

## Research into learning environments: Directions for the future

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### Abstract

Research into co-operative, competitive and individualistic learning environments has a long history, commencing in the 1920's and still being very strong today. Recent research has addressed some of the limitations of earlier studies by being conducted over longer periods, which enables the differential effects of the various environments to become more apparent, and by the use of cross-over designs which permit the effects of changing from one environment to another to be examined. Perhaps the most innovative contributions recently have been the development of two theoretically-based instruments to determine the extent to which classes conform to the goals, tasks and rewards by which the environments under which they are required to operate are defined, thus addressing questions of validity. The Class Description Questionnaire (CDQ) was developed to determine the nature of the learning environment from high school students' perspectives. The Learning Environment Video Observation Schedule (LEVOS) is a system of video observation and analysis which enables the researcher to quantify the extent to which teachers and students conform to the requirements associated with the learning environment. The results of the LEVOS are presented on three-dimensional graphs indicating the percentages of class time spent on goals, tasks and rewards which are either co-operatively, competitively or individualistically based. The LEVOS also allows the researcher to identify any other variables which may

not have previously been considered important but which may affect results on dependent variables such as achievement.

### Background

The past decade and a half has been an important period in the long history of research into learning environments. Up until that time, the results of the large number of studies dating back to the 1920's seemed to provide very conflicting results regarding the relative efficacy of co-operative, competitive and individualistic environments in relation to achievement. A meta-analysis into the effects of these environments on achievement, conducted by Johnson, Maruyama, Johnson, Nelson and Skon in 1981, began a debate which questioned not only the conclusions of the analysis, but the method by which those conclusions were

reached. The debate is of academic interest and has been traced elsewhere (Moriarty, 1991). It is not relevant here, except to say that it eventually resulted in considerable agreement among the main debaters with regard to the most effective way to define co-operative learning environments.

Another issue which had emerged before the meta-analysis, was concerned with the conditions under which many previous studies had been conducted and the general length of studies. Slavin (1977) considered that future research into the relative effectiveness of different learning environments should take place in the classroom rather than the laboratory and should be of at least 4 week's duration. Few classroom studies have been conducted for longer than 4 weeks.

One of the main reasons why studies need to be longer, on the whole, than they have been in the past, is to allow time for the differential effects of the environments to emerge. This relates not only to achievement but to other dependent variables such as behaviour, including lengths of time that students remain on- or off-task in different learning environments.

Longer studies can also have limitations which may not otherwise be apparent. For example, if teachers and students have been instructed in the appropriate goal, task and reward structures for the environment or environments in which they are required to work, for various practical reasons, these requirements may be more difficult to sustain over a longer period. While it seems incredulous that past research into learning environments has not involved any verification of the extent to which teachers and students conform to the definitions of the learning environments under which they are expected to operate, perhaps this is more of an issue in longer studies. One way of approaching the question of validity is to determine from the students' perspectives the degree to which the environment conforms to the co-operative, competitive and individualistic definitions employed in the study. This can be approached by asking the students to complete a questionnaire developed specifically for that purpose. This has been done, but the Class Description Questionnaire (Moriarty, 1991) is suitable only for students of high school age and has been found to be inappropriate for

primary school children.

Another way of approaching the question of validity is to video-tape classes as they operate and then complete an observation schedule also constructed for the purpose. The Learning Environment Video Observation Schedule (LEVOS) was developed by Moriarty (1991) and has been used successfully with primary school classes. Apart from determining the extent to which students and teachers conform to the requirements of co-operative, competitive and individualistic goals, tasks and rewards, the video analysis is useful for identifying and quantifying other variables which affect achievement but which are unintended. The following section of this paper is a description of the LEVOS.

The Learning Environment Video Observation Schedule (LEVOS)

The LEVOS is used to determine whether goals, tasks and rewards are based on co-operation, competition or individualisation, as these are the characteristics by which the environments are defined and distinguished. The schedule on which the analysis is based is a two-way grid which includes this information and allows for other relevant behaviours to be recorded. After some experimentation with a schedule which contained three main sections for the goals, tasks and praise or reward, respectively, the sections for the goals and tasks were combined.

The goals and tasks section is divided into four rows, one for teacher explanation, clarification or reminder of the goal or task structure, one for recording whether students work alone or together on tasks, one to indicate if students are helping one another and the last one to

record when students seek or have help from the teacher with their tasks. The section of the schedule for recording praise or reward is divided into three areas. The first is for teacher explanation of the reward system and the others for praise or rewards given by the teacher. The behaviours which form part of both the section of the schedule for goals and tasks and the section for praise and rewards are also coded according to whether they occur on a co-operative, competitive or individualistic basis, according to the definitions of the different environments. The environmental orientation is shown in the columns.

Two categories associated with tasks could yield further information on student behaviour by using checks or crosses to denote on- and off-task behaviour, respectively. The coding of behaviour according to whether students are on- or off-task alone or together when they should be performing tasks constructed co-operatively, competitively or individualistically, is the basis on which to establish objective assessment of the degree of off-task behaviour.

Two other categories are also used in another part of the LEVOS. These categories are associated with teacher-student interaction. One category, divided into two parts, is used to record student responses to the teacher and for student suggestions and questions. Relative

percentages of time devoted to these interactions and to students working alone or in groups, could be compared within and across environments. A category for teacher admonition is also included in the second part of the schedule. The amount of admonition that students receive for off-task behaviour could possibly reinforce in students the message that they are not performing well and this could be reflected in results on the dependent variables.

