

Co-Educational Change In A Rural Residential Boys High School: An Issue Of Gender Equity (Part One)

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Abstract

In 1993, 15 girls will be enrolled in both year 7 and year 11 as boarders in a rural residential boys' high school with a long tradition of educating boys. A further 30 girls will be admitted at the same year levels each year for the next three years. First preference in the selection of girls will be given to those from isolated areas of N.S.W. and second to others who do well on the entrance tests. This initiative of co-educational change is unique in Australia in that it concerns admitting girls to a fully residential rural boys' high school .

This paper deals with issues that have been addressed as part of the initial planning of the evaluation of the process of co-educational change. It explores equity issues in the process of co-education and presents a theoretical framework based on the dominant assumptions revealed in teacher responses to questions about co-educational change. Later papers will report on the process of co-educational change at the school.

The researchers in this study have taken the role of facilitator rather than acting as independent observer/evaluators. The various measures used in the study will be designed and administered in co-operation with the staff of the school and the authorship of the chapters and editing of the final report will be the responsibility of the principal and staff. The submission for funding the study was prepared jointly by the staff of the Boys' high school, the Department of School Education and the researchers and the funds will be administered by all three.

The context of co-educational change

An OECD report in 1986 found that across all western, industrialised countries, despite significantly increased retention rates in secondary schools, marked gender differences in subject choices persisted. The Commonwealth Schools Commission (1984,1987) found that Australian girls and boys appear to follow "two distinct gender based educational pathways" (1984, p4). The same discrimination is found in pre-service and in-service teacher education (Dunne and Rose, 1988). Foster (1992, p54) asks why the rigid differentiation in subject choice has been so extremely resistant to change.

Among the several answers to this question are, the very rigid sex segregation in employment that placed Australia highest among the 12 countries investigated by the OECD in 1977, and the tendency to view the solution to gender discrimination as increasing the participation rate by girls in non-traditional subjects and in non-traditional post-school occupational choices. Furthermore, when the participation of girls in education or women in work is compared with the participation of boys and males, some protagonists of gender equity take the evidence of equal participation as the indicator of the success of policies of equal opportunity.

