

# THE STRUCTURED CLASSROOM INTERACTIONS SCHEDULE (SCIS): A VALIDATION STUDY

BILL ATWEH, CLARE CHRISTENSEN AND TOM COOPER  
Centre for Mathematics and Science Education  
Queensland University of Technology

Classroom observation research had its beginnings in the second decade of this century (Hammersley, 1986, p. xi). Rather than representing a single type of research methodology, classroom observation research covers a wide variety of investigations and techniques. By the seventies, the decade when such studies grew exponentially, hundreds of classroom observation instruments had been developed (Borich and Madden, 1977). These have been classified by Delamont and Hamilton (1984) into two categories: systematic observations (usually based on quantitative techniques); and ethnographic studies (usually based on qualitative techniques). Hargreaves (1980) added a third category based on socio-linguistic research (see also Florio-Ruane, 1987).

Quantitative studies usually identify target behaviour(s) prior to observation, develop checklists or other schedules, and apply these instruments on classroom settings to record the frequency of occurrence of the identified behaviour. Qualitative studies usually take the form of an observer immersing himself/herself in the culture of the classroom for relatively extended periods of time and recording as much information as possible in a variety of forms (e.g. field notes and interviews). What is observed in a situation may be contingent on what was observed previously and on the theory behind the research itself.

Both systematic and ethnographic observations have their supporters and have been used extensively in the literature. In spite of the difference and controversy between the two techniques, it can be argued that they are not incompatible. They both fall in the category of research called field research (Popkewitz & Tabachnick, 1981), in contrast to laboratory or controlled experimental research. As such they share an interest in the context of learning.

Spindler (1982) claimed that ethnographic methods can produce valid conclusions when there is a long term intimacy established with the site and with the people being studied. He argued that ethnographic methods can lead to quantitative research designs. He called for the use of both techniques cooperatively. Delamont and Hamilton (1984) noted the different epistemological bases underlying the two techniques, yet acknowledged an overlap between the two traditions.

This paper is concerned with the validation of a Structured Classroom Interaction Schedule (SCIS) developed to record classroom interactions between teachers and students. The instrument was constructed as part of a long term investigation into the social context of mathematics education (Atweh and Cooper, 1989, 1991, 1992a and 1992b). The investigation employed a variety of methodologies, one of which was classroom observations. This paper describes the instrument and a trial of its validity and reliability.

SCIS had the characteristics of instruments used in systematic observations (i.e. quantitative studies) although this need not be the sole use of SCIS. It was developed to allow summaries and averages to be obtained for interactions in a typical classroom.

Although several instruments which have similar purposes have been developed and validated in the literature, SCIS was created to offer three main advantages over these similar instruments. First, it was constructed with a structure to allow it to be easy to use. Other instruments had long lists of codes that placed a heavy memory load on the novice user. SCIS classifications were logically grouped into six categories. Second SCIS had a written code to be recorded for each observed behavior, rather than columns to tick. This made it possible to record the interactions on a seating plan of the whole class such that the information about individual students with whom interactions occurred was not lost but recorded beside the students' name. Third, SCIS was flexible in that, although six aspects were recorded for each interaction, researchers could easily delete or de-emphasise a number of these categories that were not useful for a particular study, or expand others that were crucial.

## THE INSTRUMENT

SCIS was a classroom observation checklist that was capable of recording up to six aspects for each observed classroom interaction between teachers and students (a seventh aspect was added after this trial). With respect to each interaction, SCIS identified a **source**, either the **teacher** or a **student** and a **target**, again either the **teacher** or a **student**. SCIS also provided three categories to indicate the specificity involved in identifying the target. The teacher may ask a question naming a specific student. In this case, SCIS categorised the target as being **chosen**. On the other hand, the teacher may choose a student to answer a question from amongst those who have raised their hands when the teacher asked the question. In this case, SCIS categorised the student as a **volunteer** for the interaction. Lastly, a student may call out the answer without waiting to be recognised in any manner. Here, SCIS classified the teacher-student interaction as a **yell**.

In addition to source and target, SCIS categorised teacher-student interactions according to their **type**, **object**, **outcome** and **feedback** given. For **type**, SCIS classified each interaction as a **question**, a **statement**, **exchange** or **non-verbal**. The classifications of **question** and **statement** were straightforward. They were common forms of communication in classrooms. An **exchange** covered extended situations where a question or statement led to a reply which gave rise to at least one further question or statement. A **non-verbal** was any interaction which did not involve talking, e.g. a gesture with the hand, a shake of the head, a look of disgust.

The **object** of the interaction was the purpose of the interaction, what it was about. SCIS classified purpose as **process**, **knowledge**, **management**, **discipline** or **other**. **Knowledge** interactions related to recall of facts or direct applications or processes mastered previously. **Process** interactions related to integration of facts studied previously. **Management** interactions related to the organisation and management of learning, e.g. directions as to the setting out of work, requests to perform certain tasks. **Discipline** interactions were interactions that intend to direct the attention of the subject to the task or to discourage disruptive behaviour. Discipline and management interactions were able to be differentiated by the focus of the interaction - discipline interactions were generally aimed at the student's behaviour while management interactions were generally directed to the task. Interactions classified by SCIS as **other** referred to the many classroom interactions that did not fit under process, knowledge, management or discipline, e.g. social interactions, interactions regarding outside activities.

