The FourThought Teaching Strategy and Its Impact on Students' Metacognitive Skills and Achievement

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The data were obtained from two intact Grade V Social Studies classes of students with average abilities in a public school in Pampanga. Treatment was randomly assigned to these two classes to form the experimental and control groups. Both classes were taught by the same teacher and had similar lessons and tasks for six weeks. Students were pre- and post-tested on a Social Studies Achievement Test and a questionnaire that tapped metacognitive processes. The results indicated that the students exposed to FourThought Strategy showed a significant increase in their levels of metacognitive awareness and skills as well as an enhanced achievement in Social Studies.

Introduction

Recent years have seen an explosion of interest regarding the improvement of students' cognitive abilities or thinking skills. Of late, a very important development related to the teaching of effective thinking emphasizes the role of *metacognition,* or the knowledge and control the students have over their thinking. One of its distinct components is *knowledge about cognition,* or knowledge about the how, why and when aspects of learning. For students to be successful as learners and good thinkers, they must be aware of their own cognitive processes. Another component is *regulation of cognition*, which means that a student needs to learn basic regulatory skills such as planning, monitoring and most important, coordinating his learnings (Bruning, et al. 1995). Many educators now believe that through metacognition, skillful learners know a lot about their thinking and that they "effectively know how to learn."

Students' understanding of their own metacognition has been perceived to play a major role in skilled learning because it helps in controlling a host of other skills (Cross, et al. 1988). Flavell (1979) noted that metacognition plays an important role in oral communication of information, comprehending information, attention, memory, problem-solving and various types of self-control and self-correction. Students who are more metacognitively skilled are more able to assess the requirements of a particular task, construct a plan, select appropriate goals and figure how much time is needed to accomplish the task and modify the plan when necessary (Brown, et al. 1983). Reinforcing the learners' ability to practice these processes are essential for improving academic performance in different types of actual classroom tasks (King 1986; Zimmerman, et al. 1988).

Learning psychologists have consistently noted that good learners plan more effectively, monitor performance more carefully, and have a greater sense of their own capabilities and limitations as they tackle a particular task (Nickerson 1984; Romainville 1994). As John says, "Part of being a good learner is learning to be aware of one's own mind... the good student may be one who often says that he does not understand, simply because he keeps a constant check of his thinking. The poor learner who does not, so to speak, watch himself trying to understand, does not know most of the time whether he understands or not" (Holt 1994).

Furthermore, helping learners develop purposeful awareness of their metacognitive abilities can help them improve their capacity to learn from school tasks (Pintrich, et al. 1990). Sternberg (1998) pointed out that metacognition represents a part of the abilities that lead to students' academic success. Studies show that a substantial relationship exists between students' metacognition and achievement in school. Students' ability to think about and do assignments, search for and find pertinent information, organize and express their ideas, and assess their work are all important features of metacognition linked with school success (Bruning, et al. 1995). In one study on the relationship between metacognition and academic achievement in 35 Belgian students, Romainville (1994) found that students who were more aware of their thought processes and who evoked metacognitive knowledge more frequently performed better.

A number of programs and strategies have been developed in recent years to promote gains in students' thinking and learning, all pointing to the importance of self-conscious management of one's thinking and learning processes. One practical approach is the infusion of the teaching of effectual thinking with the teaching of a regular subject in the curriculum. Perkins (1995) suggests that instruction needs to give the teaching of effective thinking as well as content point blank attention in order to advance students' thinking abilities and to enhance subject matter learning. Educators who are alarmed over low student achievement would find the infusion of the teaching of metacognitive skills to subject matter learning interesting as educators who are alarmed over students' inability to think effectively do. To weave metacognition into the rhythm of regular subject instruction is "to make what some students do on rare occasions into a regular pattern of practice" (Schoenfeld 1987).

The FourThought Teaching Strategy

One teaching strategy that infuses the enhancement of metacognitive skills in the teaching of students' regular coursework is the FourThought Strategy (FTS) which was introduced by Tishman, et al. (1995) in the book *The Thinking Classroom*. The design of the strategy is greatly influenced by the assumption that there is a deep-rooted desire within every child to exercise his or her mind and the challenge to teachers is to release and capitalize on this desire. It is built around a four-step process that promotes metacognitive attention to thinking. The four steps include (1) mind-setting, (2) stating, (3) checking, and (4) thinking back which are all geared towards the resolution of any "thinking challenge" or learning task.

