explained a significant proportion of self-efficacy variance. It might be argued, however, that the regression of a performance X locus of control interaction on self-efficacy beliefs would best test the proposed

relationship between self-efficacy, performance accomplishments and locus of control. This interaction effect did not explain a significant amount of self-efficacy variance either: As in the case of performance accomplishments, this interaction accounted for an R^2 change of zero.

The immediate problem raised, is the reason for this deviation from Bandura's perceived self-efficacy theory. On the basis of Kazdin and Rogers' (1978) assertion that valid mechanisms of change identified in analogue research should remain unchanged when research is extended to attain greater external validity, the validity of Bandura's model becomes questionable. A possible explanation is that the extension of the model to a sample of children and their academic behavior, is too far removed from the model's original sphere of application. An alternative hypothesis may be suggested. While the findings of this research seem to question the validity of the determinants of self-efficacy as proposed by Bandura (1977a, 1977b), any judgements as to the validity of the entire theory should be reserved until more extensive research has been conducted. Such research lies within the realm of the second line of research proposed by Bandura (1974): That is to assess whether self-efficacy beliefs determine the initiation and maintenance of coping behavior.

As will be evident in later discussions, perceived self-efficacy theory may carry great heuristic potential for therapy and education. Such confidence in the utility of this theory necessitates a consideration of possible reasons for the present research not supporting Bandura's proposals of the determinants of self-efficacy beliefs. Some possibilities are provided by research dealing with self-concept and self-esteem.[a]

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[a] Research relating to self-concept and self-esteem are considered to have some relevance to perceived self-efficacy, as these three concepts all refer to the individual's feelings/beliefs about himself/herself and his/her abilities. It is quite plausible that changes in self-efficacy beliefs, whether positive or negative, might affect an individual's self-esteem or self-concept accordingly.

Rubin (1978) conducted a study to establish the stability of self-esteem ratings over time, and their relation to academic achievement. Two groups of subjects were used: Group A, members of which completed a self-esteem inventory and achievement tests at ages 9 and 12; and Group B, who completed the same tests at ages 12 and 15. Pearson correlations showed greater test-retest reliability for Group B than Group A. Of greater importance to the present research is the finding that correlations between self-esteem and academic achievement increased over the 9 to 15 year range. Extrapolating to self-efficacy and its proposed major determinant, performance accomplishments, this implies that successful performance may not be such an effective source of information for self-perception in younger children. With the mean age of the subjects used in the present research being 11 years 7 months, the relative unimportance of performance accomplishments as a determinant of self-efficacy beliefs may thus be accounted for.

Furthermore, the relative youth of the sample used may also explain the importance of modeling as a self-efficacy determinant. Thelen, Paul and Roberts (1975) found that younger children imitate more than do their older counterparts in unstructured situations. The notion that modeling may constitute the most important source of information relating to self-perceptions (whether self-efficacy, self-concept or self-esteem) in younger children is further supported in a study by Brady, Figgueres, Felker and Garrison (1978). With the belief that positive self-statements increase self-concept, a teacher-training programme was developed to enable teachers to facilitate the development of a positive self-concept in their students through 'teaching' self-evaluation and self-reinforcement (Felker, Stanwyck & Kay, 1973). This was achieved by focusing on five 'Keys' to enhance self-concept. These five keys were:

KEY 1: 'Adults, Praise Yourselves';
KEY 2: 'Teach Children to Praise Themselves';
KEY 3: 'Teach Children to Praise Others';
KEY 4: 'Teach Children to Set Realistic Goals';
KEY 5: 'Help Children Evaluate Realistically'.
(Brady et al., 1978, p. 434).

The relationship of each of the individual 'Keys' to self-concept, anxiety and achievement responsibility was investigated by performing three regression analyses. Of interest here, is the analysis with self-concept as the dependent variable and the five 'Keys' as predictor variables. The male and female self-concept scores were predicted by Keys 1, and 3, thus entirely by praise/reinforcement variables. Key 1, in which teachers were trained to serve as classroom models for self-rewarding behavior, was the most powerful predictor of self-concept. It accounted for 28% of the variance in male self-concept scores, and 25% in female self-concept scores.

The findings of the Brady et al. (1978) study are most similar to those of the present research. Not only is modeling the most important predictor of self-efficacy and self-concept, but it also explains similar proportions of variance in the dependent variables: 28%, 25% and 28% for male self-concept, female self-concept and self-efficacy respectively.

Further reasons for the importance of modeling in general for younger children could probably be found within a developmental framework. For example, it might be proposed that with increasing maturity, individuals rely more on their own judgement, opinions and feelings; while the judgement and advice from significant others, such as parents and teachers--hitherto of crucial importance to the child--decrease in value. This notion, however, requires further empirical justification.

Reasons for the efficacy of the teacher as a model for scholars could be found in the original motivation for using the teacher as model in the present research. Reviews by Bandura (1969), Bandura and Walters (1963) and Flanders (1968) demonstrated that prestigious or exemplary models facilitate vicarious learning to a greater extent than do models with no claim

to power or prestige. Furthermore, models with control over resources of value to the child elicit a high rate of imitative behavior (Bandura et al., 1963; Grusec & Mischel, 1966; Hetherington & Frankie, 1967). While there is some uncertainty as to the optimal age of the model relative to that of the observer (Kirkland & Thelen, 1977), a study by Jakubczak and Walters (1959) found adult models to be superior to peers in effecting changes in subjects' acceptance of help from others.

Within the framework of traditional education, the teacher wields tremendous power/authority relative to the small amount of freedom enjoyed by the child (Hamilton & Gordon, 1978; Meighan, 1978; O'Leary, 1977b). The teacher fulfils a crucial role in determining what the child has to learn, regulating times for work and play, establishing rules of conduct and evaluating the child's academic performance (Ginsberg, 1972). This is particularly true for teachers used in the present study. While attempts were made to sample schools falling along a continuum from traditional to more open, integrated schools, the South African education system favours the traditional framework. The sample used in the present study thus consisted largely of schools and teachers with a more traditional, authoritarian approach to teaching.[9]

In conclusion, the findings of Study 1 provide support for the validity of only one of the determinants of self-efficacy as proposed by Bandura; namely, modelling. The discrepancy between this finding and Bandura's theory is firstly ascribed to the relatively greater importance of modeling than performance accomplishments to the young child's self-efficacy beliefs.

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[9] Using a subjective assessment, three schools participating in this research adhered to the traditional teaching approach; one was considered borderline due to the adoption of both traditional and open teaching methods; while the remaining two schools adhered fully to the philosophy of open education.

Secondly, the characteristics associated with the teacher in a more traditional school being optimal in facilitating modeling effects, are thought to contribute to the importance of this predictor variable.

As the determinants of self-efficacy as proposed by Bandura (1977a, 1977b) were not supported in Study 1, the search for other determinants of self-efficacy beliefs was extended in Study 2. This search was motivated by the 72% of self-efficacy variance left unexplained by the independent variables investigated in Study 1. Due to the potential value of perceived self-efficacy to education (to be discussed) the focus of this exploratory research was the classroom environment. The importance of the latter has only been realized in research conducted over the past decade. Consequently Study 2 involved a search for environmental factors--either equivalents of, or related to, Bandura's original determinants--which may further determine the formation of self-efficacy beliefs. In addition, these environmental factors were compared to the performance accomplishment, modeling and locus of control determinants proposed by Bandura.

STUDY 2

> One had to cram all this stuff into one's mind, whether one liked it or not. This coercion had such a deterring effect that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year. It is in fact nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of enquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wrack and ruin without fail. It is a very grave mistake to think that the enjoyment of seeing and searching can be promoted by means of coercion and a sense of duty. To the contrary I believe that it would be possible to rob even a healthy beast of prey of its voraciousness, if it were possible, with the act of a whip, to force the beast to devour continuously, even when not hungry--especially if the food, handed out under such coercion, were to be selected accordingly.
>
> Albert Einstein

Failure at school the increasing need for school psychologists to deal with scholars' emotional problems and the rapidly expanding field of remedial education, all point to the fact that unlike Einstein many children are not surviving the tortures of modern education. It would be ridiculous to hold our education systems responsible for all the evils in a twentieth century society. However, the question as to why a child who has had the resourcefulness, persistence and intelligence to master a task as difficult and abstract as the acquisition of language, should fail at school, is most valid. As evidenced in publication titles, investigations into the nature of education have pointed out the culprit: "The Underachieving School" (Holt, 1970); "Teaching as a Subversive Activity" (Postman & Weingarten 1969); and "Compulsory Miseducation" (Goodman, 1964).

