**CONSTRUCTING TEACHING MODELS OF STUDENT ACTIVE LEARNING FROM CLASSROOM OBSERVATION**

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**Abstract:** This qualitative interpretive case study was carried out employing four classroom observations in each of twelve Indonesian and four Australian primary school classrooms, focusing on the continuing attempts to implement new teaching methods called Student Active Learning (SAL). SAL may be explained, briefly, as an attempt, within the centralized Indonesian school system, to implement student-centered constructivist ideas. A study of the relevant literature indicates that teaching based on constructivist principles is unlikely to be implemented well in the classroom unless there are highly quality teachers, readily available manipulative materials, and supportive learning environment. As Indonesian often lack one or more of these aspects, it seemed likely that Student Active Learning principles might not be “fully” implemented in Indonesian primary mathematics classrooms. Thus smaller scale, parallel study was carried out in Australian schools where there is no policy of Student Active Learning but where its underlying principles are compatible with the stated views about learning and teaching. The results of this study suggest that SAL has been implemented at four levels in Indonesian primary mathematics classroom, ranging from essentially no implementation to a relatively high level of implementation, with an even higher level of implementation in three of the four Australian classrooms observed.

**Kata kunci**: belajar aktif, case study, primary mathematics

In the 1994 Curriculum the government of Indonesia recommended that Student Active Learning (abbreviated as SAL) approach should be adopted for learning and teaching in all schools to improve quality of learning and teaching practices.

This qualitative interpretive case study was carried out employing four classroom observations in each of twelve Indonesian and four Australian primary school classrooms. These classroom observations were part of research on the Implementation of Student Active Learning into primary school teaching in Indonesia, focusing on the continuing attempts to implement new teaching methods called Student Active Learning (SAL)- an English translation of the Indonesian expression Cara Belajar Siswa Active (CBSA), which may be literally translated as Methods Learning Student Active. SAL may be explained, briefly, as an attempt, within the centralized Indonesian school system, to implement student-centered constructivist ideas.

It should be noted that this new SAL curriculum was intended to be a replacement, or extension of previously existing methods which have been predominantly teacher-centered, and expository or didactic. The earlier Developmental Instruction System – or, literally, Procedure Development System Instructional-formulated measurable instructional objectives, devised appropriate content and instructional methods, and used standardized written tests and examination to assess learning outcomes. However, PPSI emphasized skills and memorized facts.

Another important aspect of SAL is that it is a new national policy that is to be applied across the curriculum-that is, in most school key learning areas, at both primary and secondary levels. It should also be noted that the existing highly centralized system of achievement testing at most levels of Indonesian schooling have continued through more that a decade of development trialling, and successive stages of nation-wide implementation of SAL.

Initially, the Government established two SAL projects, namely the Teacher Education Development Project and the Cianjur Project. Through TEDP project Student Active Learning was introduced through primary and secondary pre-service teacher education. The Cianjur project on the other hand implemented Student Active Learning through in-service teacher education and a Professional Development System which were initiated from the top (at Ministry level) while also being implemented from the bottom (at sub district level). The aims of the Cianjur project, which involved teachers, head teachers, and school supervisors were to:

* provide children with activities to assist their learning;
* encourage cooperative learning in the classroom;
* assist learning by providing for problem solving based on direct observation;
* work cooperatively within the community to provide for the education of children;
* provide for teachers to meet regularly to exchange ideas; and
* provide help and guidance through teacher center. (Moegiadi, Tangyong & Gardner, 1994: 45).

The TEDP project was considered to have failed to implement Student Active Learning in classrooms (Raka Joni, 1993). It was assumed that it was because the institutional and training “distance” from Teacher College and Teacher Training School to primary schools classroom was too great (Raka Joni, 1992). The lectures of Institute of Teacher Training and Education who had been trained about Student Active Learning taught student-teachers, and later some of these would become “teacher trainers” in the Teacher Training Schools. The Teacher Training School leavers would then teach in primary schools.

