Asia Pacific Education Review
2006, Vol. 7, No. 2, 195-204.

A critical review of research on questioning in education: limitations of its positivistic basis

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In spite of its prevalence and importance, questioning in education has been underestimated and misconceptualized. The major reason for this has been that most studies on questioning have been heavily dependent on the paradigm of positivism. The present study critiques the limitations of those studies on four specific issues: 1) the narrow conceptualization of the purpose of teacher's questioning, 2) the unwarranted assumption that objectively effective types of questions exist, 3) the assumption that the meaning of the text is explicit and fixed, and 4) the belief that the learner's question functions as a means for external ends.

Key words: questioning in education, teacher's questioning, learner's questioning, adjunct questions in prose material, positivism

Education is a multifaceted entity, views of which give particular inclinations and importance to certain aspects of education. This study is based upon an alternative view of education. It conceptualizes education around 'questioning', highlights the educational significance of questioning, and critiques previous studies in line with this view.

Education has been conceptualized in various ways. Among the major views frequently cited as consistent with practice in schooling are the technological model, the initiation model, and the socialization model(Lee, 1991). Despite the critical differences in their conceptual frames and underlying assumptions, these views appear to share common ground in such important aspects as their views on educational goals and content, the role of the learner, and the nature of educational progress. In these models, the results of education are prearranged, subject matter is fixed and imposed, learners are receptive, the learning process is cumulative, and objective criteria are applied in evaluating learners' achievement. The roots of such similarities in views can be traced back to a positivistic epistemology which is now severely criticized. Thus, it is meaningful to propose a view of education that examines those aspects of education not fully captured by the three existing models and that is simultaneously compatible with contemporary epistemological trends.

Positivistic epistemology, which is representative of straightforward notions of objectivism and absolutivism, is under attack by post-positivism and other epistemological positions(Bernstein, 1983; Gadamer, 1975; Glasersfeld, 1995; Hanson, 1958; Kuhn, 1970; Rorty, 1979). These positions view human inquiry as more inclusive than do the natural sciences. Current emphases are placed on subject-object interactionism and a revised conception of relativism. It is argued that human knowledge has evolved from structural changes of the human mind by the subjects' active interaction with surrounding objective realities.

In an effort to incorporate a revised epistemology, this study focuses on questioning as the main characteristic of education. The concept of education is defined as an activity to upgrade one's questions in a progressive direction. There are three pivotal characteristics of the new conception of

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education: subjecthood, structuredness, and reflectiveness (Yang, 1992). Educational activity has to do with structural changes in the learner's cognitive process induced by active participation. Furthermore educational activity is an endless process in a reflective operation.

This radically different definition requires different perspectives and practices in education. Education aims not to give answers to the learners; instead, the learner acquires upgraded questions. Educational content is something to be inquired by learner's active participation. Process instead of results is emphasized. Educational progress is evaluated not in terms of an accumulation of pieces of fragmented information, but in terms of structural changes in cognition.

This conceptual shift also requires a radical change in logic and the mode of research on questioning. Traditionally, learners' questioning has been regarded as a means to gain ready-made answers or the fixed meaning from texts. Furthermore, most studies on questioning have been heavily dependent on the paradigm of positivism which has its own problems, and have thus presented an underestimated, narrow, and distorted picture of questioning in education.

This paper will review past studies on questioning and critique their major drawbacks and limitations which are unavoidable consequences of the dependence on the paradigm of positivism. The reviews and critiques are presented in four categories: 1) the narrow conceptualization of the purpose of teacher's questioning, 2) the unwarranted assumption that objectively effective types of questions exist, 3) the assumption that the meaning of the text is explicit and fixed, and 4) the belief that the learner's questions function as a means for external ends.

Limitations Of The Research On Questioning According To The Paradigm Of Positivism

The Narrow conceptualization of the purpose of teacher's questioning

The teacher's questions can be considered as the most powerful device to lead, extend and control communication in the classroom. Actually the style of interaction between teacher and students can be seen as a recycling process: "teacher's question- students' responses- feedback"(Dillon, 1990; Westgate & Hughes, 1997; Yang, 2002). This illustrates the dominant role the teacher's questions play in classroom interaction.

Why do teachers ask questions? This can be rephrased by "what are the educational objectives to be attained through teacher's questions? or "what are the criteria for judging the efficacy of a teacher's questions?" Even if everyone recognizes the importance of a teacher's questioning, their expected roles vary among researchers. Most positivistic research on teacher's questioning has paid attention to the variables which influence the effect of teacher's questions, while ignoring the nature of effect itself. Their assumptions about the purpose of teacher's questions can be drawn logically from the positivistic epistemology or can be clarified by analyzing the method used in measuring the effects of teacher's questioning.