The problem of modern education has been identified as the lack of freedom in learning experienced by the child. Content learning is emphasized, while insufficient attention is given to the emotional and social development of the child (Elardo & Elardo, 1976; Finlayson, 1973). Open education, granting the child the freedom to learn at his/her own pace according to his/her interests, has been proposed as a possible solution

to this problem[10] (Elias & Elias, 1974; Shiffler, Lynch-S[illegible] & Nadelman, 1977). The teaching of more general coping skills (e.g., problem-solving skills) has also been suggested, rather than the comparatively valueless memorization of content which is emphasized in contemporary schools.

It is along these lines that the concept of self-efficacy may have some value. Given that the determinants of children's self-efficacy beliefs can be identified, as in the case of modeling in the previous study, a child can be taught to hold a general conviction/belief regarding his/her abilities: For example, "I can do most things if I put enough effort into them". Thus, rather than be daunted by the increasing demands of education, such a belief would trigger the initiation and maintenance of the required behavior: Due to his/her belief in his/her ability, the child will persist until achieving, for example, the successful solution of a maths problem; or change his/her behavior if it is not appropriate to achieving success. For this child, the pleasure of success will further enchance his feelings of personal success. In turn, the latter has been found to correlate with superior adjustment (Pishkin & Thorne, 1968). Thus, self-efficacy beliefs learned in school will have an application outside of school--which, after-all, is the general aim of education: Namely, equipping children with skills that enable them not only to successfully perform their chosen role in life, but to be able to choose it as well (Anderson, 1970). It must be noted, however, that this focus on self-efficacy does not absolve schools from teaching the basic skills necessary to perform most tasks. This point is emphasized by Bandura (1977a, 1977b): No matter whether the motivation to perform a task and efficacy expectations are present, the task can be performed successfully only if the individual has mastery over the requisite skills.

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[10] More detailed descriptions of open education can be found in Krasner and Richards (1975), Ruedi and West (1973) and Winett (1973).

These beliefs regarding the potential value of self-efficacy in education prompted the present exploratory research regarding additional determinants of self-efficacy beliefs. The choice of environmental factors as the focus of this research was determined by the increased importance attributed to environments in determining behavior (Kelly, 1966; Krantz & Risley, 1977; Trickett & Moos, 1973). This has led to the search for behavior-environment, or person-situation, relationships in psychiatric wards (Moos & Houts, 1968); juvenile correctional institutions (Moos, 1968a; Wilkinson & Repucci, 1973); a therapeutic community milieu (Moos, 1968b); as well as in subject variables, such as the relationship between leadership and seating position in an academic environment (Hiers & Heckel, 1973).

A similar interest has developed in the impact of the classroom environment of the child on his/her academic performance. This is most clear in attempts made to construct indices of classroom environment (Barker-Lunn, 1969; Brophy, Coulter, Crawford, Evertson & King, 1975; Finlayson, 1973; Michaels, 1977; Moos, 1978; Slavin, 1977; Trickett & Moos, 1973; Withall, 1949, 1951).

The social climate of classrooms is thought to be particularly important in determining the learning efficiency of students. This refers to the 'personality' of the environment, which is thought to be as unique as the personalities of people. It is the social climate which is responsible for the classroom atmosphere being regarded as, for example, co-operative, competitive or punitive. Factors thought to contribute to classroom climate involve the interpersonal relationships among pupils, relationships between teacher and pupils, attitudes of the students to the subjects under study, and finally, the pupil's perceptions of the structural characteristics of the classroom (Anderson, 1970).

These factors investigated in the present research involved, firstly,

the student-teacher relationship as is measured on the Attitude toward Teachers scale (Arlin & Hills, 1974). The scale provides an index of the pupil's liking for the teacher, particularly in terms of the freedom given to the pupil, the innovations in lesson presentation and personal interest taken in the scholar. This factor was thought to have considerable implications for self-efficacy beliefs, particularly due to the importance of modeling effects, as demonstrated in Study 1. It was proposed that a highly-regarded model would be more effective in eliciting imitative behavior, than a model disliked by the observer.

A second factor concerned the pupil's perceptions of the structural characteristics of the classroom. The Attitude toward Learning Processes scale (Arlin & Hills, 1974) indicates the degree of freedom experienced by the pupil, and thus provides an index of open education. Using self-esteem as an approximation of self-efficacy, a number of studies suggest the possibility of the structure of the classroom affecting self-efficacy beliefs. Bell, Zipursky and Switzer (1976), Groobman, Forward and Peterson (1976), Neill (1968) and Ramayya (1972) all found children in open classrooms to have higher self-concepts than their counterparts in traditional classrooms. This finding is held to be due to two characteristics of the open classroom: Individualized instruction and the lack of failure when the scholar proceeds through the syllabus at his/her own pace. Academic achievement in open classrooms has further been found to surpass that in traditional classrooms (Enhel & Klein, 1978; Feiss & Dyhdalo, [illegible]; Solomon & Kendall, 1976). These results, however, must be treated with some caution due to the contradictory findings in research comparing open and traditional schools. Ruedi and West (1973) did not only find that children in traditional classrooms attained higher academic grades than did children attending open schools; but also that their subjects did not differ with regard to self-esteem. Featherstone (1967a, 1967b) has

also reported that children attending traditional schools achieve higher scores on conventional tests than open class scholars; while Klass and Hodge (1978) did not find open and traditional schools to affect pupils' self-concept differentially. A study by Shiffler et al. (1977) renders this issue even more equivocal. This study involved a comparison of two groups of children attending a school with an open education philosophy. The first comprised of pupils with a high self-concept, the second group of low self-concept subjects. They found that the first group showed a higher percentage of task-oriented behaviors, while the low self-concept group showed a high percentage of non-directed behaviors. Thus it seems possible that an interaction exists between self-concept and academic achievement, which may have been confounded in studies employing the structure of the school (i.e., open versus traditional) as an additional independent variable. However, on the basis of the studies supporting open education as a facilitator of positive self-perceptions and academic performance, this factor was investigated as a potential determinant of self-efficacy beliefs. These findings would not only have relevance to self-efficacy beliefs, but also give further information relevant to this contentious issue.[11]

Finally, due to the general importance of the social climate [illegible] behavior, various aspects of classroom climate as provided [illegible] the Classroom Environment Scale, or CES, (Trickett & Moos, 1974) were investigated as potential determinants of self-efficacy beliefs. While the CES is designed

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[11] While the structure of the classroom was investigated as a possible determinant of self-efficacy, attempting to solve this issue was beyond the scope of this research. It must be noted, however, that longitudinal research in this area, while long overdue, might provide some solutions to this problem. Only by studying children attending these two types of school over time can it be established whether they do, in fact, differ with regard to academic achievement; and if so, whether these differences are accounted for by their schooling rather than other factors.

to provide nine dimensions of social climate relating to relationship, personal development, system maintenance and system change dimensions, a factor analysis of the scale was conducted for reliability and validity reasons (see 'Apparatus' for further details). The factor analysis produced three significant factors--student participation, teacher participation and rule specification. Due to the greater reliabilities of these factors and the pressure towards using the most specific and valid of predictor variables (Cohen, 1968; Kerlinger, 1973), these three factors rather than the nine CES subscale, were assessed as possible determinants of self-efficacy beliefs.

The purpose of the present research, therefore, was to investigate the contribution of various social climate variables (attitude to teacher, structure of classroom, teacher participation, student participation and rule specification--to self-efficacy beliefs. The contribution of these factors was investigated in conjunction with the performance accomplishment, modeling and locus of control determinants proposed by Bandura (1977a, 1977b).

Method

Subjects

Since the same subjects were used for both these studies, the information will not be provided again here. Rather, a description of the sample is available in the first study (see p. 17).

Apparatus

Children's self-efficacy beliefs, a modeling effect, locus of control beliefs and performance accomplishments were respectively assessed via a child self-efficacy scale, the Intellectual Achievement Responsibility Questionnaire (Crandall et al., 1965) and the Wide Range Achievement Test (Jastak & Jastak, 1965). Full details regarding these tests and the manner in which they were employed in the present research appear in the section 'Apparatus' in Study 1 (see pp. 17-25).

Descriptions of the tests used to assess various aspects of the social climate in classrooms follow.

The Classroom Environment Scale (Moos & Trickett, 1974). The Classroom Environment Scale (CES) was developed to assess the social climates of classrooms. The CES Form R, consisting of 90 true-false items, constitutes nine separate subscales which reflect the respondent's perceptions of current teacher-student and student-student relationships, as well as the organizational structure of the classroom. Briefly, these subscales are:

Involvement:	Assesses the active involvement of students in class activities and discussions.
Affiliation:	Ascertains the degree of friendship between students.
Teacher support:	Measures the amount of help, concern and friendly behavior given towards the students.
Task orientation:	Assesses the emphasis on staying with the task and completing planned class activities.
Competition:	Measures the emphasis placed on students competing for grades and recognition.
Organization:	Ascertains the orderliness of the classroom in terms of students' calm and polite behavior and the organization of assignments and class activities.
Rule clarity:	Assesses the importance of cooperating and following a clear set of rules and the students' knowledge of the consequences of violating these rules.
Teacher control:	Measures the extent that rules are enforced and the severity of punishment for rule violation.