**Outcome** is included in SCIS to allow classification of the results of the interactions. This was done by categorising responses in terms of **no response, positive, negative, partly, hints** and **continued**. The classification of **no response** was straightforward. It usually occurred in situations where no response was expected/intended, as was the case for many statements or discipline interactions, or where the target ignored the interaction. SCIS deemed an outcome to be **positive** if it satisfied the source of the interaction. For example, a student answers a question from the teacher correctly, or a teacher grants the student's request for clarification. A **negative** response was deemed by SCIS to be one that was not satisfactory to the source of the interaction. A classification of **partly** was given in the case in which the outcome of an interaction was only partially satisfactory to the source. For example, a student's answer was close but not exact. SCIS provided the classification **hints** for the situation where the teachers give hints to students that help them to give a satisfactory outcome for the interaction. Such hints did not constitute the outcome of the interaction by themselves, yet they were useful information in understanding interactions. Finally, the classification **continued** was used where the classroom interaction did not occur in isolation. At times, one interaction led into another (with different source and target). In this case, the outcome of an interaction was said to have continued in another interaction. For example, a teacher asks a student a question and receives an insufficient response and then turns to another student for further clarification.

The last aspect of the interaction that may be recorded in SCIS was **feedback**. This category was for interactions that did not finish with outcome. It classified feedback in terms of **no feedback, positive feedback** or **negative feedback**, which acknowledge the degree of acceptance of the outcome, or, finally, **praise** or **rebuke**. The classification of **no feedback** was straightforward - it signified the situation where the interaction did not go past outcome. For example, a teacher asks a question of one student, the student gives the correct answer and the teacher moves on to other tasks. A **positive feedback** was a verbal or non-verbal indication by the source of the interaction that the outcome from the target is satisfactory to them. Similarly a **negative feedback** was a verbal or non-verbal indication that the outcome was not satisfactory. Some interactions concluded with **praise**, or affirmation to the target that their answer was correct, or **rebuke**, anger or disappointment about the negative outcome.

## TRIAL OF THE INSTRUMENT

SCIS was trialled and validated by using it in a research project in 1991. Six researchers were involved in the trial in classroom settings. Two of the researchers were recent graduates from Diplomas in Primary and Early Childhood education and current students in Bachelor of Education degrees. Both had limited teaching and research experience. Another two researchers were experienced secondary school teachers, one of whom was a current Masters student and the other a PhD student in education. Both of these two researchers had studied subjects on research design and techniques. The fifth researcher was a research assistant at the Centre for Mathematics and Science Education who was currently enrolled in a Master's degree in Chemistry, but who, at the time of the observations, had limited experience in educational settings. The sixth researcher was one of the designers of the instrument. The project consisted of four stages.

1. *Initial Training*

The researchers attended an hour and a half training session on the purposes of the study and the use of instrument. A sample of classroom interactions was analysed by each researcher independently and the codings were compared and discrepancies discussed.

2. *Independent Trial*

Each researcher had the opportunity to try the use of the instrument in two thirty minutes classroom sessions. Year 9 mathematics classes in two city schools were used for these observations. These sessions were conducted as soon after the training sessions as possible. Each researcher discussed with the project manager the outcome of these trials and clarifications were given to some remaining ambiguities about the instrument and the required procedures.

3. *Data Collection*

For the actual collection of data in this study, researchers were first divided into two groups of three and each group assigned to a different school. Each researcher observed two thirty minute sessions of mathematics classes, one with each of the other two researchers in the school. This meant that a total of three sessions were observed in each school, a total of six thirty minute sessions in the project, each observed by two people. Also, each researcher collected data from two sessions.

During each session, the researchers sat at the back of the classroom with a stop watch, a summary of the instrument and blank pages for recording the observations. Researchers were encouraged to record the time at which interactions occurred as well as the code for the interaction. In addition, the researchers were encouraged to record as many comments about the interactions as possible in order to match the interactions for later comparisons. The recording sheets had three columns: one for recording the time of interactions; one for recording the codes for interactions; and the last for comments. Not all three columns need be filled in for each interaction.

After the class, the two researchers met and discussed their codings for the lesson. They were instructed to point out any consistencies/inconsistencies in their recordings as well as discuss any obvious problems encountered. At the end of the project, each researcher wrote a short report of his other experience and observations.

4. *Final Meeting*

A final meeting for about one hour was then conducted to finalise the administration of the project and to discuss the instrument and the observations.

## RESULTS AND DISCUSSION

In general the researchers' responses to the instrument and its use were favourable. The structured nature of the instrument meant that a simple card with a listing of the letters of the different categories was sufficient for its use. All researchers reported increased confidence in the use of the instrument within the short time span of the project. The

project showed that relatively short training was sufficient for the use of this instrument. However, these trials resulted in the identification of some concerns with respect to the design and use of the instrument.