According to the positivistic point of view, teachers' questions were usually used to lead pupils to a 'preconceived end' (Barnes & Todd, 1995). The effect of such questions is confined by facilitation of memorization or comprehension rather than the development of the pupil's cognitive structure.

Research regarding the positivistic perspective (Atwood & Wilen, 1991; Good & Brophy, 2000; Newmann, 1992; Phillips & Duke, 2001; Rowe, 1986; Wimer et als., 2001) confirms that memorization takes precedence over structural change of cognition. Positivistic procedures are as follows: 1) teachers ask various questions which have a variety of frequencies, levels, positions, length, pausing time and so on; 2) in experiments, the teacher asks mechanically as planned, and in return the students' responses have no impact upon the teacher's questions; 3) the effects of the teacher's questions are reduced by the scores on tests covering what the teacher asked; 4) researchers concentrate on the statistical significance of the difference of students' achievements or responses according to variations of the teacher's questions; and 5) all the experiments are performed by a group, so the individual cognitive structure or characteristic is not a primary consideration.

The deficiency of explanatory power and inconsistencies in research results indicate the ineffectiveness of the positivistic paradigm. Reviewing studies (Gall, 1984; Redfield & Rousseau, 1981; Samson et als., 1987; Winne, 1979) on the effect of the level of a teacher's questions also have a serious drawback because they don't deal with the limits of the positivistic research methodology itself. It seems that positivists consider problems to be solvable by more relevant control, more elaborated research design, more precise measurement and so on. The author's view however, is that these problems can not be solved if the positivistic way of thinking is retained, because the positivistic perspective is too narrow and inflexible to be an appropriate, logical basis for studying teacher's questions.

If we admit that the purpose of a teacher's question should be to help the students upgrade their questions, the desired styles of a teacher's questions might be identified as 'diagnosing questions', 'dissolving questions', and 'illustrative questions'.

'Diagnosing questions', 'dissolving questions', and 'illustrating questions' function respectively at different stages of teaching. Relevant styles of questions at specific stages and purposes might be irrelevant at other stages or for other purposes. Thus, the effect of a teacher's questions should be studied and evaluated differently in terms of their purposes and the stage of learning.

Each style of question needs to be explained in detail. The 'diagnosing question' is essential at the first step of teaching. Posing relevantly those questions is not simple at all because they are for the purpose of grasping the learner's structure rather than confirming the learner's possession of specific information. Piaget's clinical method, the so called 'art of questioning' (Piaget, 1972) can be used as a method of diagnosing the learner's cognitive structure.

The 'dissolving question' is a crucial type of questioning. This type of questioning has been emphasized by the Socratic method, termed as 'refutation.' However, the 'dissolving question' has rarely been dealt with in the positivistic approach, which reflects the positivistic view of knowledge and education. The concept of 'dissolving questions' is based on the assumption that individual thought or knowledge contains a structure, and one can eventually obtain a new structure by dissolving the old. From the positivistic point of view, in contrast, which considers the progress of knowledge as the process of additive accumulation, one's old knowledge does not need to dissolve and should not dissolve.

'Dissolving questions' can be compared to those questions in a cross-examination in court. However, classroom dissolving questions are constructive while courtroom dissolving questions are destructive. In a cross-examination 'dissolving' is an end, but in teaching it is a means. In order to be constructive, classroom dissolving questions should not only challenge one's thoughts but also provide a motive and power to renew one's cognitive structure. If not, the learner may feel confused and helpless, like a witness in a successful courtroom cross-examination.

Finally, the 'illustrative question' is performed for the purpose of providing examples of good questioning. Most questions in present classroom can be Illustrative questions. For example, "what do you think is the theme of this writing?", and "what are the instruments made by applying this principle?" are common 'Illustrative questions'. Schwab (1969) conceptualized learning as 'enquiring' and suggested that the teacher's lecture and text should be considered as not an authoritative source of truth but something to be interpreted. He emphasized that the teacher should ask questions for the purpose of helping the learners develop the art of asking questions. This closely corresponds to this author's point of view.

When a teacher asks 'illustrative questions', he(she) must consider the learner's cognitive level in addition to the characteristics of the content. If the teacher asks questions that are too simple and easy, it results in an exchange of asking and answering between the teacher and student without any meaningful thinking. At the same time, if a teacher asks questions that are beyond the student's capability, it might weaken and dullen the student's thinking rather than stimulate it.