Innovation: Assesses the degree of student participation in the planning of classroom activities as well as the amount of unusual and varying activities and projects planned by the teacher.

A 36-item Short Form (Form S) of the CES is available for rapid assessment of a classroom's social climate. It consists of four items with the highest item-to-subscale correlations chosen from each of the nine subscales. While not deemed suitable for comparisons of individuals (Moos & Trickett, 1974) it may be used for inter-class or inter-school comparisons. Form S was thus used to assess the children's perceptions of the classroom environment, as the inclusion of Form R in a lengthy test battery would have overburdened the scholars unnecessarily.

It is deemed imperative that independent factor analyses be conducted when applying a test to a different culture (Barling, 1978; Gorsuch, 1974; Nigelschmidt & Jakob, 1977; Ryckman, Posen & Kuhlberg, 1978). Thus, together with the fact that the nine CES subscales were each assessed from only four items, necessitated a separate factor analysis of the 36 items of Form S (see Table 7). A principle components factor analysis with varimax rotation produced three factors with eigenvalues greater than 1.00 explaining respectively 21.1%, 14.6% and 12.6% of the variance. These factors were labelled as follows (numbers of items loading significantly are reported in brackets in descending order of importance): 'student participation' (19, 24, 28, 33, 1[illegible], 15); 'teacher participation' [illegible], 21, 12, 30) and 'rule specification' (35, 25, 14, 34, 16). These three factors, referring respectively to the students' involvement in the classroom, the degree of personal interest in his/her pupils displayed by the teacher and the clarity of the rule structure and consequences for transgressions, were used as indices of the social climate in the classroom in this research.

Table 7

Principal components factor analysis with Varimax

Rotation for the classroom environment scale

(N = 5041

Item No.	Factor 1	2	3	Communality
24	-0.62	0.04	-0.03	0.41
33	0.60	0.08	0.01	0.46
15	0.52	0.03	-0.15	0.31
10	0.50	-0.03	-0.09	0.41
19	-0.38	0.10	0.03	0.41
28	-0.34	0.24	-0.10	0.29
12	-0.19	0.62	0.00	0.43
21	0.05	0.57	0.03	0.39
30	-0.02	0.48	-0.47	0.24
20	0.25	0.47	0.19	0.36
25	-0.02	0.21	-0.46	0.44
17	0.10	0.00	0.45	0.32
35	-0.08	-0.03	0.41	0.19
34	0.21	-0.29	0.38	0.49
14	-0.30	-0.08	0.32	0.24
29	-0.20	0.13	-0.04	0.05
4	0.16	-0.04	0.15	0.33
18	-0.10	0.16	-0.11	0.21
3	-0.13	0.11	-0.02	0.13
16	0.12	-0.03	-0.08	0.31
23	-0.11	-0.10	0.02	0.28
1	0.08	-0.04	-0.02	0.23
27	0.07	-0.08	-0.01	0.50

Table 7 (contd.)

Item No.	Factor 1	Factor 2	Factor 3	Communality
32	0.06	0.06	0.05	0.28
9	0.06	-0.18	-0.06	0.32
31	0.05	-0.01	-0.11	0.27
8	-0.05	-0.07	-0.00	0.56
5	0.05	-0.04	-0.02	0.20
2	0.04	-0.00	-0.04	0.38
13	0.04	0.12	0.15	0.20
20	0.03	0.10	-0.01	0.40
[illegible]	-0.01	-0.10	0.09	0.21
36	-0.01	-0.06	0.22	0.29
11	0.01	0.08	-0.09	0.42
4	-0.01	0.14	-0.12	0.27
22	-0.01	0.01	-0.00	0.25
Eigenvalue	2.53	1.75	1.51	
% Variance	11.10	14.60	12.60	

Load[illegible]only significant factors are reported.
No items load significantly on more than one factor.

Attitude toward Learning Processes; Attitude toward Teachers (Arlin & Hills, 1974). Arlin and Hills devised these two Likert-type questionnaires to assess pupils' attitudes towards teachers and the learning processes employed in their schools. Item selection was based on a preference for 'open' or 'informal' teaching; thus high scores on these tests indicate not only a pupil's high regard for his/her teachers or a positive attitude towards learning, but also the degree of freedom in learning and informal, formal teaching in the school.

Items in the Attitude toward Learning Processes scale cover aspects of

the open classroom such as:

-- independent learning: e.g., "We get enough chances to choose our own activities in class"

-- freedom of movement: e.g., "I have to spend too much time sitting at my desk"

-- opportunity for interaction/group work: e.g., "I get enough chances to work with others in small groups"

The teacher's adoption of the innovative and student centered nature of informal teaching particularly, is reflected in the Attitude toward Teachers questionnaire. For example:

-- "My teachers try new and interesting ways of teaching".

-- "My teachers care about my feelings".

-- "My teachers enjoy laughing and joking with us".

Each of the questionnaires contains 15 items which are answered on a forced choice format: 'NO', 'SOMETIMES', 'USUALLY', 'YES'. These are scored on a 0 to 4 scale. 'NO' being scored as 0, 'YES' as 4. Reversed scoring applies to items formulated in a negative manner, while a score of 2 is assigned to items not completed or with more than one answer.

The noticeable feature of these two tests is their cartoon format. Seven of the fifteen items on both tests are illustrated. The cartoon format of these questionnaires was included since, while performance on these and comparable non-illustrated tests is equivalent, children enjoy the cartoon tests more (Arlin & Hills, 1974).

On the basis of the Arlin and Hills (1974) study, amusing illustrations were scattered throughout the test battery. The levity this brought about in a somewhat unusual testing situation (i.e., pupils having to evaluate their school and teachers) was intended to maintain interest throughout the lengthy testing session. It was further hoped to facilitate the testers' attempts at establishing rapport with the subjects; as well as creating the atmosphere of it being acceptable to give honest, albeit

n gative, evaluations of self, teacher and school without the fear of any repercussions eventuating.

Procedure

The data for Study 2 were attained from a single administration of tests to pupils and their class teacher. The following tests were administered to the pupils:

-- General inf rmation (name, age, sex, school)
-- Spelling and Arithmetic subscales of the Wide Range Achievement Test
-- Intellectual Achievement Responsibility Questionnaire
-- Attitude toward Learning Processes
-- Attitude toward Teachers
-- Children's Self-efficacy scale
-- Cl ssroom Environment Scale

A teacher self-efficacy scale was administered to the teachers.

Details concerning the experimenters, their instructions and test administration appear in the 'Procedure' section of Study 1 (see pp. 23-25). An example of the entire test battery and the instructions accompanying each test appear respectively in Appendices A and B.

Statistical analysis

The contribution of environmental variables to self-efficacy was assessed via a multiple regression procedure. The linearity of the relationship between each of the environmental variables and the dependent variables was established first. The major regression analysis conducted thereafter involved the use of a forward stepwise inclusion method in conjunction with the hierarchical inclusion of sets of predictor variables. The rationale for a pre-established hierarchy of variables was provided by Bandura's (1977a, 1977b) proposal that the determinants of self-efficacy follow the order of performance accomplishments being the most important, with modeling effects the second most important determinant. Due to the

belief that locus of control attenuates not only performance accomplishments, as suggested by Bandura, but modeling effects as well, l[illegible] of control formed the third component of the hierarchy in Study 1. The order in which environmental variables were entered into the regression equation in this study was determined by their previously proven or intuitive links with these three determinants.

Open classrooms have been found to facilitate academic achievement (Eshel & Klein, 1978; Reiss & Dyhdalo, 1975; Solomon & Kendall, 1976.; while student participation was deemed a type of performance accomplishment. These two environmental variables were thus linked to the original performance accomplishment variable. Due to the teacher being the model used in this research, and the variables 'attitude to teacher' and 'teacher participation' referring to the students' perceptions of the teacher, these two variables were combined with the three modeling polynomials. There were no theoretical bases for the linking of rule specification with any of the original predictor variables.

The linkages of performance accomplishments, student participation and 'openness' of the classroom on the one hand, and modeling, teacher participation and attitude to teacher on the other, brought about an 'ordering' problem. These linkages were made to facilitate the use of hierarchical inclusion of variables, which is considered to be a superior regression procedure (Overall & Spiegel, 1969; Cock, 1974; Wertz & Linn, 1971). However, the exploratory nature of this research afforded no clues as to the ordering of variables within these sets. Thus the performance accomplishment and modeling sets of variables were entered into the analysis as blocks and then subjected to a forward stepwise inclusion procedure. More specifically, the variables were entered into the analysis in the following manner: All performance variables were entered on the first step, the exact ordering of these variables depending on their respective contributions to explaining variance in the dependent variable. The modeling

variables were entered in the second step, their ordering again following a stepwise inclusion method. Finally, locus of control beliefs and the environmental variable, rule specification, were respectively entered on steps 3 and 4.