Minding-setting, or getting ready, orients the learner to the specific concept, topic or task to be discussed. It allots some seconds of quiet time to have a clear picture of the upcoming challenge. Stating refers to setting of goals and standards, where plans and steps are clearly stated to complete the task successfully. Checking means "keeping tract of thinking," where thoughts are periodically monitored while keeping in mind the stated goals and checking if the plans and standards are followed. Thinking back involves asking questions that require reflection on the thinking processes used in the task, evaluating success in handling the task, regulating thoughts and actions, and identifying the best steps to complete and succeed in the task. On the other hand, thinking challenge refers to any complex or non-routine learning task like studying for a test, conducting an experiment, writing an essay, taking a quiz, participating in a group work, listening to a lecture, or watching a film (Tishman, et al.).

The four-step process guides the teacher in facilitating students' metacognitive skills, thus making the simplest classroom experience an exercise in thoughtful planning, skillful problem solving, creative and independent thinking, and reflective learning. It helps the teacher to actively involve the students in organizing ideas together and in testing and modifying them.

Purpose and Method

This experimental study aimed to investigate the assertion that putting the four components of the FTS to work would create a positive impact on students' thinking and learning outcomes. Specifically, the study aimed to find out if, after being exposed to the FourThought strategy, the levels of metacognitive awareness and skills of the experimental group may increase; the experimental group's posttest mean scores (PTMS) in a Social Studies Achievement Test may have a significant difference from the PTMS of the control group; and the experimental group's average grade in Social Studies may have a significant difference from that of the control group.

The subjects of the study constituted two intact grade five Social Studies classes in a public school in Pampanga, each class consisting of 45 students with average abilities. Treatment was randomly assigned to these two classes by tossing a coin to determine the experimental (Eg) and the control groups (Cg).

The study utilized the experimental research method, specifically the Non-equivalent Control Group design, a variation of a quasi-experimental design from Gay (1996). This design is used when random assignment of individual subjects to groups is not administratively possible. According to Gay, one advantage of this design is that since classes are used "as they are," possible effects from reactive arrangements are minimized.

Instruments

Both groups used two instruments which were administered as pretests and posttests.

The Self-Assessment Questionnaire on Metacognitive Skills *(Talatanungan sa Pansariling Tasa sa Metacognition [TPTM]).* This 20-item instrument was originally developed by O'neil and Abeidi (1996) to assess or measure intermediate grade students' levels of metacognitive skills and was used in this study for the same purpose. Having been validated and translated in Filipino language for the use of Filipino children by Malibiran (1998) in her study on the development of metacognitive skills among intermediate grade pupils, the instrument did not necessitate further validation for this study. A formal letter of request was sent to the author for the use of the Filipino version of the instrument.

The instrument operationally defined metacognition as a construct consisting of four sub-skills: (a) planning, (b) self-checking/evaluating, (c) cognitive strategy, and (d) awareness. These sub-skills were represented in the questionnaire as follows:

SKILLS	ITEMS	SAMPLE ITEMS
Awareness	1,5,9,13,17	1. Alam ko ang aking ginagawa at iniisip. (I know what I am doing and thinking of.)
Cognitive Strategy	3,7,11,15, 19	2. Inaalam ko kung ano ang dahilan sa gawain o aralin. (I find out the objective of the activity or lesson.)
Planning	4,8,12,16, 20	3. Pinag-aaralan ko munang mabuti kung ano ang dahilan sa ganitong gawain bago ko simulang sagutin ang mga tanong. (Before I start answering the questions, I study the rationale of the activity.)
Self-Checking/ Evaluating	2,6,10,14, 18	4. Sinisikap kong iwasto ang aking ginagawa habang patuloy ang gawain. (I try to correct/check what I'm doing while I do the activity.)

The scores for each sub-skill were used in this study to determine the learners' level of metacognitive skills. They were represented as:

__1 Not at all (*Hindi Kailanman*) which reflects absence of metacognitive skill
__2 Somewhat (*Paminsan-minsan*) which shows low level metacognitive skill
__3 Moderately so (*Madalas*) which means average metacognitive skill
__4 Very much so (*Palagi*) which reflects high level of metacognitive skill

Social Studies Achievement Test (SSAT). This is a 50-item multiple choice researcher-made test constructed to measure students' knowledge and skill in comprehending, synthesizing and analyzing ideas about the subject. Each question has four possible choices. The questions were constructed based on the grade five Social Studies lessons in the second quarter for the school year 1998-1999 and were distributed according to a prepared table of specifications. The particular topics covered in the test were about "American Occupation of the Philippines, the Commonwealth Government and the Japanese Period in the Philippines. All questions were written in Filipino, the medium of instruction in the teaching of Social Studies in public schools.