In sum, there is no type of teacher question which can be performed mechanically. If the characteristics and stages of the learners are not considered appropriately, the impact of a teacher's questioning will be meager or negative. Furthermore, the positivistic approach has inevitable limitations to studying a teacher's questioning considering that it disregards the various purposes of teacher's questioning, interaction of teacher and learner, and the individual characteristics of the learner, and it reduces the effect of a teacher's questioning into the difference of the score between an experimental group and a control group .

The unwarranted assumption that objectively effective types of questions exist

It is fairly safe to say that the main purpose of positivistic studies is to clarify the objectively effective types of questioning. These studies are based on the assumption that content-proof, context-proof, student-proof, and teacher-proof effective questions exist, and that the types of questions can be graded in terms of their effectiveness. These assumptions heavily influence every process such as research problems, conceptual frameworks including the classifying scheme of the questions, research variables, and experimental designs and procedures.

The premise that the meaning or effect of the question can be generalized independently of the epistemic subject is founded on objectivism that excludes the process of interpretation and intervention of the subject. Positivists exclusively use concepts which can be classified as the same category by anyone and from any point of view. However, that kind of effort does not contribute to make the studies

meaningful.

This needs to be discussed in more detail. To begin with, the relevancy of the positivistic method of defining the level of questions can be analyzed. Most studies (Phillips & Duke, 2001; Sellappah et als., 1998; Stephanie, 1982) on the level of questions are basically based on Bloom's(1956) taxonomy. Moreover, they consider these levels as being divided broadly into two categories: fact questions and higher-order questions (Gall, 1984; Perry, Vanderstoep & Yu, 1993; Redfield & Rousseau, 1981; Rowan & Robles, 1998; Samson et als., 1987; Sellappah et als., 1998; Wilen, 1992; Wimer et als., 2001).

Researchers assume that the level of question is determined by the type of cognitive process which is needed to answer the question. At the same time, they also believe that the level of each question can be defined by logical analysis. These two beliefs reveal the assumption that the level of question can be generalized independently of the subjects and contexts. In other words, such research believes that the cognitive process type needed by each question is fixed in itself.

This is an unwarranted assumption. For example, what is the level of the question, "what are the causes of the Civil War?" Sanders (1966) took this question as an example of a 'synthesizing question', since it apparently requires the student to grasp causes on the basis of a whole understanding about the Civil War. However, can that expectation be actually fulfilled by the learners? Some learners may respond to that question by memorizing the 'answer' written in a reference book, and others may respond by recalling what the teacher said. In addition to that, to those who do not know about the 'Civil War', that question is almost meaningless.

A logically determined level of questions irrespective of subject and context is too arbitrary to be a research variable. Many studies into the effect of the level of teacher's questions(Gall, 1984; Perry, Vanderstoep & Yu, 1993; Redfield & Rousseau, 1981; Rowan & Robles, 1998; Samson et als., 1987; Sellappah et als., 1998; Wilen, 1992; Wimer et als., 2001; Winne, 1979) reported incoherent results, which is an inevitable consequence of the application of the positivistic conceptual scheme. Studies focused on the position, frequency, and pausing time of a teacher's questions are similarly ineffective.

As for the position of a question, the research problem is phrased like this: "Is there any difference in effect according to whether a teacher poses questions before the content or after the content?" The author believes that this kind of question is irrelevant to exploring human cognitive processes. The learner has his/her own intentions and strategies to monitor cognitive process. Thus, it is very hard to discern a pure effect of the position of a question. If anything, that effect is too trivial compared with those of other variables, and can be applied restrictively only to an experimental situation where one is not allowed to turn over backward the leaves of textual material and the learning time is fixed.

Studies to clarify the effect of the frequency of a teacher's questions (Good & Brophy, 2000; Rickards & Di Vesta, 1974) need to be examined in terms of the validity of their assumptions. The effects of a teacher's questions can never be explained in terms of objective frequency since the effects are a result of interaction among the qualitative factors such as the questions' purpose, content, timing, and the cognitive characteristics of the learners.

We can criticize studies on the effect of pausing time (Atwood & Wilen, 1991; Dillon, 1990; Kawa, 1980; Newmann, 1992; Rowe, 1986) on the same basis. However long the teacher might wait for the student's response after he asks a question it would be meaningless unless the student thinks over it during that time. As it were, what makes a teacher's questions effective is not an absolute amount of pausing time, but the subjective time duration and the meaningfulness of the question to a student's cognition.

