Influence of Culture on Multicultural Learning Environments

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AIMS AND SIGNIFICANCE

The study reported in this paper is concerned with the cultural/ethnic backgrounds of students and how such cultural and contextual factors can interact with student perceptions of their learning environment and their preferred instructional modes.

The conceptual framework for this study evolved from two sources.

First, emerging evidence from an Australian Research Council (ARC) funded project (1993-1995) entitled "The impact of self-managing schools on curriculum practice at the secondary school level" currently being completed by the researchers, suggests that students in classrooms with large numbers of students from a variety of ethnic backgrounds often find it difficult to match the knowledge and teaching strategies being used by their teachers, with those learned in other cultures. Second, the researchers have recently completed an extensive study of science classrooms in Papua New Guinea (PNG) and a number of other Pacific countries (Waldrip, 1994; Waldrip & Giddings, 1994; Waldrip & Giddings, 1993) - in all these studies, the cultural context of the school and the subsequent teaching methods utilised by the science teacher, have revealed the powerful influence of culture on learning.

Specifically, the study sets out to:

identify and examine any culturally bound learning practices of students in secondary school science classrooms.

determine how students in multicultural science classrooms perceive their learning environment.

examine the relationships (if any) that exist between students' cultural background and the students' expectations of the learning processes, the perceptions of their preferred learning environment, their preferred instructional strategies, and their understanding of science.

The teaching and learning strategies occurring in high school classrooms throughout multicultural Australia are often perceived as being in conflict with the natural learning styles of the students (Waldrip, 1994; Sloneic & Del Vecchio, 1992). Teachers can use practices that may inadvertently conflict with a student's way of thinking, previous learning strategies, or their home environment,
mores and values. High school classrooms around the world are becoming increasingly multicultural. Many students in our classrooms come from communities with widely differing cultural practices. There is an increasing need for teachers to be sensitive to the important cultural milieu into which their teaching and learning are to be placed (Thaman, 1993).

It has been well argued that in many science classrooms throughout Australasia, teachers attempt to enforce a traditional school view of scientific concepts while often failing to recognise the existence of their students' own preconceived views (Osborne & Freyberg, 1986; White & Gunstone, 1992). In those cases where major disparities exist between students' views and the traditional school view, it has been suggested that the students' learning becomes fragmented and lacking in cohesiveness (Waldrip & Taylor, in press). These disparities can also be exacerbated by an inappropriate selection of teaching and learning strategies (Giddings & Waldrip, 1994).

Okebukola (1986) suggests that the cultural background of the learner can have a greater effect on education than does the substantive nature of the course content. Furthermore, it is suggested that unless students can relate the application of what is being taught to their own cultural background, then many of the teaching strategies used by teachers are likely to be less than effective in enhancing learning.

For some time now, it has been argued that one of the main sources of students' learning difficulties is the lack of optimisation between teaching strategies utilised by the teacher and the natural learning styles of the learner (Hofstein, Giddings, & Waldrip, 1994; Kempa & Martin-Diaz, 1990a & 1990b). As schools are increasingly becoming multicultural in their scope and clientele, any examination of the interaction of cultural variables with learning processes, assumes critical importance.

Walberg’s (1981) model of "educational productivity" suggests that nine factors require optimisation in order to increase affective, behavioural and cognitive learning. These causal influences of student learning include a set of aptitude variables (Ability, Development & Motivation), a set of instructional variables (Quantity & Quality) and a set of environmental variables (Home, Classroom, Peers & Media). Waldrip and Giddings (1994) argued that a fourth set of variables (under the broad heading of Culture) should be included (see Figure 1). This study will build on the theoretical premise, that unless the cultural effects of educational factors are taken in context, then educational productivity will not be optimised. As Zaharlick (1992) has suggested, educational productivity can only be optimised when the context is accounted for.
Note: Aptitude, instruction, and the psychological environment are major direct causes of learning (shown as X, Y, and Z). They also influence one another (shown as a, b, and c) and are in turn influenced by feedback on the amount of learning that takes place.