The test was first subjected to content validity by a panel of Social Studies experts at the UP College of Education. After validation, the SSAT was pilot tested to one grade six class in the subjects' school. Item analysis was done to make the final draft which was then administered to another group of grade six students in the same school and subsequently tested for reliability. The Split-Half Method was used, and the Spearman Brown formula was applied to the test which yielded a reliability coefficient of .76.

Pre-Experimental Phase

Prior to the beginning of the second quarter of school year 1998-99, arrangements regarding the handling of the two chosen intact classes were discussed with the principal and the grade five coordinator. The subjects' first quarter mean general academic weighted average grades (GWAs) were obtained from their class advisers to check initial group comparability.

Examination of the means and a t-test for independent samples indicated essentially no difference between the two groups as shown in Table 1. Therefore, the two groups were considered initially comparable in terms of their first quarter general weighted averages (GWAs).

Table 1. General Academic Weighted Averages of the Experimental and Control Groups

Group	X	SD	T
Experimental[a]	84.09	2.20	$.16_{ns}$
Control[a]	84.19	2.94	

[a] n = 45 df = 88 ns = not significant

Verifying further whether the two classes were similar in characteristics, both were administered pre-tests on two instruments (TPTM and SSAT). A t-test for independent samples was used for the pretest data. Table 2 shows that the computed t-values were less than the critical t-values at the .05 level of significance. Therefore, it was apparent that the two groups not only had initial comparable levels of metacognitive awareness and skills as measured in the TPTM but also had the same initial knowledge on the concepts and skills tested in the SSAT.

Table 2. Mean Pretest Scores of the Experimental and Control Groups

Data	Group	X	SD	t
TPTM	Experimental[a]	2.66	.38	-1.47
	Control[a]	2.78	.42	
SSAT	Experimental[a]	19.71	4.04	-.28
	Control[a]	19.96	4.31	

[a]n = 45 *Note*. TPTM = Talatanungan sa Pansariling Tasa sa Metacognition
df = 88 SSAT = Social Studies Achievement Test

Experimental Phase

In this study, the teaching experiments were done in the context of Social Studies subject which, with its rich content, provides a fertile ground for cultivating good thinking skills.

On the first day, the pretest for the TPTM was administered to both Eg and Cg to determine the groups' initial equivalence as well as to measure the students' initial metacognitive level. It was stressed that the TPTM was not a test to be graded by the teacher and the data will be used as a way of getting to know the students better. The students were told to answer the questions as honestly as possible and to mark every item. It took students from both groups an average of 25 minutes in answering the TPTM. The remaining class time was used to establish rapport with the students. The pretest for the SSAT was administered the next day.

On the succeeding days, the planned lessons were carried out in the respective classes. The researcher facilitated the classes of both the experimental and the control groups for a period of six weeks, at 40 minutes per day for each class. Both classes were scheduled in the morning. Throughout the study, similar lessons were covered for both classes which were based on the Minimum Learning Competencies as required by the Department of Education. The two classes used the same textbooks and materials and were assigned the same amount of homework and seatwork. Instructional objectives were similar for each class and all tests measuring achievement were similar. The Filipino language was used as the medium of instruction in the teaching of lessons. Two separate classrooms were used. However, the size, set-up and conditions of both rooms were essentially identical.

The Cg was taught using the conventional methods of lecturing and open class discussion. The teacher's role was one of information disseminator.

Metacognition was infused in the teaching of Social Studies utilizing the FTS in the Eg. Instruction started by conditioning the minds of the learners for the lesson and task ahead (**M**ind-Setting). Students were asked to think about what they know or do not know about the particular topic, issue or task. Objectives were presented to the students for them to know what to expect. The teacher then involved the students in developing a plan of action, that is, formulating their goals and standards to complete the task (**S**tating). As they went about their particular task, the teacher helped the students to maintain/monitor their plan of action, that is, periodically checking their progress whether their set goals and standards were being met (**C**hecking). In this mode of teaching, teacher capitalized on social-cognitive activities such as cooperative learning and active classroom discourse. Finally, at the end of the class period, the teacher guided the students in evaluating the task and their learning (**T**hinking Back). In this approach, the teacher acted as a model of good thinking and a facilitator for learning with the students as active participants. To easily remember the four steps, the researcher also referred to the FTS as "My Students Can Think" Strategy. Putting all the four steps to work further enhanced the excitement and attraction of classroom teaching.

After the initial exposure of the Eg to FTS, the FTS framework was left posted on the board to serve as a reminder of how good thinking works. Furthermore, to explain and make metacognition a more permanent part of the students' daily learning, the teacher initially provided each student in the Eg sample of the FTS framework which served as students' guide in their thinking and learning of a particular task or challenge.