So far, the assumption that objectively effective types of questions exist has been critiqued. Positivists presuppose that the overt characteristics of questions determine their functions and roles, and they try to clarify the effect of each variable. However, positivists disregard the content of questions, the relevance of content to the learner, and the individual cognitive process. This results in inconsistency among the research findings and the inability to explain the reality. In addition, restrictive use of the observable concept confines the purposes and problems of research; researchers have rarely paid attention to the pivotal characteristics of questions such as subjecthood, structuredness, and reflectiveness.

In sum, the intention of studies to improve the effectiveness of teaching by clarifying a series of efficient questioning skills is a respectable undertaking by itself, but the research problems and methods of the studies need to be reconceptualized.

The assumption that the meaning of the text is explicit and fixed

Considerable efforts have been made to clarify the effect of questions inserted in prose material (Aleksic, 2003; Dickerson, 1987; Fuller, 1992; Hamaker, 1986; McIntosh &

Draper, 1996; Reinking et als., 1996; Wang & Andre, 1991; Wood, 1995). Such questions function as a sort of cue system to highlight the focus of the text and to guide the relevant cognitive process to the learners. Studies around these questions can be regarded as a meaningful effort to apply the information processing theory for construction of learning materials. However, most of these studies have defined the meaning of 'interpretation' too narrowly. As a result, they have neither attained consistent results, nor given implications of their practice.

The main research problem is to clarify the differential effect according to the position, frequency, and level of inserted(or adjunct) questions in the text (Aleksic, 2003; Andre, 1990; Andre & Thieman, 1988; Benton & Blohm, 1986; Pi-Sui-Hsu & Dwyer, 2004). Researchers have made an effort to expect and validate the findings by conceptualizing through the 'cybernetics model', 'mathemagenic model' and 'directed attention model'. However, the application of these models has been performed in terms of a positivistic paradigm, and their basic research scheme rarely doubted.

Unfortunately, the actual findings of such research have been so inconsistent that they could not be explained relevantly by any of these models. For example, according to the 'directed attention model', higher-cognitive inserted questions are expected to be more effective than fact questions. However, the actual studies cannot support that expectation. In addition, according to the 'cybernetic model' and 'mathemagenic model', the learner's achievement would be better when questions are inserted in the material than when there is no question inserted in it. However, the results (Yilmaz, 2003; Andre & Thieman, 1988) have also been inconclusive.

To address the inconsistency of the results, an alternative research design which includes individual differences has been suggested (Pi-Sui-Hsu & Dwyer, 2004; Yang, 1986). However, this alternative design cannot be a solution as far as it adheres to a positivistic point of view about the purpose of reading the text and the effect of questioning.

In accordance with their positivistic perspective, they assume the text has its own meaning and that understanding the text refers to copying its objective meaning. Meyer (1983) named such a concept as the 'Xerox theory of meaning' and criticized its limitations. According to this theory, the meaning of a text can be clarified by analyzing each word and phrase, and the parts have their objective meanings irrespective of the whole. However, Meyer points out that the meanings of the words and sentences are not fixed before using but exist through the vivid communicational process. He emphasizes that all the trials to establish the meaning of language mechanically and objectively are in vain.

The positivistic perspective of language has limitations because it excludes the tacit dimension, the structural characteristics, and the context-dependence of language. From the alternative point of view such as constructivism and philosophical hermeneutics, the meaning of a text depends on the context and the reader. The meaning or the truth of any statement may be considerably different according to the discipline it is based upon, and each discipline has its own conceptual scheme, logic of heuristics, and way of interpretation or evaluation.

Moreover, it needs to be emphasized that the meaning of a text should be subjectively explored and interpreted rather than objectively found. The interpretative process of a text can be conceptualized as a dialectical interaction between the expectation of the reader and the sense of the text.

Hence, studies around inserted questions in the text should take an alternative approach which properly regards the subjective, dynamic and dialectic aspects of the interpretative process.

The belief that the learner's question functions as a means for external ends

Parallel to the interest in teacher-generated or text-inserted questions for teaching, there has been interest in learner-generated questions. If we accept that educational activity is related to upgrading a learner's understanding, there is no disagreement that the learner's spontaneous question is a very important variable in educational research. However, the research purpose and methodology vary according to the epistemology upon which the studies are founded.

It is fairly safe to say that most positivistic studies in this area have concentrated on the effect of self-questioning on the processing of the text. There are three discernible theoretical perspectives in self-questioning: 'active processing theory', 'metacognitive theory' and 'schema theory'.