The Cianjur project on the other hand was considered successful, based on the assessment criteria determined by the Office of Educational Research and Development, Ministry of Education, because it was regarded as having succeeded in making the teaching and learning process more active for students (Moegiadi, Tangyong & Gardner, 1994: 60; Raka Joni 1990: 35). However, its conceptual basis was considered to be weak (Raka Joni, 1992) because it was presented in an oversimplified way.

The Consortium of Education attempted to reformulate philosophical and psychological bases of SAL to make the theory clearer and to accommodated recent theories of learning. Raka Joni, one of the Consortium’s members, developed theories based on two basic principles of the SAL approach: constructivistivism and the *tut wuri handayani principle* (Raka Joni, 1993: 57). The first principle argues for constructivist view of learning – i.e. viewing learning in terms of students constructing their own meanings from their learning experiences. The second principle, a Javanese expression *tut wuri handayani*, is literally translated as “follow but always be aware”. This principle allows students to follow their own path of learning as much as possible.

The problems of Student Active Learning implementation, therefore, could come from the concepts themselves, or the process and strategy used for the implementation, or from personnel at the delivery level such as teachers, head teachers and supervisors. Discussing such difficulties in implementation of such innovation.

The aim of this study was to investigate the implementation of Student Active Leaning (SAL) in primary mathematics in Indonesian schools. The study focuses on existing learning and teaching practices in Indonesian primary mathematics classrooms and examines the extent to which primary teachers have implemented SAL principles in their mathematics teaching practices.

The implementation of a new approach in the context of existing teaching practice involves teacher change. Teacher change is always tied to teacher’s conceptions and beliefs about new learning and teaching approaches and about subject matter. To assimilate new ideas, teachers need the opportunity to reformulate their own ideas in order to change their existing conceptions and integrate these new concepts of learning and teaching into their teaching of the subjects matter. Thus, teachers’ beliefs about Student Active Learning, about subject matter influence their implementation of SAL in classroom practice.

Given that the focus of study involved many factors, it was considered appropriate to use a qualitative methodology within an interpretive paradigm. Such paradigms guide research in their practical scientific activities. Guba and Lincoln (1994: 105), argues that a paradigm, defined as a “basic beliefs system or worldview”, is primary as it guides disciplined inquiry for investigations in choosing the appropriate methodology for their research. Case study was employed as strategy of inquiry in this study and classroom observation and interviews as major methods of data collection.

# Methodology

The study set out to investigate the implementation of Student Active Learning. This required some picture of students being active, or not, and teachers promoting active or other kinds of learning. The study also aimed to link classroom observations data with information about teachers’ backgrounds, and interview-data about their educational beliefs and declared views about curriculum, learning and the mathematics curriculum.

### Selection of Participants

The sample of Indonesian schools consisted of eight schools, selected from two regions in Java using non-random selection. The schools in the sample were selected from two types of regions namely urban and rural. The district of the City of Yogyakarta and Bantul County were chosen as the urban and rural representatives respectively. The selection of the two districts and the sub-districts within those districts was based on the Provincial Educational authority’s recommendation that these two districts achieved remarkable progress in education compared with other districts within the Province of Yogyakarta.

Schools are organized within local government areas in clusters consisting of one nucleus school and three to eight member schools. Two nucleus schools and two related member schools from each sub-district sample were non-randomly selected based on the district level authorities’ recommendations, based on a request that schools meet the requirements for the sample for this research. The sample of Australian schools consisted of two Victorian primary schools that were non-randomly selected.

A total of sixteen Indonesian teachers were selected from the four nucleus schools and four member schools in the two selected regions (that is two teachers per schools, one from upper and one from lower primary) using non-randomly selection technique. As for the selection of Indonesian teachers, the selection of participating Australian teachers was also based on the principals’ recommendation.