Results

A summary of the exploratory regression analysis conducted to explore environmental determinants of self-efficacy beliefs is reported in Table 8. On the basis of Study 1, the linear, quadratic and cubic components of modeling and the quadratic component of IARQpos were used in this analysis. As is evident from an inspection of the variables entering the equation, the environmental variables were all represented by their linear components. This was due to the test for linearity showing no significant deviations from linearity for any of these variables ($p < 0.01$). The multiple R's associated with each variable also appear in Table 8, as well as the increases in R^2 accounted for by predictor variables and the corresponding F-values. The latter indicate the significance of these R^2 changes as the variables enter the equation and in the final equation when these values are adjusted according to increases in the degrees of freedom.

Inspection of Table 8 indicates that the performance set of predictor variables were entered into the equation at step 1. The performance accomplishment and classroom structure variables did not bring about any increases in R^2. Student participation on the other hand, accounted for 2.7% of the variance in self-efficacy scores, with significant F-values both on entering the equation (12.212) and in the final equation (9.761).

Only the modeling polynomials of the modeling set of variables entered in step 2 were significant predictors of self-efficacy. The linear component accounted for 0.08% of the variance (F-values on entering, and in the final equation, respectively, 4.863 and 4.890); the quadratic component for 3.3% (respective F-values, 151.846 and 148.543); while the cubic component brought about a 23.5% increase in the dependent variable

Table 3

The Determinants of Self-Efficacy: Summary of Regression Analysis

Independent variable entering equation	Multiple R	Increase in R^2	F	
			To enter equation	In final equation
Step 1				
Performance accomplishments	0.022	0.000	0.174	0.465
Classroom structure	0.025	0.000	0.126	0.047
Student participation	0.165	0.027	12.212*	9.761*
Step 2				
Modeling[2]	0.245	0.033	151.846*	148.543*
Modeling[3]	0.543	0.235	78.951*	77.625*
Attitude to teacher	0.543	0.000	0.017	0.126
Teacher participation	0.513	0.000	0.003	0.005
Modeling	0.550	0.008	4.863*	4.890*
Step 3				
IARQneg	0.553	0.004	1.662	1.50
IARQpos[2]	0.554	0.000	0.231	0.204
Step 4				
Rule specification	0.561	0.008	5.183*	5.183*

* $p < 0.01$

variance explained by preceding variables (F-values respectively 78.951 and [illegible]). The attitude to learning and teacher participation variables were entered into the analysis in step 2. The 0.4% and 0.0% of the self-efficacy variance accounted for by IARQneg and IARQpos respectively, were not significant either on entering the equation or in the final equation. Finally,

the environmental variable, rule specification, was entered into the analysis in step 4. This variable accounted for 0.8% of the variance in self-efficacy scores, with a corresponding F-value of 5.183. All the F-values mentioned in the above discussion of Table 8 were significant, with $p < 0.01$ in all cases.

Discussion

The results of the present study follow those of Study 1 regarding the relationship between self-efficacy, performance accomplishments, modeling and locus of control: The modeling polynomials combined explained 27.6% of the variance in self-efficacy scores, whereas neither performance accomplishments nor the two locus of control subscores significantly accounted for any variance in the data. This finding was predictable as this study was based on information gained from the same sample as was used in Study 1. However, the reason for investigating these effects in conjunction with environmental variables, lay within the goals of multidimensional research. A criticism directed against traditional psychological research holds that the complexity of the real world is ignored by research which independently investigates the relationship between dependent variables and various independent variables; and then pieces together the findings of these separate studies (Cooley, 1971; Kaplan & Litrownik, 1977; Kerlinger, 1973; Kerlinger & Pedhazur, 1973; Levin, 1976; Rotter, 1975). The effects of various independent variables on a dependent variable are thus assessed in combination or interactively. To avoid the eventuality of the environmental variables obtaining false importance in this research, they had to be investigated simultaneously with the original self-efficacy determinants proposed by Bandura. As possible explanations of findings relating to the original variables were explored in Study 1, no further mention of these explanations will be made here.

Analysis of the environmental variables showed interesting, if not

supporting, results. The performance-related variable, classroom structure, did not explain any variance in self-efficacy scores. This finding may be considered to reflect the unimportance of this variable to self-efficacy beliefs. However, the situation is not that simple. This variable was investigated on the basis of studies indicating the importance of open classrooms in facilitating academic achievement (Eshel & Klein, 1978; Reiss & Dyhdalo, 1975; Solomon & Kendall, 1976). The assumption was made that if academic achievement (which is considered a performance accomplishment in the educational setting) determines self-efficacy beliefs to a certain extent, so should the structure of the classroom, if it in turn affects academic achievement. Yet, recognizing the fact of the sample being biased towards traditional schools, the present finding would be acceptable even if classroom structure were a determinant of self-efficacy beliefs. However, studies such as that by Ruedi and West (1973) have shown traditional schools with their stress on achievement to produce superior academic results than open schools. If this view were accepted, and if classroom structure were a determinant of efficacy beliefs, it should have proved significant in the above regression analysis. The above argument for two alternative interpretations of the insignificance of the classroom structure variable, may be regarded as superfluous, due to the underlying assumption that performance accomplishments determine efficacy beliefs, not being supported in either Study 1 or Study 2.

However, this also does not solve the issue. This is evident from the variable 'student participation' accounting for a significant 2.7% of the self-efficacy variance. Student participation in the classroom can be considered a type of performance accomplishment, in so far as, for example, the pupil's asking/answering questions elicits feedback concerning his ability, performance at and understanding of the subject matter. Indeed, Yarworth and Gauthier (1978) mention 15 studies which have shown the

student's participation in academic and non-academic activities to be correlated with his/her academic achievement. Thus, in contrast to the insignificance of the spelling and arithmetic achievement tests used as an index of performance accomplishments in Study 1, the significance of student participation in Study 2 lends some support to Bandura's proposal that performance accomplishments provide information pertaining to self-efficacy beliefs.

The only conclusion that can be drawn from the above findings is that the exact nature of these performance accomplishments on which self-efficacy beliefs are supposedly based (i.e., whether these should be accomplishments eliciting continuous feedback as in classroom participation, or periodical feedback in class tests) should be identified. Only then can investigations using adequate sampling and investigatory procedures reflect on the contribution of performance related variables such as classroom structure to efficacy beliefs.

In Studies 1 and 2, modeling effects were found to explain 28% and 27.6% of the variance in self-efficacy scores respectively. Possible reasons for the importance of modeling were the age of the subjects, and the characteristics of the teachers who were used as models: adulthood, prestige and control over valued resources. As the environmental variables 'attitude to teacher' (an index of the child's liking for the teacher) and 'teacher participation' (indicating the personal interest taken by the teacher in his/her pupils) involved the child's perception of the teacher, these variables were thought to have some relevance to self-efficacy beliefs. The finding that neither of these variables accounted for a significant increase in R^2, therefore, was surprising. A tentative explanation for this finding can again be found in the characteristics of the model: Prestige and power have been found to facilitate vicarious learning (Bandura, 1969; Bandura et al., 1963; Bandura & Walters, 1963; Flanders, 1968; Grusec & Mischel, 1966; Hetherington & Frankie, 1967).

However, these are neither necessary nor sufficient conditions for liking the model, or for a warm relationship to exist between the model and the observer. The latter relationship aspects were investigated in this study. Actually, the status quo in the school seems to foster a dislike of teachers and the belief that teachers and schools are intended to provide merely an aversive means of passing time. This was particularly evident during the testing of this research. Items such as 'my teachers are friendly to students' or 'do you like and admire your teacher' elicited a spontaneous chorus of jeers. Thus it appears that while pupils may respect or fear the power, authority and prestige of their teachers, and subsequently model their own behavior according to that of the teacher, this does not necessarily imply a liking of, or an affectionnate relationship with, the teacher.

The final environmental variable investigated, 'rule specification', which refers to the extent to which rules and codes of conduct are clarified by the teacher was found to explain a significant 0.08% of the variance in self-efficacy scores. While the amount of variance accounted for by this variable may seem extremely small to be significant, it is attributable to the large sample size (Cowles, 1974; Signorelli, 1974).