To begin with, according to the 'active processing theory', the learner must generate his own questions that shape, focus, and guide his thinking during reading in order to actively comprehend the text. Major research problems of the studies(Chan, 1991; Davey & Mcbride, 1986; Graves & Levin, 1989; Shiang & Mcdaniel, 1989; Tayor, Alber, & Walker, 2002) based on this perspective have been as follows: 1) Do the student-generated questions induce prose processing superior to experimenter-generated questions? 2) Does the generation of higher order questions produce better

comprehension because higher order questions are presumed to induce more thorough processing of given material? 3) Does generating more questions induce more processing of prose, which results in better comprehension and retention?

Approaches to these themes have been similar to those of studying the effects of a teacher's questions and the effect of inserted questions in prose material, and as such have similar drawbacks. For example, self-questioning is considered as a tool for the effective comprehension of the content of a text, the level of the question is defined by a logical analysis, the effect of the observable frequency of the question is among the main themes, the effects of the independent variable is reduced to the score of the comprehension test, the major concerns with input and output variables only, and effort is rarely made to theorize in relation to the process.

Secondly, studies (King, 1992; Malone & Mastropieri, 1992; Marzola, 1988-1989; Nolan, 1991; Palincsar, 1982; Wong & Jones, 1982) based according to the'metacognitive theory' have emphasized the effect of questioning as a metacognitive skill. The main research problems have been as follows: 1) whether or not students could be trained to identify important parts of the text and construct questions about them, and 2) whether or not such self-questioning would enhance students' learning of the given material.

Metacognitive theory is consistent with efforts to facilitate learning through the training of learning skills, learning strategies, or learning how to learn. In this approach, questioning is considered as either one type of learning strategy such as planning, monitoring, checking, self-examining (Nibet & Shucksmith,1986), or one of many learning skills such as outlining, note-taking, underlining, summarizing (Armbruster & Anderson,1981). However, the belief that learning strategies or skills can be acquired by direct teaching or training has not been supported theoretically and empirically.

A learning skill such as 'note-taking' can not guarantee effective learning. What makes learning effective is not a learning skill itself such as note-taking, but the learner's way of using it. In other words, learning questioning skills in general is different from actually raising relevant, meaningful questions which are consistent with the characteristics and level of the text. One's learning strategy is not something additive to one's knowledge. Those two interact with each other, so they cannot be precisely differentiated. Hence, it needs to be emphasized that posing meaningful questions is not a mechanical application of skills acquired through training but a reflection of an individual's educative level.

Studies to examine the transfer effect of self-monitoring questions after training (Andre & Anderson, 1978-1979; Wong & Jones, 1982) should admit that obtaining that skill may have a minor role at most in one's learning. For example, making it a rule to check the main idea of the text is just one condition among many conditions which are needed to grasp the main idea. Moreover, the main idea a student grasps is a reflection of his cognitive level, so it may not be the same as the idea supposed by the expert. In sum, it is natural that the facilitative effects through the training of general questioning techniques should be considerably weak.

'Schema theory' is another theoretical perspective. From this point of view, the effect of the learner's prior knowledge on prose processing is emphasized (Pressley et als., 1992; Singer and Donlan, 1982). This perspective is relatively comprehensive in the sense that it emphasizes the activity of the cognitive subject, and the structural dimension of cognition. However, the learner's question is still considered restrictively as a means to facilitate learning rather than an end in itself. As a result, the structural dimensions of a question implied in schema theory have been disregarded.

Thus far, positivistic studies on the effect of self-questioning on the comprehension and retention of the text have considered the learner's questions as a means to aid learning of specific content rather than as a valuable factor in itself. As a result, crucial characteristics such as subjecthood, structuredness, and reflectiveness of a question have rarely been paid attention to. The author believes valuable research problems and methodologies can not be acquired until the learner's question is recognized as an end rather than a means(e.g., Yang, 1992, 1995, 2002). Only then can the educative significance of learner's questions be adequately evaluated.

Suggestions For Further Research

When we attempt to conceive of the questioning process as occupying the central position in education, we will have more questions on questions than answers to them. Several areas of research on questioning worthy of investigation and solvable through a nonpositivistic approach can be identified. The promising research questions and some preceding studies in each area are as follows.

1) What are the definitive characteristics of educative questions?

Research on questioning has been conducted in several realms, such as psychotherapy, surveys, law, journalism, as

well as education. The function and purpose of the practice of questioning are considerably different among the realms. However, most positivistic research on questioning in education has paid little attention to the definitive and unique characteristics of educative questions.