### Observation and Observation Schedule

From the outset it was important to use a method of recording observations which would provide useful information for the research questions, while ensuring comparability between different classrooms, in different educational systems. The method needed to be manageable, under realistic observation conditions. Knowing that the available time for carrying the observation would be limited, it was important that the recording could be completed in real-time, with no need to spend time after each lesson completing detailed field-notes, or checking and annotating category-boxes from memory after leaving the classroom.

It was also important that the method of observation did not pre-empt the investigative purpose of the research by using observation categories that would force particular conclusions while excluding others. A method, for example, that defined active learning according to a limited set of observable criteria, before attempting to observe any classrooms, would impose a distorting research lens on the observations. Knowing that objectivity is a hypothetical, and unrealizable ideal, it was nonetheless intended that the method should remain reasonably open, with scope for recording novel events of particular, but unexpected, interest.

An important feature of the evolving method of recording was that it should provide sufficient information about the particular classroom, the teacher’s performance, and what the students did, individually and collectively, that could use to reconstruct a clear account of the physical context, as well as the sequence of classroom events. Classrooms are such complex and busy places that it becomes extremely difficult to rely on memory, alone, to distinguish particular events, or the sequence of events, or the duration of an event, for example.

After some preliminary trialling, and extensive discussion, a workable framework for recording classroom observations was developed. This included the following features, laid out on two pro-forma pages. (The observation schedule is provided in attachment).

*Page 1*.Included on page 1 were spaces for noting:

* school, teacher, grade, lesson-topic, number of students, and lesson-duration;
* methods of assessment used during the lesson;
* main features of the classroom;
* resources used for instruction; and
* the start of observed behaviors, or instructional activities, with a place to record the times at which different activities began, as well as the different roles played by the teacher and the students.

*Page 2* (and possible further pages). These allowed for continuing notes about the classroom activities, time spent on the activities, and different roles of the teacher and the students, as the lesson proceeded.

Figure 1 indicated the headings and aspects of the layout for this Observation Schedule. The columns for writing notes on different aspects observed allowed space for descriptive notes, and even for extra sketches of changing arrangements of groups and the class, as they moved to sit on the floor, or in concerns of the room, as the lesson progressed.

Teaching and learning is a flexible dialogue between teacher and students, directed partly by the teacher’s sense of the students’ attention to instruction, reaction to learning activities, and the results of practice and practical tasks. The Assessment section was used to record aspects of teacher’s sense of the students’ attention to instruction, reaction to learning activities, and the results of practice and practical tasks. The Assessment section was used to record aspects of the teacher’s continuing over-seeing of student work. During the lesson, the teacher would monitor or assess students’ learning in different ways, sometimes by directing questions to individual students, at other times by a process of general question-and- answer directed to a group, or to the whole class. In some of the lessons students would be called on by the teacher, or selected by a group of student worksheets to correct the student work after the lesson.

In the section for recording the Physical Setting, a simple sketch plan was made to show the overall layout of classroom furniture, the doors or windows, cupboards, blackboard, students’ desks or tables, and the teacher’s desk or table. It was also possible to show how students sat at their work places, facing the teacher, or turned towards one another a round a table.

The section used to record Resources used during the lesson listed instructional materials such as plastic straws, scissors, counters, number lines, textbooks or worksheets, and the blackboard.

While the observer can fill in details of the Physical Setting when time allows, other aspects needed to be recorded as they occurred, for example the use of particular materials, when they were produced, or the movement of groups around the room, and changes from one kind of activity to another.

It was anticipated that three different categories would be sufficient to describe the Classroom Organization: whole class; small groups; and individual. However, when the observations were carried out, it became clear that it would also be useful to note when students worked in pairs, as this was a common seating arrangement in several classrooms.

It was a simple matter to note, when students worked in groups, whether all the groups were attempting the same activity, or whether each had its own activity different from those of the other groups. Some teachers, however, employed an additional method of organization, which was classified as “mixed”. Typically the teacher might start a section if the lesson giving instructions to the whole class, with a group of students being assigned a group-activity, and moving to their workstation to start this activity independently. The teacher would then continue working with the remainder of the class, continuing to give further instructions and explanations and demonstrations. Some of these instructions might then result in another group being given specific instructions to work as an independent group. This continued until the last group was formed (Pardjono, 2000: 114).