Studies with possible relevance to the present finding were conducted by Hunter and Meyers (1972) and Moos (1978). Hunter and Meyers (1972) investigated the relationship between classroom climate, pupil attitudes and achievement in special classes for the emotionally handicapped. Control, defined as a low frequency of disruptive occurrences, was found to be one of four climate dimensions related to favourable pupil attitude, productivity, attendance and arithmetic achievement. In fact, the most successful classrooms in their study had climates of acceptance and control. Similar findings were reported in Moos' (1978) attempt to construct a typology of junior high and high school classrooms. Classrooms exclusive-

ly oriented towards teacher control of student behavior were disliked by students as well as teachers. However, classrooms with little control were regarded as equally unpleasant. With regard to order and control in the classroom, student satisfaction seemed to be highly related to a moderated degree of structure: Specifically, rules and clarity of expectations facilitated the predictability of the environment.

In terms of the rule specification variable and self-efficacy beliefs, the implication of the present two studies is that rather than a clear set of rules being unpleasant to the child, it provides him/her with the security of clear and consistent parameters within which to operate. The knowledge that certain behaviors produce certain outcomes is crucially important to efficacy beliefs. In fact, this knowledge is the basis of outcome expectations, one of the two components of self-efficacy beliefs.

In conclusion, this exploratory research of the environmental determinants of self-efficacy again confirmed modeling effects as the most important predictor of children's self-efficacy beliefs. Of the environmental variables investigated (i.e., classroom structure, student participation, teacher participation, attitude to teacher and rule specification) only two were found to account for a significant proportion of the self-efficacy variance; namely, rule specification and student participation in the classroom. In contrast to the first study of the present dissertation in which achievement test scores were investigated, the significance of student participation (regarded as a type of performance accomplishment) attested to this variable being a determinant of efficacy beliefs, as was proposed by Bandura (1977a, 1977b). Thus the present research supports the perceived self-efficacy theory to an extent. Both modeling and performance accomplishments are determinants of children's self-efficacy beliefs, but their respective importances are the reversal of that proposed by Bandura: Modeling is most important, with performance accomplishments less so.

GENERAL DISCUSSION

Extrapolating from Bandura's (1974) views on the nature of research necessary to further the understanding of self-reinforcement, two lines of research were regarded as important to the validation of the perceived self-efficacy theory. Firstly, research establishing the determinants of self-efficacy. Secondly, research investigating whether self-efficacy beliefs do, in fact, facilitate the initiation and maintenance of coping behavior.

Both the studies reported were concerned with the first line of research, namely, the determinants of self-efficacy. These determinants, however, were investigated in a sample of primary school children, rather than the snake phobic samples employed by Bandura. This was based on Kazdin and Rogers' (1978) assertion that behavior change agents established in laboratory research, if valid, would retain their validity when research is extended to different samples to attain greater external validity. On the basis of these views expressed by Kazdin and Rogers and Bandura's determinants enjoying only partial support in this research, the following conclusions can be made: Modeling and performance accomplishments are determinants of children's self-efficacy beliefs, but their order of importance is a reversal of that proposed by Bandura (1977a, 1977b). Furthermore, these findings do not reflect the general validity of the model. The latter can only be established by the second line of research proposed by Bandura (1974): Namely, whether self-efficacy beliefs do in fact enhance coping behavior.

However, two contentious issues in the present research should be mentioned before interpreting its findings as reflecting on the inaccuracy of the self-efficacy determinants proposed by Bandura, rather than any empirical inadequacies in the studies reported here. These issues concern the definition and measurements of the dependent and independent variables,

which are critical to the ultimate findings of any research (Cooley, 1971; Isaac, 1970). More specifically, this issue relates to the discrepancy between the definition and measurement of the dependent variable, self-efficacy, and the independent variable, modeling, utilized in the present research, as opposed to the procedures used in the research conducted by Bandura.

As mentioned previously, the research conducted by Bandura and his associates (Bandura, 1977; Bandura et al., 1975; Bandura & Adams, 1977; Bandura, Adams & Beyer, 1977) employed efficacy expectations as an index of self-efficacy beliefs. A similar assessment procedure is being used to assess children's self-efficacy beliefs in an academic setting: Subjects rate their anticipated success in specific academic tasks on a scale from 0 to 100 (Bandura, 1978c). However, on the basis of Bandura's implicit rather than explicit reference to the interaction between efficacy expectations and response-outcomes (1978b), the index of self-efficacy used in the present research involved a multiplicative combination of these two components. This deviation from the assessment procedure employed by Bandura was further motivated by the emphasis placed on successful coping behavior being dependent not only on efficacy expectations and the requisite behavioral skills, but on the motivation to perform as well (Bandura, 1977a, 1977b). This motivation is incorporated in response-outcome beliefs, i.e., the belief that successful performance leads to a certain outcome or reward. While this deviation in conceptualizing self-efficacy beliefs was deemed acceptable for the above reasons, it might be responsible for the results not conforming totally to Bandura's proposals.

The investigation of modeling effects as a predictor of self-efficacy beliefs in this research also differed from Bandura's conceptualization of

this determinant. According to Bandura, the value of [illegible] experiences as a source of information relevant to self-efficacy beliefs lies in the individual seeing another person perform a difficult task successfully. The observer, identifying with either the model, the task, or both, is then led to believe that he/she can perform the task successfully. In Studies 1 and 2, the teacher was used as a model to assess the effect of this determinant on children's self-efficacy beliefs. In contrast to Bandura's views, the teacher's successful performance on academic tasks was not investigated as a source of vicarious information. The teacher is expected to have complete mastery over the academic material being presented. Rather, it was held that in terms of the present study's requirements, the teachers' self-efficacy beliefs would provide an approximate index of the modeling effect. The assumption was made that his/her [illegible] beliefs would permeate lesson presentation, interaction with pupils, maintaining discipline--in fact, all aspects of teaching. In terms of the nature of 'abstract modeling', common attributes (i.e., the teacher's self-efficacy beliefs in this case) can be extracted from these diverse vicarious experiences (Bandura, 1977b). Thus the child can learn from the teacher's confidence in his or her own abilities to perform teaching behaviors successfully. Or lack of confidence, as O'Leary and O'Leary (1977a) see it:

> '.....when teachers model failure and inappropriate ways of coping with failure, children not only [illegible] in kind, but thoroughly enjoy the realization that teachers are not always perfect'
> (O'Leary & O'Leary, 1977a, p. 179).

Despite these alterations in procedure, however, some confidence can be placed in the findings of this research: Modeling was the most important determinant of children's self-efficacy beliefs, with the student's participation in the classroom (an environmental equivalent of [illegible] accomplishments) playing a relatively small role in comparison. Of the

other environmental variables investigated, only the clarity of the rules in the classroom was found to significantly predict self-efficacy beliefs--albeit to a very limited e It can thus be concluded t'at in so far as the determinants of self-efficacy are concerned, attempts to attain greater external validity for Bandura's model have succeeded only partially: Modeling and performance accomplishments do determine children's self-efficacy beliefs, but not in the same order is that proposed for adult snake phobics.

As is evident from the research with snake phobic subjects, the self-efficacy concept has heuristic potential for therapy. It can also be advantageously empl yed in the classroom, as is evident from tudy 2. The validity of the theory must, however, be established first, particularly as the present research findings cast doubt on the proposed causal aspects of the model.

The major task is to assess self-efficacy beliefs adequately. This requires not only the construction of tests, but first and foremost, a clarification as to the nature of these beliefs. Guidelines could possibly be found in valence-expectancy theory, which is theoretically very similar to the self-efficacy model (Bandling, 1978) particularly in so far as the relationship between efficacy expectations and response-outcomes is concerned. In valence-expectancy theory, successful job performance is considered a function of expectancy beliefs, referring to the individual's belief that certain behaviors will produce the desired outcome, and instrumentality beliefs, i.e., the belief that performance leads to a certain outcome. The amount of effort expended thus depends on the subjective probability of success, and most important, the valence attached to the outcome. Extrapolating to self-efficacy beliefs, it is most plausible that the effort required for the initiation and maintenance of coping behavior in the face of obstacles is directly proportional to the importance placed on overcoming the obstacles or achieving the desired outcomes. Another factor relating

more to the actual assessment of self-efficacy involves the generality of such a scale. Ross Thomas (1976) and Rotter (1975) advocate the use of more specific forms of a test rather than its global categories. A problem arises, however, as to the limits of such specificity. In the present research, self-efficacy was relevant to school curricula. But even then it is possible that a child's self-efficacy beliefs concerning, for example, science and Sotho or music and arithmetic may differ. Such problems must be solved if an adequate assessment procedure for self-efficacy beliefs were to be devised.

Given a valid and reliable assessment procedure, self-efficacy's status as a behavior change agent must be established. This can be achieved through studies similar to that of Bandura and Adams (1977) in which the predictive validity of self-efficacy beliefs was established by assessing the effects of a snake desensitization programme on these beliefs. With the goal of external validation, studies can be conducted to assess the effect of, for example, assertiveness training, extra mathematics lessons, or attending a driving school on self-efficacy beliefs concerning respectively assertive behavior, mathematics, and driving a car.