The effort to identify the nature of educative questions can not be separated from pursuing the nature of education. In this study, subjecthood, structuredness, and reflectiveness are suggested as crucial characteristics of educative questions. In further studies the nature of educative questions should be elaborated upon in terms of an endogenous theory of education.

2) What are the immanent taxonomy and categories of questions in education?

As discussed, the dominant categorization of questions in education are founded on Bloom's(1956) taxonomy which is based on unwarranted assumptions. Deficiency of explanatory power and inconsistencies in research results indicate the ineffectiveness of such taxonomy.

As an alternative, this study identified the types of teacher's questions as 'diagnosing questions', 'dissolving questions', and 'illustrative questions'. In line with that, the immanent taxonomy and categories of questions in education need to be specified in further research.

3) What contingent relationships are there between problem solving ability and problem posing ability?

In spite of its importance, the research on problem posing ability is comparatively rare. Smilansky(1984) analyzed empirical data and concluded that the problem solving ability could not be a sufficient condition but a necessary condition for problem posing ability. Additionally, Dillon(1988) has reported that there were no close relationships between two abilities, especially in ill-structured problem situations. The theoretical and empirical analysis on the relationships between two abilities needs to be elaborated upon.

4) What are the methods to diagnose the level and content of learner's questioning?

Piaget's clinical method, the so called 'art of questioning' (Piaget, 1972) provides implications for diagnosing the learner's cognitive structure. In addition to this, Vygotsky's (1978) notion of 'Zone of proximal development' has stimulated a considerable body of recent research. The dynamic assessment approach(Sternberg & Grigorenko, 2006), including Feuerstein's 'Learning Potential Assessment Device' and Budoff's 'Measures of Learning Potential', can be examples of applying Vygotsky's insight into diagnosis of the level and content of learner's cognition. Various methods which can supplement the limit of static and positivistic assessment are expected.

5) what are the internal and external atmosphere and conditions that might facilitate learner's questioning?

Learner's questions make the perfect opening for teaching to enter as well as for learning to ensue. In other words, questions by learners create openings that reveal everything necessary for pedagogical appreciation and intervention. Dillon(1988) identified the cognitive, affective, and behavioral propensities entailed in the presumptions of questioning-realization of ignorance, experience of perplexity, the felt necessity to know, commitment to the truth, confidence in the knowable and so on. Yang(1995) highlights the educational significance of questioning, and explores the inner mechanism of question generation. Moreover, the external conditions that might facilitate learner's question are discussed, especially in the domain of the instructional method, the organization of educational material, and the evaluation method. Further studies which recognize learner's questioning as a valuable factor in itself are recommended.

References

Aleksic, Maja (2003). Adjunct questions as aids to effective illustration processing. Doctoral dissertation, The Pennsylvania state university.

Andre, M. E. D. A., & Anderson, T. H. (1978-1979). The development and evaluation of a self-questioning study technique. *Reading Research Quarterly, 14*, 605-623.

Andre, T. (1990). Type of inserted questions and the study post-test delay. *Journal of experimental Education, 58*, 77-86.

Andre, T., & Thieman, A. (1988). Level of adjunct question, type of feedback, and learning concepts by reading. *Contemporary Educational Psychology, 13*(3), 296-307.

Armbruster, B. B., & Anderson, T. H. (1981). Research synthesis on study skills. *Educational leadership, 39*(2), 154-156.

Atwood, V., & Wilen, W. (1991). Wait time and effective social studies instruction: what can research in science education tell us? *Social Education, 55*, 179-181.

Barnes, D., & Todd, F. (1995). *Communication and learning revisited: making learning through talk*. Portsmouth: Boynton/ Cook publishers.

Benton, S. L., & Blohm, P. J. (1986). Effect of question type and position on measures of conceptual elaboration in writing. *Research in the teaching of English, 20*(1), 98-108.

Bernstein,R.J.(1983). *Beyond objectivism and relativism: science, hermeneutics, and praxis.* Philadelphia: University of Pennsylvania press.

Bloom, B. S. (1956). *Taxonomy of educational objectives.* New York: David Mckay company, inc.

Chan, L. K. S. (1991). Promoting strategy generalization through self instructional training in students with reading disabilities. *Journal of Learning Disabilities, 24*, 427-433.

Davey, B., & Mcbride, S. (1986). Effects of question-generation training on reading comprehension. *Journal of Educational Psychology, 78,* 256-262.