Figure 1. Educational Productivity Model Within Multicultural Classrooms

One of the major researched factors that appears to affect student learning is the classroom psychosocial environment (Fraser & Fisher, 1982; Fraser, 1989). Similarly, after analysing data collected in a detailed questionnaire from thousands of individuals working in multinational corporations operating in 40 countries, Hofstede (1984) meta-analysed his data and identified four dimensions of culture, namely, Power Distance, Uncertainty Avoidance, Individualism, and Masculinity/Femininity. Hofstede's work was based on psychology, organisation sociology and management theory.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
<th>Derived From</th>
<th>Sample Item</th>
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<tbody>
<tr>
<td>Gender Role</td>
<td>Measures the extent to which gender roles are differentiated or overlapped by students.</td>
<td>Hofstede: Masculinity/ femininity Moos: Relationship Anthropology Organisation sociology</td>
<td>I feel that all students should have the opportunity to do the same subjects</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Measures the extent to which students are part of a strong cohesive group.</td>
<td>Hofstede: Individualism Moos: Relationship Sociology</td>
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</tbody>
</table>
Anthropology
Management theory

I try to say what the group thinks rather than give my opinions.

Risk
Involvement
Measures the extent to which students feel threatened by involvement in class discussion.
Hofstede: Uncertainty Avoidance
Moos: Relationship

Organisation sociology

I prefer to allow others to answer questions in class.

Competition
Measures the extent to which the students feel threatened by competition from other students
Hofstede: Uncertainty Avoidance
Moos: Personal development

Social psychology
Management theory

I don't care if I get a poor mark in class.

Teacher Authority
Measures the extent to which students expect and accept that power is distributed unequally in a school.
Hofstede: Power Distance
Moos: Personal development

Modelling
Measures the extent to which the students prefer to learn by a process of modelling.
Hofstede: Uncertainty Avoidance
Moos: Personal development

Organisation sociology

I learn best by memorising.
Congruence
Measures the extent to which the students feel threatened by learning in ways that are different to their own cultural pattern.
Hofstede: Uncertainty Avoidance

Moos: System maintenance & change dimension

Organisation sociology

What my parents tell me makes more sense to me than what I learn in class.

Knowledge Transmission
Measures the extent to which students feel threatened by becoming involved in new learning process.
Hofstede: Uncertainty Avoidance
Moos: System maintenance & change dimension

Organisation sociology
I like to learn the way I have always learnt things

Table 1. Descriptive Information for Each Scale in the SLACE Instrument

This study utilises an instrument (See Table 1) that contains scales which reflect these four dimensions. Moos (1979) identified three basic types of classification for assessing human environments. Moos three types of dimensions were: a Relationship Dimension that assess the extent of interpersonal support and help between participants; a Personal Development Dimension that assess personal growth and self-enhancement; and a System Maintenance and System Change Dimension that measures the rule structure and its response to change. An instrument, provisionally identified as the Students' Learning and Cultural Environments (SLACE) inventory was developed specifically for use in this study and incorporated both the Moos classification and the Hofstede dimensions.

The Moos' scheme has been used to classify the individual scales used in most of the learning environment instruments that have been developed. For a learning environment instrument to provide a complete picture of a learning environment, aspects of each dimension should be assessed.

The initial development of SLACE was guided by:
i. Consistency with the social psychology, organisation sociology and anthropological literature. All relevant scales contained in existing
instruments for learning were examined for guidance in identifying dimensions.
ii. Consistency with management theory literature. Important dimensions in the unique environment of multicultural, multi-national organisations were identified through an extensive review of the literature.
iii. Coverage of Moos' General Categories. Dimensions for the SLACE were chosen to include at least one scale from each of the Moos' three general dimensions.
iv. Salience to teachers and students. By interviewing teachers and students an attempt was made to ensure that the SLACE's dimensions and individual items were considered salient by teachers and students.
v. Economy. SLACE was designed to have a relatively small number of reliable scales, each containing a small number of items.