Thus rather than the anticipated three types of classroom organization, a total of five were recorded: Whole Class, Group, Pairs, Individual and Mixed.

Being familiar with a range of classrooms it was possible to anticipate different kinds of teacher and student activities.

The list below lists some of the actions, together with their codes, used to describe Teacher Activity:

SU – supervising students (whether working individually, or in pairs, groups or as a whole);

ED – Explaining and demonstrating (typical chalk-and-talk exposition);

AQ- Asking Questions;

GD- Giving directions or instructions to students (as distinct from instructing); and

MF – Motivating students and providing feedback on their efforts.

Categories for Student Activity included:

DR- Drill and practice (repetitive routine textbook-type-exercises);

LS – Listening and observing

QA – Answering Questions; and

TA – Carrying out non-drill tasks.

Much of this evolved from commonsense knowledge of typical classes, in Australia and Indonesia. It was clear, also, without endanger the need to be as open-minded and as objective as possible in observations, that usually each teacher activity had a matching student activity. For example, of the teacher was asking questions, students would be answering them; if the students were engaged in drill and practice, the teacher was usually supervising this; and when the teacher was explaining or demonstrating with diagrams at the blackboard, the students were usually listening and observing.

Naturally, in practice, there were students whose attention strayed from the teacher’s exposition or the task being carried out. However, the classes observed were conducted by competent teachers, who had no difficulty with student control. Typically, in cases, the teacher activities were matched by corresponding student behavior, rather than by aberrant behavior.

# Findings and Discussion

Once the lesson observations had all been completed, it was possible to begin to compare the Observation Schedules for each lesson. But this huge amount of raw data needed to be sifted and interpreted before any clear sense of active learning or non-active learning could begin to emerge. How could this be done?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| School ID | INDONESIA | | | | | | | | AUSTRALIA | |
| URBAN | | | | RURAL | | | |
| NUCLEUS | | MEMBER | | NUCLEUS | | MEMBER | |
| IUN1 | IUN2 | IUN1 | IUN2 | IUN1 | IUN2 | IUN1 | IUN2 | AUS1 | AUS2 |
| Upper  Grade | AW | BS | SM | MD | PJ | MS | SH | RE | CR | JH |
| Lower  Grade | JM | SA | RK | SD | SJ | ST | KS | TS | BM | SB |

Key

|  |  |
| --- | --- |
|  | Category 1: While Class and Individual |
|  |  |
|  | Category 2: Whole Class, Pairs, and Individual |
|  |  |
|  | Category 3: Whole Class, Group and Individual, with the same task for all group |
|  |  |
|  | Category 4: Whole Class, Group and Individual, with different task for different group |
|  |  |
|  | Category 5: Whole Class, Mixed, Group and Individual, with different tasks for different groups | |

Figure 2: Classroom Organization during four observed lessons

For each lesson, the notes about the time of different activities, and the grouping categories (Whole Class, Group, Mixed, Pairs, Individual) were used to construct a Time Line showing Classroom Organization. For example, for a 60 minute-lesson, the first observed activity might have been Whole Class for 20 minutes, followed by Mixed for a further 30 minutes, concluding with all the separate groups being called back for the final 10 minutes as a Whole Class. The total time spent in any one organizational category through the lesson could be totaled, and expressed as a percentage of the whole lesson.

By types of Classroom Organization used by teachers during the four observed lessons were classified into five categories as shown in Figure 2. Color-coding helps to pick out category differences visually.

The Indonesian schools were classified according to whether they were Urban or Rural, and according to whether they were Nucleus or Member schools, where Nucleus schools were ones in which SAL had been introduced at an earlier stage, with these schools then being used to induce a cluster of Member schools into the use of SAL.