Dickerson, C. T. (1987). The effects of adjunct questions on learning from text inconsistent with prior knowledge. *Dissertation Abstracts*.(UMI No. AAC 8804837).

Dillon, J. T. (1988). Levels of problem finding versus problem solving. *Questioning Exchange: Multidisciplinary review, 2*(2), 105-116.

Dillon, J. T. (1990). *The practice of questioning.* New York: Routledge.

Fuller, J. A. (1992). Deep and surface processing in learning from text among baccalaureate nursing students. *Dissertation Abstracts*.(UMI No.AAC MM76354).

Gadamer, H. G. (1975). *Truth and method.* New York: Seabury press.

Gall, M. D. (1984). Synthesis of research on teachers' questioning. *Educational Leadership*, November, 40-47.

Glasersfeld, E. von (1995). *Radical constructivism: A way of knowing and learning.* London: The Falmer press.

Good, T. L., & Brophy, J. (2000). *Looking in classrooms.(*8th ed.). New York: Longman.

Graves, A. W., & Levin, J. R. (1989). Comparison of monitoring and mnemonic text-processing strategies in learning disabled students. *Learning Disability Quarterly, 12,* 232-242.

Hamaker, C. (1986). The effects of adjunct questions on prose learning. *Review of Educational Research, 56*(2), 212-242.

Hanson, N. R. (1958). *Patterns of discovery: An inquiry into the conceptual foundations of science.* Cambridge: Cambridge university press.

Kawa, H. D. M. (1980). A study to investigate the effects of wait-time and questioning strategies on the oral language behaviors of teachers and students during children's literature discussions in language arts. Doctoral dissertation, Pennsylvania state university.

King, A. (1992). Comparison of self-questioning, summarizing, and notetaking - review as strategies for learning from lectures. *American Education Research Journal, 29*, 303-323.

Kuhn, T. S. (1970). *The structure of scientific revolutions* (2nd ed.). Chicago and London: The university of Chicago press.

Lee, H. W. (1991). *The concepts of education.* Seoul: Muneum press.

Malone, L. D., & Mastropieri, M. A. (1992). Reading comprehension instruction: summarization and self-monitoring training for students with learning disabilities. *Exceptional Children, 58*, 270-279.

Marzola, E. S. (1988-1989). Interrogating the text: Questioning strategies designed to improve reading comprehension. *Journal of Reading, Writing and Learning Disabilities International, 4*(4), 243-258.

McIntosh, M. E., & Draper, R. J. (1996). Using the question-answer relationship strategy to improve student's reading of mathematics texts. *Clearing House, 69*(3), 154-162.

Meyer, M. (1983). *Meaning and reading: A philosophical essay on language and literature.* Amsterdam: John Benjamins publishing company.

Newmann, F. (1992). Higher order thinking and prospects for classroom thoughtfulness. In F. Newmann(Ed.), *Student engagement and achievement in American secondary schools.* New York: Teachers College press.

Nibet, J., & Shucksmith, J. (1986). *Learning strategies.* London: Routledge & Kegan Paul.

Nolan, T. E. (1991). Self-questioning and prediction: Combining metacognitive strategies. *Journal of Reading, 35*, 132-138.

Palinscar, A. S. (1982). Improving the reading comprehension of junior high students through reciprocal teaching of comprehension-monitoring strategies. Doctoral dissertation, University of Illinois.

Perry, M., Vanderstoep, S., & Yu, S. L. (1993). Asking questions in first grade mathematics classes: Potential influences on mathematical thought. *Journal of Educational Psychology, 85*, 31-40.

Phillips, N., & Duke, M. (2001). The questioning skills of clinical teachers and preceptors: a comparative study. *Journal of Advanced Nursing, 33*(4), 523-529.

Piaget,J.(1972). *The child's conception of the world*. New Jersey: Littlefield, Adams & co.

Pi-Sui-Hsu, & Dwyer, F. (2004). Effect of level of adjunct

questions on achievement of field independent/field dependent learners. *International Journal of Instructional Media, 31*(1), 99-106.

Pressley, M., Wood, E., Woloshyn, V. E., Martin, V., King, A., & Menke, D. (1992). Encouraging mindful use of prior knowledge: Attempting to construct explanatory answers facilitates learning. *Educational Psychologist, 27*, 91-109.

Redfield, D. L., & Rousseau, E. W. (1981). A meta-analysis of experimental research on teacher questioning behavior. *Review of Educational Research, 51*(2), 237-245

Reinking, D. et als. (1996). The effects of inserted questions and mandatory review in computer-mediated texts. Reading research report No. 50 (ED 394138)

Rickards, J. P., & Di Vesta, F. J. (1974). Type and frequency of questions in processing textual material. *Journal of Educational Psychology, 66*(3), 354-362.