First, researchers were unable, in the classroom setting, to record some interactions that occurred in private between students and students and between students and the teacher. In most classes, teachers and students were seen to engage in one-to-one interactions that could not be heard by a third party. Arguably these interactions may be of greater value to understanding the classroom than the public interactions. It was felt that these interactions needed to be classified in some manner so that they could be followed up and their contents investigated in interview situations after the observation. Hence, a new classification **private** was added to the aspect or category **type** to record such interactions. If the type of the interaction was recorded as private, the other aspects of the interaction were not necessarily recorded.

A second concern was expressed with respect to the difficulty found by some researchers in differentiating between the **type** classifications. One of the difficulties was with types **knowledge** and **process**. One possible understanding of process used in SCIS covered procedures to perform tasks or solve exercises. The definition went beyond the information being learnt in the class observed, the concepts, facts and algorithms; it related to applications of such knowledge. The ability to distinguish between **knowledge** and **process** types of interaction may therefore be problematic if the observer is not aware of what the students have learnt/been taught in the past, as was the situation in this project. However, this may become less of a problem in situations that involve observations of classrooms for extended periods of time, and more experienced teachers or researchers may be able to make this distinction easier than novices.

Another difficulty was encountered in distinguishing between the types **discipline** and **management**. To overcome this difficulty, the definitions of these categories have been expanded to take into account the observations in this study. However, there remain problems with classifying some interactions. Interactions often have a *face* meaning and a *deep* meaning, or what Puro and Bloome (1987) call *implicit* and *explicit* meaning. For example, the instruction "read the problem carefully" may be used as a management instruction in a sense to encourage the student to identify the essential information in the problem. However, the same instruction could be used to rebuke a student who have guessed a solution and gave a wrong answer. These types of interactions are of great interest to socio-linguistic type of research. It is possible to incorporate them in the schedule by using comments next to the interaction or by **underlining** the letter used to code this interaction. Such interactions could then be the source of explorations with the student and/or the teacher at the conclusion of the class.

A third concern arose with the ability of some of the researchers to include all aspects in recordings of all interactions. There was a large amount of information to be recorded on each interaction. This meant that some interactions were missed and some interactions were only partially recorded. As a result, the **outcome** and **feedback** aspects of the interaction were not recorded in many of the interactions recorded.

This last concern is typical of classroom observation research. Observation is always a selective activity and observers are rarely able to observe everything in a classroom. The purposes of the study and the theory behind the research usually dictate what is of value to concentrate upon. Novice researchers, or research assistants who are not very

knowledgeable with the aims of the study and its background, may attempt to observe every single interaction as well as to record all aspects for each interaction. Experienced researchers, on the other hand, tend to concentrate only on what they feel to be significant interactions for their study. As argued above, SCIS is flexible enough so that aspects that are not of concern to the individual study may be omitted while others that are central may be elaborated. For example, in investigations that assess the effect of type and degree of feedback on student self concept, it may not be as important to record the object of interaction. For these studies additional categories may be needed to record non-verbal vs verbal feedback (Bull, 1983). On the other hand research that aims at comparing the use of open ended questions in mathematics and social sciences may not be interested in recording the feedback part of the schedule. It is also possible to be selective in the choice of interactions. Time sampling is a technique that has been used in time-on-task investigations in the past twenty years.

## CONCLUSIONS

Several instruments similar to the Structured Classroom Interactions Schedule have been developed and used in classroom research. Many of these instruments have been developed within a logical positivist/empiricist tradition. According to this view, the phenomenon observed has its own objective reality. Hence, for these instruments, the establishment of validity and reliability was a major criterion for establishing their usefulness. Invariably, such validity and reliability were established using sound statistical tools on data from well designed and controlled experiments (Medley and Mitzel, 1963).

In this study, no attempts to statistically test validity and reliability have been made. The concept of validity followed in this project has been based on the definition presented by Cronbach (1971) who stated that "to validate is to investigate" (p. 443). Interpretation of results of measurement has been interpreted as the product of negotiation within a community of experts rather than the statistical proofs of experiments. Evaluation has followed the approach of Cherryholmes (1988) in seeing the process of validation as a socially critical activity where "the tacit knowledge of subjects and social scientific knowledge of researchers are resources for discourse on construct validation" (p. 450).

This investigation has attempted to point out any problems with the use of SCIS. These problems have been identified and incorporated into the current form of the instrument. This investigation has shown that the instrument can easily be used for classroom research. The required time for training of research assistants is not excessive. However, more experienced researchers, and assistants who are very familiar with the theoretical foundations and aims of the research project, would make more valid use of the instrument. Further, this instrument's structure implies that it is easy to use and at the same time has flexibility that enables it to be modified to suit a variety of studies.

SCIS has a variety of uses. It may be used as a sole instrument in systematic observation types of research. In the Social Context project, for which this instrument was initially developed, this instrument was used within a study that was mainly based on ethnographic methodology. In that context the instrument was used to identify students within the observed class that had interesting patterns of communication with the teacher, e.g. above or below average number of interactions, or interactions restricted in some manner. It was also used as a basis for in-depth interviews with the teacher about their perceptions of students' abilities and attitudes.

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