Similar methods were used to combine other observations of different lessons given by each teacher. For example, a time-line was used to identify successive changes and durations of particular categories of Teacher Activity, and related Student Activity. This was then used to compile the total amount of time spent on each kind of activity during the entire lesson. Finally this total was expressed proportionally as a percentage of the total lesson time.

Since the focus of this research was on Student Active Learning, there needed to be further analysis in terms of the extent to which student was “active” or not. At this stage research drew on a range of background theory, including the cognitive taxonomy of Benjamin Bloom and colleagues (Bloom et al. 1956), Robert Gagne’s hierarchies of learning (Gagne, 1965; Gagne & Glasser, 1987), and Raka Joni’s account of different levels of knowledge and skills (Raka Joni, 1993).

The researcher realizes that Bloom et al’s taxonomy and Gagne’s hierarchies are now quite dated and have been extensively criticized. Alternative approaches to distinguishing one kind of learning from another might have been based on Richard Skemp’s (1979) two-level account of instrumental and relational mathematics learning, or his three-level modification, adding formal or logical to his previous two kinds of learning, However Skemp did not use activity as a distinguishing feature.

Focusing as closely as possible on the raw data, it was decided to identify Low, Medium, and High levels of activity, using following distinguishing features:

Low = base level knowledge of facts, requiring verbal recall, or

concretely handled;

Medium = conceptual knowledge, requiring comprehension and rule-

application; and

High = using analysis, synthesis and conceptual evaluation, higher order

thinking and more open-ended problem solving.

Table 1: Levels of Activity and Examples of Performances.

|  |  |
| --- | --- |
| Level and Kinds of Activity | Example of Observed performance |
| LOW  Explaining & showing  Dictating  Giving directions  Supervising drill  Listening & observing  Drill & practice | * The activity required learner to memorize and recall information. * Remembering facts, stated concepts, specific procedures, rules, principles, formula. * Distinguish between member and non-member of a concept without being fully aware of the basis for classification, such as sorting “triangular” shapes for others. * Practicing skills, or doing drill-type exercises. |
| MEDIUM  Asking questions  Supervising tasks  Leading discussion  Playing games  Answering questions  Discussing | * Activities involve simple interpretation and translation, such as reading and using graphs. * Using formally defined characteristics to distinguish objects, for example, selecting right-angled triangles from other triangles and rectangles and right-angled polygons. * Applying concepts or rules to a related problem, such as determining the longest side of a triangle. * Using relationships between two or more concepts, or identifying cause-and-effect. |
| HIGH  Monitoring  Giving feedback  Investigating  Presenting solutions  Reflecting  Problem posing | * Problem solving, requiring students to devise their own methods of solution, or correctly select an appropriate method from a collection of known methods. * The activity requires students to determine the structure or organization of a collection of ideas. * Constructing a new concept based on existing concepts * Judging information using internally generated criteria or externally provided criteria. * Learning how to learn * Reflecting on what is being done, or has been done, including metacognition |

These were further elaborated in terms of specific indications of performance (see Table 1, based on Pardjono, 2000: 123; Appendix H) such as memorizing facts in the Low Level, comprehension and interpretation in the Medium level, and concept formation and metacognition in the High level of activity.

These Levels of Activity were also linked with specific Teacher Activities and related Student Activities. For example a teacher explaining and demonstrating, while students listened and observed, was regarded as a Low Level of Activity. The teacher engaging with the students in questions and answering, or requiring students to discuss their answers for non-drill tasks was regarded as Medium level. Students being involved in problem solving, problem posing and reflection on investigations was regarded as High level. Very few occurrences of High Level of Activity were observed and relatively few occurrences of Medium Level.