Rorty, R. (1979). *Philosophy and the mirror of nature.* Princeton University press.

Rowan, T. E., & Robles, J. (1998). Using questions to help children build mathematical power. *Teaching Children Mathematics, 4*, 504-509.

Rowe, M. (1986). Wait time: slowing down may be a way of speeding up. *Journal of Teacher Education, 37*, 43-50.

Samson, G. E., Strykowski B., Weinstein, T., & Walberg, H. J. (1987). The effects of teacher questioning levels on student achievement: A quantitative synthesis. *The Journal of Educational Research, 80,* 290-295.

Sanders, N. M.(1966). *Classroom questions: what kinds?* New York: Harper & Row.

Schwab, J. J. (1969). Learning as enquiring. In D. Vandenberg (Ed.), *Teaching and learning*(pp.32-38). Urbana: University of Illinois press.

Sellappah S., Hussey T., Blackmore A. M., & McMurray A. (1998). The use of questioning strategies by clinical teachers. *Journal of Advanced Nursing, 28*, 142-148.

Shiang, C. P., & Mcdaniel, E. (1989). The effects of questioning on thinking processes. *Clearing House* (ED 310131).

Smilansky, J. (1984). Problem solving and the quality of invention. *Journal of Educational Psychology, 76,* 377-386.

Singer, H.,& Donlan, D. (1982). Active comprehension: Problem-solving schema with question generation for comprehension of complex short stories. *Reading Research Quarterly, 17*(2), 166-186.

Stephanie, S. A.(1982). A study of the relationship between teaching techniques and student's achievement on high cognitive level question-asking skills(Doctoral dissertation, the university of Chicago,1981). *Dissertation Abstracts International, 42*.

Sternberg, R. J., & Grigorenko, E.L. (2006). *Dynamic Testing: The nature and measurement of learning potential.* Cambridge university press.

Tayor, L. K., Alber, S. R., & Walker, D. W. (2002). The comparative effects of a modified self-questioning strategy and story mapping on the reading comprehension of elementary students with learning disabilities. *Journal of Behavioral Education, 11*(2), 69-87.

Vygotsky, L. S. (1978). Mind *in society: The development of higher psychological processes*. Cambridge: Harvard university press.

Wang, T., & Andre, T. (1991). Conceptual change text versus traditional text and application questions versus no questions in learning about electricity. *Contemporary Educational Psychology, 16*, 103-116.

Westgate, D., & Hughes, M. (1997). Identifying quality in classroom talk: an enduring research task, *Language and Education, 11*(2), 125-139.

Wilen, W. W. (1992). *Questions, questioning techniques, and effective teaching*. National Education Association, Washington.

Wimer J. W., Ridenour, C. S., Thomas, K., & Place A. W. (2001). Higher order teacher questioning of boys and girls in elementary mathematics classrooms. *The Journal of Educational Research, 95*(2), 84-92.

Winne, P. H. (1979). Experiments relating teachers' use of higher cognitive questions to student achievement. *Review of Educational Research, 49*(1), 13-49.

Wong, B. Y. L.. & Jones, W. (1982). Increasing metacomprehension in learning disabled and normally achieving students through self-questioning training. *Learning Disability Quarterly, 5*, 228-240.

Wood, R. A. (1995). The effect of inserted and massed post adjunct questions with and without corrective feedback on improving the reading comprehension of learning disabled adolescents. *Dissertation Abstracts*. (UMI AAC 9525503).

Yang, M. K. (1986). Effect of the position and the level of questions inserted in prose learning material. Unpublished master's thesis, Seoul National University, Korea.

Yang, M. K. (1992). A critical review of research on questioning in terms of its significance and problems in education. Unpublished doctoral dissertation, Seoul National University, Korea.

Yang, M. K. (1995). A study of the educational conditions facilitating the learner's question. *Korean Journal of Educational Research, 33*(1), 95-116.

Yang, M. K. (2002). Exploring the characteristics of students' questioning in class and their educational implications. *Korean Journal of Educational Research, 40*(1), 99-128.

Yilmaz, N. P.(2003). The effect of the inserted questions on learning relating theoretical knowledge to the context. *Educational Sciences: Theory & Practice, 3*(2), 483-488.

Received January 31, 2006
Revision received October 11, 2006
Accepted November 30, 2006