The FTS framework was used consistently to accustom the students to think about thinking. The teacher translated the metacognitive strategies in the Filipino language for easier and better understanding and were posted on the top front wall of the Eg's classroom.

While both groups displayed their work (that is, accomplished test papers, posters, drawings and illustrations) in their respective classrooms' bulletin boards, the thinking slogans "Think Before You Act", "You Become What You Think" and "Do not memorize, Internalize" were posted by the teacher in the Eg's room. Consequently, the students from the Eg were prompted to formulate their own thinking slogans which they used in different class activities.

Two grade five Social Studies teachers acted as observers to ensure that the two classes differed only in the teaching approach and that no other factors had caused the result. Observations were done on six separate class meetings; three were announced and three were unannounced. The result of the evaluation of the two faculty observers showed that each criterion in the observation checklist was obtained to a very great extent throughout the experiment.

To determine if the experimenter's biases were controlled during the study, students from the Eg and Cg were asked to answer a Teacher Evaluation Form which was developed

and revised (1994) by the U.P. Integrated School's Office of Research, Development and Publication. It consisted of 24 statements—13 of which were about the knowledge and methodology of the teacher, and 11 were about the teacher's personal character and relationship with the students. A comparison of the students' evaluation of the teacher's performance and personality yielded a t-value of .21 which was not significant at the .05 level.

Both classes were given posttests on the SSAT and TPTM at the end of the grading period. The second quarter average grade in the Social Studies subject of students in both groups were obtained by averaging their performance or marks earned over the course period on three actual classroom tasks: (a) quizzes and tests (b) seatwork, homework, projects, and class participation, and (c) periodic test.

Finally, aware of the ethical principle involved in conducting research of this nature, the researcher sought permission from the Cg's adviser to handle the class for another session after the research period. In that particular session, the Cg was oriented about the FTS.

The SAS System, Version 6.12 was used for the statistical computations in the study. The statistical tool used to test the mean differences was the t-test. An alpha level of .05 was set for all computations.

Discussion of Results

Metacognitive Ability Levels

A t-test for correlated means (.05) was employed to determine whether the utilization of the FTS had a significant effect on the levels of metacognitive skills of students in the experimental group. Calculations of the pretest and posttest mean scores on the TPTM revealed that the experimental group students gained significantly in their metacognitive ability levels after being taught with the FTS as indicated in Table 3.

Table 3. Mean scores in the TPTM Pretest and Posttest of the Experimental Group

Experimental[a]	X	SD	S_D	T
Pretest	2.66	.36	.05	15.38*
Posttest	3.48			

[a] $\underline{n} = 45$ $\underline{df} = 44$ *$\underline{p} < .05$

To further bolster the preceding results, the levels of metacognitive skills of the experimental and control groups were also compared. Means, standard deviations and t-value were obtained from the students' scores on the TPTM posttest. A t-test for independent samples revealed a significant difference between the TPTM posttest scores of the two groups as shown in Table 4 . The results show that the calculated t (8.09) exceeded the table value of t (2.02), indicating significant difference between the levels of metacognitive skills of students in the experimental and control groups after the research period in favor of the Eg.

Table 4. Mean Scores in the TPTM Posttest of the Experimental and Control Groups

Group	X	SD	T
Experimental[a]	3.88	.26	8.09*
Control[a]	2.89	.42	

[a]n = 45 df = 88 *p < .05

Social Studies Achievement

SSAT Scores. At the end of the study, mean posttest scores of the experimental and control groups in the SSAT were compared using a t-test for independent samples. Means, standard deviations, and the t-value were derived from the raw scores gathered on the students' SSAT posttest. As Table 5 indicates, the scores of the experimental and control groups were significantly different at the .05 level of significance since the computed t (5.66) exceeded the critical t (2.00) value. Therefore, there was significant difference between the posttest mean scores in the SSAT of students who were exposed to the FTS and students taught in the CTP. This implies that students in the experimental group scored significantly better.

Table 5. Mean scores in the SSAT Posttest of the Experimental and the Control Groups

Group	X	SD	T
Experimental[a]	37.27	3.14	5.66*
Control[a]	32.53	4.65	

[a]n = 45 df = 88 *p < .05

Second Quarter Average Grades in Social Studies. To determine the effect of the FTS on the actual performance of the students in the Social Studies subject after the experimental period, the second quarter average grades in Social Studies of the experimental and control groups were compared. Computation of a t-test for independent samples (.05) indicated that the two groups differed significantly in their second quarter mean class scholastic rating in Social Studies. The means, standard deviations, and t-value are presented in Table 6.