The three rows which comprise the final part of the LEVOS are classified according to whether they occur on a class, group or individual basis. If students were not permitted, for example, to discuss ideas or help one another in small groups, and there is also limited interaction with the teacher on a class basis, they would be restricted in what they could learn from each other. The final three categories of the LEVOS are necessary in order to determine whether the behaviours to which they referred, or the bases on which they occurred, (class, group or individual), operated differentially across environments. The final part of the LEVOS, therefore, includes additional categories which are not used to verify the required structure of the learning environment. The LEVOS has been reproduced in Figure 1.

Figure 1

#### Learning Environment Video Observation Schedule

##### GOALS & TASKS<sub>CpCmIn</sub>

1. Teacher explains/clarifies/reminds class
2. (a) Students work alone
- (b) Students work together
3. Students help one another
4. Student seeks/has help from teacher

##### PRAISE & REWARD<sub>CpCmIn</sub>

5. Teacher explains reward system
6. Teacher praises
7. Teacher rewards

##### OTHER<sub>ClGrInd</sub>

8. (a) Student responds to teacher

(b) Student suggests ideas/asks questions

9. Teacher admonishes

Cp:Co-operativeCl:Class

Cm:CompetitiveGr:Group

In:IndividualisticInd:Individual

Methods of analysing data on the LEVOS.

The first 30-second interval from each 4-minutes of video tape are analysed using the LEVOS coding sheets. A comparison of results depending on whether observations are made at the beginning of each three or four minutes shows very little difference in the patterns which emerge. At the end of each appropriate 30-second interval, a check (or cross for off-task behaviour) is made once in each category representing an observed behaviour. In one 30-second interval, for example, one or more students may have been working alone, others may have been helping each other, while the teacher gave help to others. One check in each of the three respective rows representing these categories is then made in the column which denotes that the tasks are structured either co-operatively, competitively or individualistically.

Once the coding of the video observations for all lessons is complete, the frequencies in each cell of the matrix are noted separately for each class. These frequencies are then changed to percentages of total coded time for each class or teacher, thus allowing comparisons among teachers.

The LEVOS coding sheets can be used to provide a sequential representation of lessons within one or more classes. Composite coding sheets, which indicate the frequency of tallies in each cell of the two-way grid over a certain period for each class, are compiled. Frequencies are then converted to percentages of total coded time for each class. Percentage sheets are constructed, each percentage sheet indicating the relative percentages of time that the classes within each environment over each period of time spent on the coded activities. The analyses, based on the coding sheets for each class, are conducted in three ways. Firstly, a vertical comparison of the columns in the upper part of the composite coding sheet for each class and for all classes combined within each environment should indicate a distinct pattern of co-operation, competition or individualisation within each 5-week period provided that teachers and students conform to the required definitions of the learning environments.

The second way in which the composite coding sheets for each class can be compared is on a horizontal basis. In this analysis, relative amounts of class time spent on various parts of the lessons are compared. The percentage of class time during which students should take part in whole-class discussions or the percentage of class time that teachers are expected to praise or reward students, is not a requirement for each environment. The analysis, however, is not restricted to determining whether classes work within certain limitations. Differences found between environments in other areas, such as in the amount of time that students have available to learn

from each other, may contribute to differences in measures on the dependent variables.

The third way in which the analysis is conducted is by examining each class during each period on a sequential basis. Rather than examine

total percentages of coded class time represented in the cells (the composite picture), lessons are examined in chronological order to construct a sequential picture of events in each classroom. This type of comparison can give valuable insight into the effect that behaviours developed in one environment can have on behaviours in another environment which is subsequently implemented. For example, it is possible that behaviours developed under one environment could persist for a while even after the environment under which they were developed has been changed. Sequential analysis, therefore, could help account for differences in measures on the dependent variables over two consecutive periods and a change of environment with one class.

Individual profiles of classes or the combined profiles of classes which work in each environment over the same period can also be represented on three-dimensional graphs. These graphs show the relative percentages of coded class time spent by the teacher in explaining goals and tasks to their classes, by the students being on- or off-task alone or together, by students helping each other or receiving help from the teacher and by the teacher explaining the reward system or giving praise or rewards. Each category is defined by its focus, that is, co-operative, competitive or individualistic. The graphs can be constructed with the Wingz programme produced by Apple in 1988.

### Conclusion

An issue concerning the analysis of the tapes which should be mentioned is that it may be difficult for someone who has not been present during the video taping to make some decisions regarding the coding. For example, if the students are observed working alone, it may be impossible to determine without further knowledge whether the students are working on tasks which are co-operatively, competitively or individualistically structured. This problem may be overcome, but it is possibly more desirable to have the researcher present at the lessons when they are video-taped.

Another issue which should be considered is the argument that students and teachers may behave differently in the presence of the camera. If the video camera is a strong reminder of the importance of maintaining the elements which distinguish each environment, especially when the research is conducted over a fairly long period, then this can only be an advantage. Teachers who encounter difficulties sustaining a particular environment may be more likely to look for effective ways to continue with that environment if they know that lessons will be video-taped. Students are more likely to behave naturally in front of the camera when the lead-up period has been well-handled. For example, if the researcher allows enough time for the teachers and students to

become accustomed to working while the camera is operating in the period prior to the research, many problems can be overcome or avoided. The question of inter-rater reliability has also not been pursued. This form of reliability could be the subject of further research into the area. To some extent, the importance of inter-rater reliability may depend on the focus of the research. If the purpose of the research is to validate the instrument, then clearly this is a concern. If the verification of the learning environment is just one aspect of the study, then a reasonable attempt to verify whether teachers and students have conformed to the requirements of each environment should be achieved through the use of the LEVOS.

#### References

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Persons wishing to use the LEVOS in their research or teaching are welcome to do so provided that they contact the author first.