Most certainly, the determinants of self-efficacy require further investigation. While the present research findings do not support Bandura's proposals regarding the determinants of efficacy beliefs, the findings are explainable in terms of the youth of the sample employed. Yet, it must be established whether these findings will be repeated in different samples. If so, more extensive research should be conducted as to when the process reverses itself and the child gains more from personal accomplishments than vicarious experiences. The remaining determinants of self-efficacy, namely verbal persuasion and physiological arousal, are also in need of further investigation. Finally, it is plausible that the determinants of self-efficacy beliefs are specific to the behavior to which these beliefs apply.

Thus, a vast range of possible predictor variables exist in all the areas to which the perceived self-efficacy theory relates.

In conclusion, it should be evident from all the above that the area for self-efficacy research is limitless. The present research, which should be regarded as the beginning of empirical investigation in this area, provided only partial support to the determinants of self-efficacy proposed by Bandura. However, it is the responsibility of future research to determine the predictive validity and explanatory value of perceived self-efficacy theory.

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APPENDIX A

TEST BATTERY ADMINISTERED TO CHILDREN

(a) Spelling subtest of Wide Range Achievement Test: Answer Sheet.
(b) Intellectual Achievement Responsibility Questionnaire.
(c) Attitude toward Learning Processes.
(d) Children's Self-Efficacy Scale.
(e) Arithmetic subtest of Wide Range Achievement Test.
(f) Attitude toward Teachers.
(g) Classroom Environment Scale; Form S: Answer sheet.
(h) List of spelling words for (a).
(i) Items of Classroom Environment Scale.

NAME _____

SCHOOL _____

DATE OF BIRTH _____

SEX _____

AVERAGE IN 1977 _____

DESK POSITION _____



1. _____ 16. _____ 31. _____
2. _____ 17. _____ 32. _____
3. _____ 18. _____ 33. _____
4. _____ 19. _____ 34. _____
5. _____ 20. _____ 35. _____
6. _____ 21. _____ 36. _____
7. _____ 22. _____ 37. _____
8. _____ 23. _____ 38. _____
9. _____ 24. _____ 39. _____
10. _____ 25. _____ 40. _____
11. _____ 26. _____ 41. _____
12. _____ 27. _____ 42. _____
13. _____ 28. _____ 43. _____
14. _____ 29. _____ 44. _____
15. _____ 30. _____ 45. _____
46. _____

(c)



Please place an X on the line next to the statement that you feel is most like you.

1. If a teacher passes you to the next standard, would it probably be
   _____ a. because she liked you, or
   _____ b. because of the work you did?

2. When you do well in a test at school, is it more likely to be
   _____ a. because you studied for it, or
   _____ b. because the test was especially easy?

3. When you have trouble understanding something in school, is it usually
   _____ a. because the teacher didn't explain it clearly, or
   _____ b. because you didn't listen carefully?

4. When you read a story and can't remember much of it, is it usually
   _____ a. because the story wasn't well written, or
   _____ b. because you weren't interested in the story?

5. Suppose your parents say you are doing well in school. Is this likely to happen
   _____ a. because your schoolwork is good, or
   _____ b. because they are in a good mood?

6. Suppose you do better than usual in a subject at school. Could it probably happen
   _____ a. because you tried harder, or
   _____ b. because someone helped you?

7. When you lose a game of cards or checkers, does it usually happen
   _____ a. because the other player is good at the game, or
   _____ b. because you don't play well?

8. Suppose a person doesn't think you are very bright or clever
   _____ a. can you make him change his mind if you try to, or
   _____ b. are there some people who will think you're not very bright no matter what you do?

9. If you solve a puzzle quickly, is it
   _____ a. because it wasn't a very hard puzzle, or
   _____ b. because you worked on it carefully?

10. If a boy or girl tells you that you are dumb, is it more likely that they say that
   _____ a. because they are mad at you, or
   _____ b. because what you did really wasn't very bright?

11. Suppose you study to become a teacher, scientist or doctor and you fail. Do you think this would happen
____ a. because you didn't work hard enough, or
____ b. because you needed some help and other people didn't give it to you?

12. When you learn something quickly in school, is it usually
____ a. because you paid close attention, or
____ b. because the teacher explained it clearly?

13. If a teacher says to you, "Your work is fine," is it
____ a. something teachers usually say to encourage pupils, or
____ b. because you did a good job?

14. When you find it hard to work arithmetic or math problems at school, is it
____ a. because you didn't study well enough before you tried them, or
____ b. because the teacher gave problems that were too hard?

15. When you forget something you heard in class, is it
____ a. because the teacher didn't explain it very well, or
____ b. because you didn't try very hard to remember?

16. Suppose you weren't sure about the answer to a question your teacher asked you, but your answer turned out to be right. Is it likely to happen
____ a. because she wasn't as particular as usual, or
____ b. because you gave the best answer you could think of?

17. When you read a story and remember most of it, is it usually
____ a. because you were interested in the story, or
____ b. because the story was well written?

18. If your parents tell you you're acting silly and not thinking clearly, is it more likely to be
____ a. because of something you did, or
____ b. because they happen to be feeling cranky?

19. When you don't do well in a test at school, is it
____ a. because the test was especially hard, or
____ b. because you didn't study for it?

20. When you win a game of cards or checkers, does it happen
____ a. because you play really well, or
____ b. because the other person doesn't play well?

21. If people think you're bright or clever, is it
____ a. because they happen to like you, or
____ b. because you usually act that way?

22. If a teacher didn't pass you to the next standard, would probably be
____ a. because she "had it in for you", or
____ b. because your school work wasn't good enough?

23. Suppose you don't do as well as usual in a subject at school. Would this probably happen
____ a. because you weren't as careful as usual, or
____ b. because somebody bothered you and kept you from working?

24. If a boy or girl tells you you are bright, is it usually
____ a. because you thought up a good idea, or
____ b. because they like you?

25. Suppose you became a famous teacher, scientist or doctor. Do you think this would happen
____ a. because other people helped you when you needed it, or
____ b. because you worked very hard?

26. Suppose your parents say you aren't doing well in your school work. Is this likely to happen more
____ a. because your work isn't very good, or
____ b. because they are feeling cranky?

27. Suppose you are showing a friend how to play a game and he has trouble with it. Would that happen
____ a. because he wasn't able to understand how to play, or
____ b. because you couldn't explain it well?

28. When you find it easy to work arithmetic or math problems at school, is it usually
____ a. because the teacher gave you especially easy problems, or
____ b. because you studied your book well before you tried them?

29. When you remember something you heard in class, is it usually
____ a. because you tried hard to remember, or
____ b. because the teacher explained it well?

30. If you can't work a puzzle, is it more likely to happen
____ a. because you are not especially good at working puzzles, or
____ b. because the instructions weren't given clearly enough?

31. If your parents tell you that you are bright or clever, is it more likely
____ a. because they are feeling good, or
____ b. because of something you did?

32. Suppose you are explaining how to play a game to a friend and he learns quickly. Would that happen more often
____ a. because you explained it well, or
____ b. because he was able to understand it?

33. Suppose you're not sure about the answer to a question your teacher asks you and the answer you give turns out to be wrong. Is it likely to happen
____ a. because she was more particular than usual, or
____ b. because you answered too quickly?

34. If a teacher says to you, "Try to do better", would it be
____ a. because this is something she might say to get pupils to try harder, or
____ b. because your work wasn't as good as usual?



ATTITUDE TOWARD LEARNING PROCESSES
ELEMENTARY

We would like to know how you feel about how you learn in school. Blacken in the circle with a pencil to show how you feel. Fill in only one circle for each question. YOUR TEACHER WILL NOT SEE THIS -- Your answers will go straight into the computer. Have fun!