Table 6. The Second Quarter Average Grades in Social Studies of the Experimental and Control Groups

Group	X	SD	T
Experimental[a]	77.04	6.53	4.42*
Control[a]	69.39	9.51	

[a]n = 45 df = 88 *p < .05

Since the calculated t (4.42) was greater than the critical value for t (2.00), there was enough evidence to say that the use of the FTS had a significant effect on the academic achievement of the learners.

The findings in this study generally indicate that infusing metacognition into classroom instruction via the FTS enhances students' metacognition. The results are consistent with claims that, young as they are, elementary students are able to manage and reflect upon their own thinking and learning and to improve this skill when properly cued and sufficiently motivated (Flavell 1979; Brown 1983 [in Bruning, et al. 1995]). Teacher's modeling of metacognitive behavior, giving corrective feedback, collaboration with the students, and posting and consistent use of monitoring checklists and mottos are all important features of the FTS which helped develop some level of basic automaticity with metacognitive skills among the students. Correspondingly, the findings maintain the general idea that metacognitive ability may be increased (Kellough, et al. 1994).

Analyzing the individual scores of the Eg students on the four metacognitive subskills (i.e., awareness, cognitive strategy, planning and self-checking/evaluation) before being exposed to the FTS, most of the students rated themselves highest in their planning skills and gave a lower rating for the skills on self-checking/evaluation. This outcome is typical of most students -- they follow instructions and perform the task assigned to them but they seldom question themselves about their own learning strategies or evaluate the efficiency of their performance. Most students make plans but when confronted with a difficult task, they actually have no idea what they should do. However, after being exposed to the FTS, post-testing results showed the students' consistent improvement in all the subskills, with most of them giving the highest rating on their skill in self checking/evaluation. This outcome clearly indicates that utilizing FTS in the teaching of a subject discipline activated the experimental pupils' awareness of their metacognitive skills.

The results also conform with the reports of researchers (Cross, et. al. 1988; Gage, et al. 1984; Alleman, et al. 1991, Mayer, et al. 1991; Perkins 1995) that awareness of metacognitive skills can be enhanced through instruction. These were also consistent with Vygotsky's (1978) view that experience, coaching and regular practice play crucial roles in the development and use of higher-order thinking skills among children in the elementary level.

Findings regarding the significant difference in mean scores in the SSAT posttest of the subjects are supported by the findings of researchers (Tishman, et al. 1995) that giving students the opportunity to develop metacognitive awareness and skills enables them to perform better in a given learning task. The results reveal that the students who were exposed to the FTS not only improved their knowledge of the concepts taught in the subject but also their skills in comprehending information and in making decisions. Also, it was informally observed that students exposed to FTS showed greater concern with checking their work more carefully as they proceeded in the learning task; suffice to say that they have learned to practice control over their own thinking and learning processes.

Conclusion

The better performance of the experimental group on the different learning tasks assigned in the Social Studies class provided a solid evidence that exposure to FTS enhances academic achievement of students. This finding is congruent with Perkins' (1995) claim that weaving metacognition into the daily activities of students can subsequently heighten their interest and learning of the school subject. The results are also consistent with research on metacognition in general, and in particular with the findings of King (1986) and Romainville (1984) indicating that reinforcing the students' ability to plan, monitor or reflect on their own thinking processes strengthens academic performance.

The FTS appears to be a viable educational tool for advancing students' metacognitive abilities and improving their learning capacities. However, the results cannot be generalizable to other subject areas since the study took place in the Social Studies classroom and with grade five pupils. Further research involving the strategy with different school subjects and grade levels is desirable to discover if similar results will be achieved.

When one considers that the total instruction time that the subjects were exposed to the FTS was only 40 minutes a day in a span of one and a half months, the gain scores are impressive. Apparently, the next step is to investigate the impact of the FTS on long term performance to see if the trends in the results reported are maintained.

Furthermore, one of the main goals of developing metacognition is to give low achieving students the strategies and skills used regularly by better students. It is suggested that low achievers be exposed to the FTS. In this regard, the impact of the strategy could be further validated by comparing the learning outcomes of the low achievers exposed to the FTS with those of the better students taught in the usual teaching manner. The objective should be to reduce or better yet to level out the initial differences between the two groups.

Finally, considering the findings in this study, the FTS can serve as a springboard for action. Children have a natural curiosity about the world, about themselves, and more importantly—about their minds and how their minds work. The challenge to teachers is to feed that curiosity and not stifle it (Lipman 1984). If teachers are to educate, they must be encouraged to teach in a way that is likely to positively influence students' thinking and learning. The FTS can serve as a guide to teachers to promote metacognition so that students will develop a growing awareness of the relationship of effective thinking to their school tasks.

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