While there are a number of research studies in science education in existence concerning culture and education generally (Atwater, 1993; Cobern, in press; Maddock, 1981; Tobin, 1993) comparatively little research examines the interaction that occurs between students' cultural environment and their learning processes. It was considered timely and relevant to examine how students' cultural expectations and motivational traits enhance or inhibit their learning within a secondary school science classroom. As Australian classes are becoming increasingly multicultural, this study is particularly important to Australian secondary schools as it will examine for the first time in an Australian setting, the crucial interaction of cultural background, students' perceptions of their learning environment, their preferred learning strategies and their understanding of science.

RESEARCH PLAN, METHODS AND TECHNIQUES

The study is relatively unusual in the field of classroom environment research because it combines both quantitative and qualitative methods. A large sample of lower secondary school students is to be involved in the quantitative aspects of the study in order to generate dependable validation data and permit statistical analysis. Because of the intensive nature of the qualitative component of the study, a smaller subsample of classes (10%) has been chosen. The study consist of three distinct phases.
Sample
The first phase (undertaken throughout 1995) and reported in this paper, involved the identification and development of instruments designed to measure: aspects of a student's cultural expectations and environment (the SLACE for which preliminary development work has been underway for the past two years); and perceptions of classroom environment (utilising a classroom environment measure based on the Classroom Environment Scale [CES]). In order to validate the instruments, field testing in a pilot study was carried out across a
sample of 500 Year 8/9 students from secondary schools drawn from school districts in Western Australia, Papua New Guinea and Tonga.

Following the pilot study, the second phase of the project (to start towards the middle part of 1996) will involve the instruments being administered to a comprehensive sample of science students across three Australian states. The sample will cover science classes at the lower secondary levels and will be chosen carefully to be representative. Three Australian states - Western Australia, Victoria and New South Wales, will be used for the data collection. These states have been selected because of their familiarity to the investigators, and because they contain many schools with large numbers of students from a variety of ethnic backgrounds. Having three states involved also makes it more convenient to find enough schools willing to take part in the study, and it removes any state bias that could occur if only one state was used. The total sample will involve approximately 2500 students from 100 science classes at the lower secondary school level (spread approximately equally between Years 8 and 9, each in a different school. These systems have been chosen to reflect differences in the ethnic mix of their multicultural classrooms.

The large database consisting of the responses from 100 classes will be used in validating the SLACE and providing additional validation data for the CES, the TOES and the TOSRA. Validity will be reported in terms of reliability, scale independence, factor structure and ability to differentiate between the perceptions of students in different classrooms. As recommended by Sirotnik (1980), all validation statistics will be reported separately using the individual student score and the class mean score as the unit of analysis.

The third phase (undertaken late 1996 to mid 1997) will involve a closer case study of three representative schools in each state.

Again, the selection of regions and particular schools from within those regions, will be guided by a desire to maximise the application of any generalisations to other Australian contexts. This qualitative component of the study will involve 10% of the original sample, or approximately 10 classes. Both subjective impressions and responses to the SLACE, CES, TOES and TOSRA instruments will guide the selection of classes for the qualitative aspects of the study. Tools used at this stage will include classroom observation, student and teacher interview, document analysis and parental interviews with the aim to identify the total picture of cultural expectations and the contrasting styles of teacher response.

Cultural differences in classroom learning environments are examined using a two-way MANOVA with the SLACE scales as dependent variables. The effect of students' cultural expectations on student achievement of cognitive and attitudinal outcomes involve the assessment of student
enquiry skills and attitudes to science based the above instruments. Simple, multiple and canonical correlation analyses are used with two different units of analysis (the student and the class mean) in estimating the strength of outcome-environment associations. Advances in research methodology over the last decade or so now make it readily possible to employ the individual student's perceptions on a questionnaire as the unit of analysis and still fully acknowledge the 'nested' nature of students in classes.