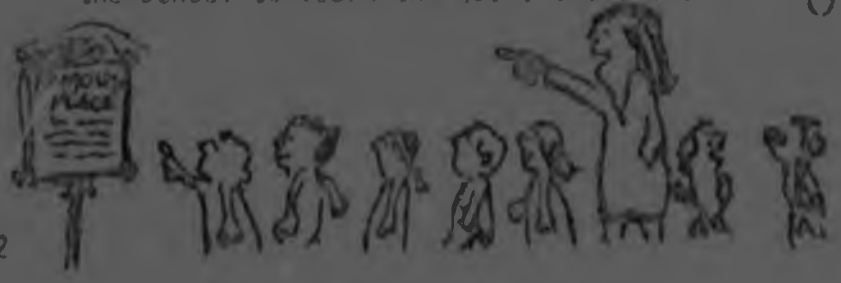
	NO	SOMETIMES	USUALLY	YES
1. We get enough time to help each other in class.	O	O	O	O
2. I have to spend too much time sitting at my desk	O	O	O	O



	NO	SOMETIMES	USUALLY	YES
3. We spend too much of our class periods with everybody working on the same thing at the same time	O	O	O	O
4. We get enough chances to choose our own activities in class	O	O	O	O



	NO	SOMETIMES	USUALLY	YES
5. We have to get permission from teachers to do anything around here.	O	O	O	O
6. We have enough chances to go outside the classroom and outside the school to learn things.	O		O	O



	NO	SOMETIMES	USUALLY	YES
7. We have enough chances to help the teacher plan what we are going to do	0	0	0	0
8. Teachers do too much of the talking in class	0	0	0	0



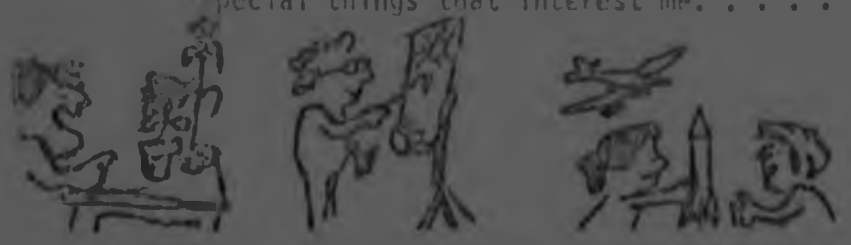
	NO	SOMETIMES	USUALLY	YES
9. We have enough chances to move around in the classroom	0	0	0	0
10. I have enough chances to study together with my friends in this school	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
11. Too much of what I learn comes from the textbook	0	0	0	0
12. We have too much homework in this school . . .	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
13. I get enough chances to work with others in small groups	0	0	0	0
14. I have enough chances to work on special things that interest me.	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
15. I have enough chances to work at my own speed	0	0	0	0

(d)

Do the same with these — blacken in the circle to show how you feel.

1. I can do most of my homework correctly.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
2. I can pass well this year.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
3. If I were away from school for a few days, it would affect my work.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
4. I can remember all the multiplication tables.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
5. I can remember names and dates for a history test.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
6. I can never do science experiments successfully.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
7. I can usually finish my homework in one to two hours.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
8. If the teacher asks me a question in class, I can usually answer it correctly.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
9. I can't do the same sum the teacher gives me in class.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
10. I could read a Nancy Drew or Hardy Boys book over a weekend.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
11. If I do my homework every day, I could get better marks.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
12. The fewer sums I do, the more difficult they become.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
13. The more I read, the better I read.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
14. If I practice spelling words frequently, I should make fewer spelling mistakes.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
15. If I don't listen during lessons, I may fail.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
16. If I work hard at it, I could read Afrikaans fluently by the end of the year.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
17. If I am caught eating in class, I may get into trouble.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
18. I can never remember the capitals of countries, even if I learn them over and over again.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
19. If I don't listen carefully in lessons, I am confused about them later.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
20. I can do my arithmetic more easily, if I follow the teacher's examples carefully.	NO ○	SOMETIMES ○	USUALLY ○	YES ○

(e)

Page 2. Arithmetic

LEVEL I. Oral Part

3 Fingers. 8 fingers. 9 or 6? 42 or 28?

3 pennies. spend 1 ?_____; 3 + 4 apples? _____; 9 marbles. lose 3?_____

Written part.

1 + 1 = _____

4 − 1 = _____

6 + 2

5 − 3

3 2
2 4 + 4 0

4 × 2 = _____

2 3 × 3

2 9 − 1 8

7 5 + 8

4 5 2
1 3 7
+ 2 4 5

6 + 2 = _____

6 2.0 4
− 5.3 0

1½ hr. = ____min.

6) 9 6 8

$\frac{1}{8} + \frac{1}{8}$ = _____

$\frac{12}{5}$ = _____

$\frac{7}{8} - \frac{5}{8}$ = _____

8 2 3
× 9 6

$4\frac{6}{7}$
$3\frac{1}{7}$
$+ 2\frac{1}{7}$

$\frac{2}{5}$ of 3 5 = _____

½ yd. = _____in.

$1\frac{3}{4}$ = $\frac{\quad}{4}$

2 7) 3 8 4

¾ yr. = _____mo.

Multiply: 7.9 6
× 3 0.8

$\frac{7}{3}$ = $\frac{\quad}{12}$

5
$- 1\frac{1}{3}$

$2\frac{1}{3}$ doz. = _____

Which is more?

$\frac{7}{8}$ or $\frac{13}{15}$ Ans. _____

Find the average of

24, 18, 21, 26, 17

Ans. _____

Write as a percent

$\frac{1}{8}$ = _____%

$4\frac{1}{5} \times 3\frac{1}{5}$ = _____

$\frac{1}{10} + \frac{1}{8}$ = _____

$\frac{1}{2} \times \frac{1}{4} \times \frac{1}{8}$ = _____

Write as decimal:

$\frac{3}{8}$ = _____

20% of 120 = _____

8.2) 6 2.7 0 3

Change to familiar numerals:

M C X L. II = _____

6^2 = _____

(− 5) (+ 9) = _____

Find interest on

300 at 4½% for 7 mo.

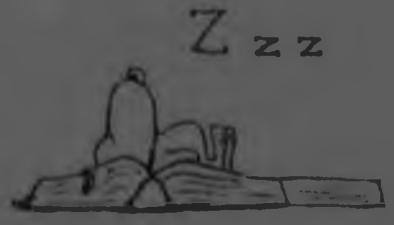
Ans. _____

Solve:

y + (9 − 8y) = 6 5

y = _____

Find square root: $\sqrt{3\,3\,4.8\,9}$



ATTITUDE TOWARD TEACHERS
ELEMENTARY

We would like to know how you feel about your teachers. Blacken in the circle with a pencil to show how you feel. Fill in only one circle for each question. YOUR TEACHER WILL NOT SEE THIS -- Your answers will go straight into the computer. Have fun!

	NO	SOMETIMES	USUALLY	YES
1. My teachers try new and interesting ways of teaching.	O	O	O	O



	NO	SOMETIMES	USUALLY	YES
2. Some of my teachers act like they are bored with teaching	O	O	O	O
3. My teachers are fair	O	O	O	O



	NO	SOMETIMES	USUALLY	YES
4. My teachers praise students a lot.	O	O	O	O
5. My teachers boss students around	O	O	O	O



	NO	SOMETIMES	USUALLY	YES
6. My teachers yell down to students	O	O	O	O

	NO	SOMETIMES	USUALLY	YES
7. I feel safe around my teachers	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
8. My teachers care about my feelings	0	0	0	0

	NO	SOMETIMES	USUALLY	YES
9. My teachers make some students look stupid.	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
10. I like and admire my teachers	0	0	0	0
11. My teachers enjoy laughing and joking with us	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
12. My teachers are friendly to students.	0	0	0	0

		SOMETIMES	USUALLY	YES
13. My teachers trust me	0	0	0	0



	NO	SOMETIMES	USUALLY	YES
14. My teachers point out my mistakes more than my good work.	0	0	0	0
15. My teachers do a good job of helping students learn	0	0	0	0

T F	1	2	3	4	5	6	7	8	9	T F
T F	10	11	12	13	14	15	16	17	18	T F
T F	19	20	21	22	23	24	25	26	27	T F
T F	28	29	30	31	32	33	34	35	36	T F

Note: Answer sheet for Classroom Environment Scale, Form S. See items 1 to 36 appearing in Classroom Environment Scale, Form R, pp. 90-91).

(b)

WRAT : Spelling Test, Level I

1.	go	Children go to school
2.	cat	The cat has fur
3.	in	We are in the room
4.	boy	The boy plays ball
5.	and	Bill and Bob play together
6.	will	They will wait for you
7.	make	She can make a dress
8.	him	They saw him in town
9.	say	Say it slowly
10.	cut	Mother will cut the cake
11.	cook	We cook our own dinner
12.	light	The light is bright
13.	must	We must do our work
14.	dress	The dress fits well
15.	reach	He couldn't reach the ball
16.	order	The captain's order was obeyed
17.	watch	My watch is fast
18.	enter	Enter this way
19.	grown	Potatoes are grown in the field
20.	nature	The study of nature is interesting
21.	explain	Explain how it happened
22.	edge	He sat on the edge of the chair
23.	kitchen	Our kitchen is small
24.	surprise	He may surprise you
25.	result	The result of your work is good
26.	advice	My advice was forgotten
27.	purchase	We did not purchase the car
28.	brief	I received a brief note
29.	success	Success makes people happy
30.	reasonable	His request was reasonable and just
31.	imaginary	He told us an imaginary story
32.	occupy	We occupy a small apartment
33.	character	Her fine character was praised
34.	society	Every society has rules
35.	official	An official invitation came today
36.	recognize	He did not recognize me
37.	familiar	We are familiar with the news
38.	commission	The commission reported to the mayor
39.	beneficial	Good food is beneficial to health
40.	appropriation	Congress made an appropriation for schools
41.	enthusiasm	People showed enthusiasm for the hero
42.	criticize or criticise	It is easy to criticize others
43.	prejudice	Prejudice is harmful to people
44.	intelligent	The soldier was intelligent and brave
45.	occurrence	War is a tragic occurrence

From : Jastak and Jastak, 1965, p 52.