This led to a classification of the observed lessons for each teacher according to whether these contained only Low Level Activities. Low Level together with some Medium Level Activities, or included at least some High Level of Activities. For example, teachers in this [Medium] category used questions for probing student skill and understanding and encouraged students to be actively learning during the whole class discussions. However no high level activities were observed in this category (Pardjono, 2000: 125). The results from this analysis are summarized in Figure 3.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| School ID | INDONESIA | | | | | | | | AUSTRALIA | |
| URBAN | | | | RURAL | | | |
| NUCLEUS | | MEMBER | | NUCLEUS | | MEMBER | |
| IUN1 | IUN2 | IUN1 | IUN2 | IUN1 | IUN2 | IUN1 | IUN2 | AUS1 | AUS2 |
| Upper  Grade | AW | BS | SM | MD | PJ | MS | SH | RE | CR | JH |
| Lower  Grade | JM | SA | RK | SD | SJ | ST | KS | TS | BM | SB |

Key

|  |  |
| --- | --- |
|  | Category 1: Low level activities only |
|  |  |
|  | Category 2: Some medium level activities |
|  |  |
|  | Category 3: Some high level activities |
|  |  |

Figure 3: Level of Activity observed

A further stage in the lesson analysis considered the structures of the observed lessons in terms of what was referred to as the Lesson Focus. Four Lesson Foci were identified: Explanation of Task, Working Task, Reflecting on Task, and Closure. As in previous analyses reported here, each lesson (and subsequently the four lessons for each teacher) was analyzed in terms of the proportion of time spent on the first three of these foci. Closure, which accounted for a very small percentage of time, was ignored here.

Lesson Mode was used to refer to the emphasis placed by each teacher, in terms of time, on Explanation of Task, Working on Task, and Reflecting on Task. When the overall percentages of time for the observed lessons for each teacher were compared, three of the possible six rank orderings of foci by time were observed.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| School ID | INDONESIA | | | | | | | | AUSTRALIA | |
| URBAN | | | | RURAL | | | |
| NUCLEUS | | MEMBER | | NUCLEUS | | MEMBER | |
| IUN1 | IUN2 | IUN1 | IUN2 | IUN1 | IUN2 | IUN1 | IUN2 | AUS1 | AUS2 |
| Upper  Grade | AW | BS | SM | MD | PJ | MS | SH | RE | CR | JH |
| Lower  Grade | JM | SA | RK | SD | SJ | ST | KS | TS | BM | SB |

Key

|  |  |
| --- | --- |
|  | Category 1: Explanation on Task, Working on Task, Reflecting on Task |
|  |  |
|  | Category 2: Working on Task, Explanation of ask, Reflecting on Task |
|  |  |
|  | Category 3: Working on Task, Reflecting on Task, Explanation of Task |

Figure 4: Lesson Mode

The three Lesson Modes observed were:

* most was spent on Explanation on the Task, with less tine spent on Working on the Task, and least time spent on Reflecting on the Task;
* most time was spent on Working on the Task, with less time spent on Explanation of the Task, and least time spent on Reflecting on the Task; and most time was spent on Working on the Task, with less time spent on Reflecting on the Task, and least time spent on Explanation of the Task (Pardjono, 2000: 130). The results of the analysis are presented in Figure 4.

This is only part of the story of the investigation. Drawing on other parts of the information collected using the Observation Schedule, similar details analysis was also carried out for such aspects of the lesson as Resources used, the Physical Setting, and the methods used for Assessment.

For example, it was possible to analyze the Assessment of classroom activities into categories based on what was being assessed: knowledge and skills, understanding, thinking processes, and effective aspects of the lesson (Pardjono, 2000: 136). This was further analyzed according to the nature of the assessment: written test, teacher observation, teacher interview, or non-test written work.

The Physical Setting was analyzed according to the rigidity or flexibility with which classroom furniture and student groupings and seating were managed through the observed lessons. In some classrooms the furniture was so bulky and heavy it was immovable, for example, while in others the students were able to move work-tables and chairs around during a lesson or the setting was altered from lesson to lesson, which tended to facilitate variable group work.

**Conclusion and Recommendation**

**Conclusion**

By carefully analyzing, examining, and comparing nine aspects of teacher’s classroom practice observed, five distinct different types of Students Active Learning implementation in mathematics classroom practices were identified. These types are summarized in Table 2.