The qualitative information identified in this pilot study is currently being used in refining the questionnaires and in seeking explanations to patterns identified through the statistical analysis of the quantitative information (e.g. why students from different cultural backgrounds differ in their perceptions of learning environment; how students' preferred learning strategies affects student outcomes; how differing cultural expectations relate to students' understanding of science, etc). The subsequent qualitative case studies in individual classrooms will employ the interpretive methods of Erickson (1986) and follow Tobin, Kahle and Fraser's (1990) qualitative study of year 10 science classes in Australia. Field notes will be taken soon after each classroom observation and all communications with teachers in the case study classes will guide the formulation of tentative assertions and subsequent observations and interviews. Feedback from teachers and draft reports also will form important input. This approach also ensures that language will not be a significant distracter in the generation of meaningful data. Prompt and useful feedback to all teachers involved is a high priority. Each participating teacher in the pilot study has received profiles of scores obtained from their students' responses, in addition to overall results for the whole sample.

OUTCOMES

Students who indicated a strong congruence between the school approach to learning and their own cultural approaches, saw their preferred classroom environment as being one which is characterised by higher affiliation, involvement, teacher support, task orientation, and order/organisation, compared to those who saw less connection between school and home. If students find that the manner in which things are learned at home clashes with their school-based learning experiences, it is not unreasonable to suggest that they find school a somewhat confusing experience. That is, they perceive their environment less favourably.

Figure 1. Congruence Between Home and School Learning and Students' Preferred Classroom Environment
Figure 2 indicates that students who revealed that they had a high respect for authority (and authority figures) saw their preferred classroom environment as being one which is characterised by higher affiliation, teacher support, and order/organisation, compared to those who had a lower respect for authority. In particular, these students preferred a much higher level of order and organisation.

Figure 2. Respect for Authority and Students' Preferred Classroom Environments

Students who revealed that they were not particularly threatened by classroom competition saw their preferred classroom environment as one which is clearly characterised by higher affiliation, involvement, teacher support, task orientation and order/organisation (see Figure 3). Thus students who were not threatened by competition tended to react positively to closer ties with fellow students, viewed teacher support as being positive and non-threatening, and were much more likely to become involved in various forms of classroom interaction.

Figure 3. Threat of Competition and Students' Preferred Classroom Environment

Students who revealed through the culture questionnaire that they viewed many classroom roles as being gender -related, saw their preferred classroom environment as one which is characterised by higher affiliation, task orientation, and order/organisation (see Figure 4). Thus those who saw teachers and students with distinct gender roles in the classroom tended to seek a classroom environment that was highly ordered, organised, and on-task.

Figure 4. Gender Differentiation and Students' Preferred Classroom Environment

As in past learning environment research, male students consistently perceived their learning environment more favourably than did their female counterparts (see Figure 5).

Figure 5. Gender and Students' Preferred Classroom Environment
Figure 6 tells us that male students were more likely to view classroom roles as being gender-related than female students.

Similarly males were less threatened by classroom competition than the female students. In many cultures the males are brought up in a competitive environment and one would expect the males to be more used to competition than their female counterparts.

Presently, there is no clear-cut answer to the question as to how we can translate the results of such research into practicable teaching strategies which are sensitive to the great diversity of the cultural expectation and preferred learning environments of students. However, the underlying premise of this research is that if we can identify the cultural expectations of multicultural students in a given classroom then it follows that we have an opportunity to optimise the teaching strategies to be utilised with them. Teachers can utilise this new information to better match the teaching strategies they select for that class with the cultural expectations of their students. In practice, this would mean that the teacher, acting in the role of a school-based manager of learning, can select a balanced set of strategies and instructional approaches appropriate to the profile that has been determined by the teacher.

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