COPY OF CLASSROOM ENVIRONMENT SCALE

FORM R (Trickett & Moos, 1974)

1. Students put a lot of energy into what they do here.
2. Students in this class get to know each other really well.
3. This teacher spends very little time just talking with students.
4. Almost all class time is spent on the lesson for the day.
5. Students don't feel pressured to compete here.
6. This is a well-organized class.
7. There is a clear set of rules for students to follow.
8. There are very few rules to follow.
9. New ideas are always being tried out here.
10. Students daydream a lot in this class.
11. Students in this class aren't very interested in getting to know other students.
12. The teacher takes a personal interest in students.
13. Students are expected to stick to classwork in this class.
14. Students try hard to get the best grade.
15. Students are almost always quiet in this class.
16. Rules in this class seem to change a lot.
17. If a student breaks a rule in this class, he's sure to get in trouble.
18. What students do in class is very different on different days.
19. Students are often "clockwatching" in this class.
20. A lot of friendships have been made in this class.
21. The teacher is more like a friend than an authority.
22. We often spend more time discussing outside student activities than class-related material.
23. Some students always try to see who can answer questions first.
24. Students fool around a lot in this class.
25. The teacher explains what will happen if a student breaks a rule.
26. The teacher is not very strict.
27. New and different ways of teaching are not tried very often in this class.
28. Most students in this class really pay attention to what the teacher is saying.
29. It's easy to get a group together for a project.
30. The teacher goes out of his way to help students.
31. Getting a certain amount of classwork done is very important in this class.
32. Students don't compete well with each other here.
33. This class is often in an uproar.
34. The teacher explains what the rules are.
35. Students can get in trouble with the teacher for talking when they're not supposed to.
36. The teacher likes students to try unusual projects.
37. Very few students take part in class discussions or activities.
38. Students enjoy working together on projects in this class.
39. Sometimes the teacher embarrasses students for not knowing the right answer.
40. Students don't do much work in this class.
41. A student's grade is lowered if he gets homework in late.
42. The teacher hardly ever has to tell students to get back in their seats.
43. The teacher makes a point of sticking to the rules he's made.
44. Students don't always have to stick to the rules in this class.
45. Students have very little to say about how class time is spent.
46. A lot of students "doodle" or pass notes.
47. Students enjoy helping each other with homework.
48. This teacher "talks down" to students.
49. We usually do as much as we set out to do.
50. Grades are not very important in this class.

51. The teacher often has to tell students to calm down.
52. Whether or not students can get away with something depends on how the teacher is feeling that day.
53. Students get in trouble if they're not in their seats when the class is supposed to start.
54. The teacher thinks up unusual projects for students to do.
55. Students sometimes present something they've worked on to the class.
56. Students don't have much of a chance to get to know each other in this class.
57. If students want to talk about something this teacher will find time to do it.
58. If a student misses class for a couple of days, it takes some effort to catch up.
59. Students here don't care about what grades the other students are getting.
60. Assignments are usually clear so everyone knows what to do.
61. There are set ways of working on things.
62. It's easier to get in trouble here than in a lot of other classes.
63. Students are expected to follow set rules in doing their work.
64. A lot of students seem to be only half awake during this class.
65. It takes a long time to get to know everybody by his first name in this class.
66. This teacher wants to know what students themselves want to learn about.
67. This teacher often takes time out from the lesson plan to talk about other things.
68. Students have to work for a good grade in this class.
69. This class hardly ever starts on time.
70. In the first few weeks the teacher explained the rules about what students could and could not do in this class.
71. The teacher will put up with a good deal.
72. Students can choose where they sit.
73. Students sometimes do extra work on their own in this class.
74. There are groups of students who don't get along in class.
75. This teacher does not trust students.
76. This class is more a social hour than a place to learn something.
77. Sometimes the class breaks up into groups to connete with each other.
78. Activities in this class are clearly and carefully planned.
79. Students aren't always sure if something is against the rules or not.
80. The teacher will kick a student out of class if he acts up.
81. Students do the same kind of homework almost every day.
82. Students really enjoy this class.
83. Some students in this class don't like each other.
84. Students have to watch what they say in this class.
85. The teacher sticks to class work and doesn't get sidetracked.
86. Students usually pass even if they don't do much.
87. Students don't interrupt the teacher when he's talking.
88. The teacher is consistent in dealing with students who break the rules.
89. When the teacher makes a rule, he means it.
90. In this class, students are allowed to make up their own projects.

Start by introducing yourself and the purpose of your research:
eg. "Good Morning. My name is .... I am going to spend some time with you this morning mainly because I want to know how you feel about some things, but also to do some spelling and arithmetic. Whatever we are going to do he we will be helping teachers at university.
I am going to give each of you a questionnaire now, but don't read through them yet. You'll have a lot of time to go through them later."
Ask some of the children to hand out questionnaires for you. When this happened, ask the children to check that they have pens/pencils with which to write.

Personal Information

"Starting on the first page, I want you to fill in some information about yourself. On the line next to NAME write your name."
So the name write:
    SURNAME
    DATE OF BIRTH *
    SEX
    AGE/DATE IN [illegible] * space * presently

    * if the children cannot answer these, this information can be obtained later from the teachers' records.

    HEAD POSITION "I wanted to know : from you or left as you face the class. Shade next for alphabetically starting with 'A', number from front to back starting with '1'. Let : us check all is in particular seat position.

Spelling sub-test - the WORD

"This is a spelling test. I want to see how many of these words you can spell. I will say the word then read a sentence with the word in it, then say the word again. Write the first one here (point to the line number 1) and go this way - I say each word (point to the next line down) along the page)." Read attached list of spelling words plus explanatory sentences at a pace of four words per minute.

Academic Achievement Responsibility Questionnaire

"What happens on the next few pages. In that a situation is described in terms of two feelings towards it. I want you to put an 'X' mark in the [illegible] feeling that you think is most like you."
Demonstrate or learn with an example
If you were having either, would you prefer:

a. pumpkin, or
b. beans

If you prefer pumpkin, you would place the 'X' next to 'a' or if beans, next to 'b'.

Have more or less a five minute break at this point.

Attitude toward Teachers and Attitude toward Learning

Use instructions on actual test, but emphasize that teachers will not see the answers. Illustrate with an example on the board:

I also cannot	a)	at not at all
	b)(NEARLY)	if only sometimes
	c)(MOST)	if almost always
	THE	if always

Have everything at ready so that [illegible]

Self-esteem Scale

They should be told the name of the rating scale by the time they have to circle their. Or, merely have descriptions of the scale on the board and tell them that they should do the same with this test as with the previous one.

Have another round of five minutes.

Arithmetic sub-test of the KFAT

"Turn to the next part where it says Arithmetic Level ;, Written Part, and look at the problems printed below the heavy line. This is an arithmetic test. It's fine to work any many of the problems as time you can work out. Look at each problem carefully to see what you have to do — add, subtract, multiply or divide — and then put your answer in the space or in under the line. If you want to work the [illegible] out on the paper, use the empty spaces or the sides to work on. Start with the top row. The problems get more difficult as you go down the page. Don't spend too much time on any one problem. You can rather skip it if it is too difficult, but to as many as you can, one by one. You will have ten minutes."

End.

Read through each test item with the children — this will help particularly the slow readers.

APPENDIX D

TEACHER SELF-EFFICACY SCALE

We would like to know your feelings about certain aspects of teaching. Blacken in the circle which describes yourself most accurately. Fill in one circle only for each statement.

1. I can achieve most things, if I put enough effort into them.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
2. I have difficulty in maintaining discipline in classes.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
3. A lesson is usually successful if I prepare it well beforehand.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
4. My classes enjoy lessons more if I present them in novel and interesting ways.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
5. With time, patience and insight, I can help even the slowest children to improve.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
6. I couldn't continue with a lesson in my normal teaching fashion, if the principal were to arrive unexpectedly to sit in on a lesson.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
7. I can usually cope with disruptive children in a class.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
8. If I restrain my temper, I can cope with a class crisis, eg. fighting, more constructively.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
9. I explain difficult topics in different ways so as to facilitate the class' understanding of it.	NO ○	SOMETIMES ○	USUALLY ○	YES ○
10. I have difficulty in being patient with slow children.	NO ○	SOMETIMES ○	USUALLY ○	YES ○

SCHOOL : _____

DATE : _____



Author Keyser V
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