Table 2. Summary of Features of the Five Types of SAL Mathematics Classrooms

|  |  |
| --- | --- |
| Type of Mathematics Classroom | Main Features |
| Traditional Classroom | All nine observed aspects in lowest category |
| Conventional Classroom | At least one of Classroom Organization, Physical Setting, Lesson Mode, Assessment and Resources Used in category 2 or higher, but no medium or high level of activities |
| Transitional Classroom | Some medium level activities |
| Consortium’ Classroom | Some high level activities and use of group work |
| Constructivist Classroom | Some high level Activities, some reflection on task & use of group work |

Separately from the observed lessons, each teacher was interviewed using a semi structured interview schedule, investigating teachers’ educational backgrounds, ideas about the nature of mathematics, and about approaches to mathematics teaching. Generally the Australian teachers commented spontaneously on their interest in student activity, while the Indonesian teachers were explicitly questioned about their knowledge of Student Active Learning. Categories relating to different features in the interviews were developed, and the information from the interviews was subjected to critical analysis along similar lines to the category development and critical analysis of the classroom observations.

One important level of analysis of the Indonesian situation focused on the differences between urban schools and remote rural schools. Interestingly the urban school teachers observed in Indonesian were judged to be operating at the Traditional or Conventional levels (which would have been expected in pre-SAL classrooms), whereas almost all the rural teachers were considered to be at the Transitional or Consortium level-that is, observably engaged in implementing SAL. This urban-rural difference was contrary to the expectation that teachers closer to urban centers, and teacher-training facilities would be better informed, better equipped, and with greater access to and involvement in professional development relating to SAL and its implementation. However the factor that appeared to have favored the observed rural schools was their involvement in the Primary Education Quality Improvement Project (PEQIP) activities (Pardjono, 2000: 253). The Primary Education Quality Improvement Project had been established in 1993, with support from the World Bank, to improve primary school quality in a small number of Indonesian provinces, as part of the trialling and partial implementation of SAL. The research found that rural schools had better professional development than urban schools, whereas urban teachers tended to be better trained and to have had more years of teaching experience. Incidentally, the only teachers whose classrooms were classified as Constructivist were three of the four Australian teachers.

Another stage of analysis considered the leadership roles played by school principals (head teachers), regional inspectors (school supervisors), and teacher support-groups through “teacher clubs”, an Indonesian approach to the process of after-hours professional development and collegial support.

A further stage of critical discussion then attempted to link the classroom observation analysis with the interview analysis. This exposed gaps or discrepancies between what teacher state they believed, or valued, and what was observed in practice. Similar discrepancies and uncertainties also arose from a background analysis of the published discussion of SAL which had led to successive attempts to implement it, region by region, and, eventually, nationally.

**Recommendation**

Finally, the large descriptive and investigational research question about the implementation of SAL was addressed, and recommendations were made for modifying and improving the use of SAL generally.

The findings of this study show that most urban school teachers’ implementation of SAL principle resulted in what is termed here as Traditional and Conventional mathematics classrooms. On the other hand, most rural schools teachers’ implementation of SAL principles was closer to the current concepts of SAL, resulting in what is termed here as Transitional and Consortium mathematics classrooms. However, no Indonesian teachers’ implementation of SAL principle resulted in Constructivist mathematics classrooms. Thus Consortium classrooms were the highest level achieved by the Indonesian teachers in this study. This is not surprising since an examination of the documents investigated in this study showed that SAL Consortium concept had not discussed the importance of “reflection” as a strategy to encourage children in active meaningful learning. There is need therefore to incorporate reflection in both the theoretical basis of SAL and its practical implementation.

In order to enable teachers to effectively implement SAL there needs to be a reduction in the target curriculum coverage and a change in the requirement that teachers provide handwritten lesson plans for each lesson in all subjects that they teach.

In order to promote teacher change, schools and local authorities should conduct frequent and continuing programs on Student Active Learning and encourage teachers to share innovative ideas through presentations at Head Teachers Club meetings.

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