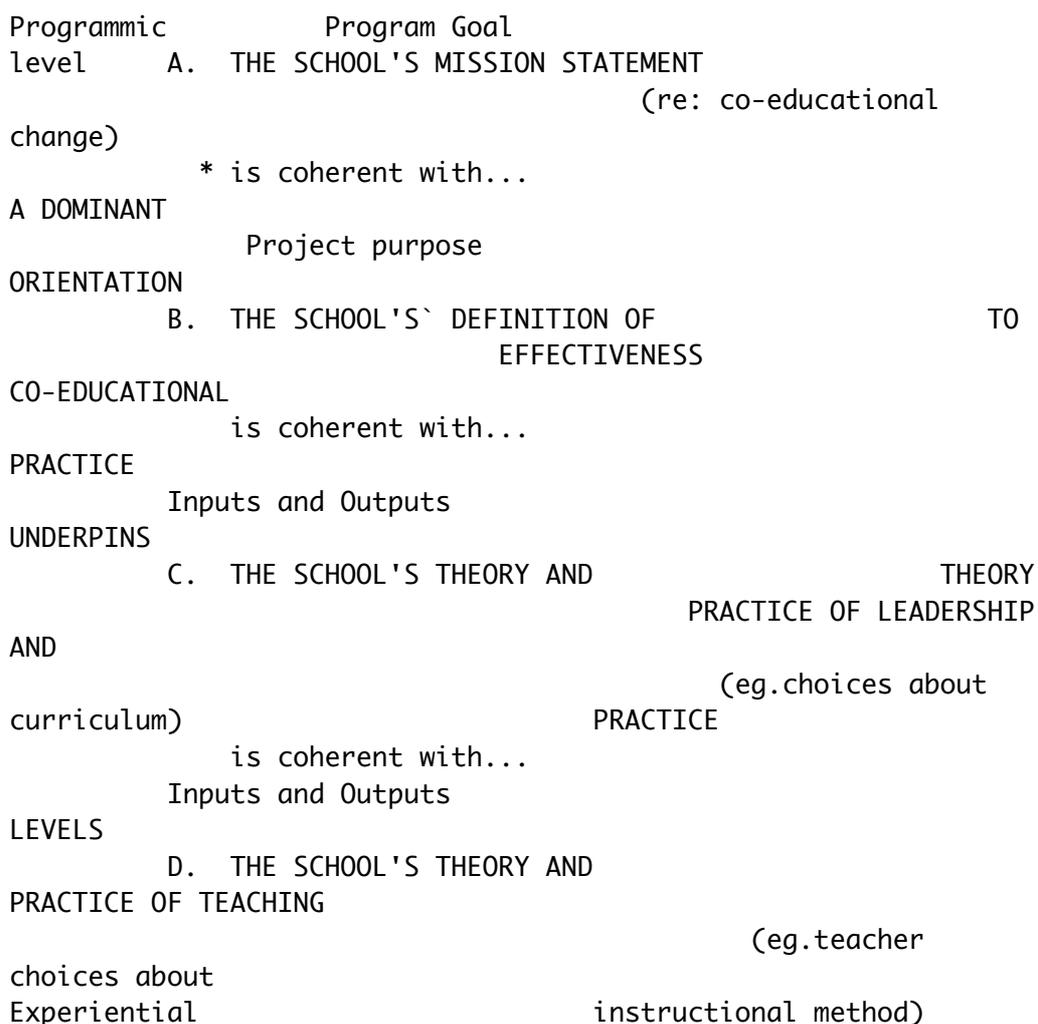
They make the mistake of confusing equality with equity but more than that, they make an erroneous assumption of gender neutrality, that is, they take male participation as the touchstone or benchmark against which female participation is to be measured. The assumption of gender neutrality ignores or downgrades the 'excluded characteristics traditionally associated with femininity' (Lloyd, 1984, p104). Within this framework, female achievements in public aspects of society such as in occupations and education, are measured in terms of the patterns and styles characteristic of the achievement of males: eg. enrolments in physics or pure mathematics at university that achieve 50% levels for females and males are seen as the ultimate in sex based equality. An emphasis on the public realm of masculine concerns centres on those subjects, attitudes, skills and knowledge that prepare males for work (the sciences, mathematics and technology). This public masculine emphasis dominates in education. The private realm of women which has its focus on relationships and interpersonal skills, socialisation, domestic areas and personal development and which leads to the public areas such as the occupations of teaching, clerical and health care, is less valued in education.

The proposal to bring girls into an all boys residential high school brings us hard up against the philosophy of liberal equality in education which we have discussed above. Clearly a masculine paradigmatic value system pervades the school: it is certainly explicit among the students and to some extent among staff. But underlying this perspective are unchallenged assumptions, agreements as yet undeclared, and both assumptions and agreements require explication.

As with many other single-sex male educational institutions, a male dominated world view constitutes the principal ideology generalised and entrenched in the school. Modifications to

curriculum content and classroom practice are likely to be more difficult to change to accommodate the needs of the girls than arrangements for the living conditions and boarding arrangements. Indeed changing the educational environment of the school would involve a recognition of the double-bind in which women are placed in education: "to be educated they must give up their own way of experiencing and looking at the world, thus alienating themselves from themselves. To be unalienated they must remain uneducated" (Martin, 1981, p.104). The content of the school curriculum, the theory, techniques and strategies of teaching and the practice and theory of leadership in the school would need to tap into this "way of experiencing and looking at the world".
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Figure 1
 A COHERENCE MODEL OF SCHOOL EFFECTIVENESS
 WITH SPECIAL REFERENCE
 TO CO-EDUCATIONAL CHANGE



level

* The basis of the coherence between the statement of Program Goal and Project Purpose is the set of assumptions (the dominant orientation to co-educational practice) which is the touchstone for all levels in the coherence model.

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Recent Australian and other relevant research

Marsh et al in 1989 reported that teacher educators are generally in favour of co-education (p.147) and that teachers say that boys are advantaged in personal and social growth and in academic achievement when educated with girls. Girls on the other hand are thought to do better in single sex schools in a more competitive learning environment especially in maths, science and in computer sciences. Teachers found an improvement in the overall educational quality in boys from a shift to co-education but not for girls (p.149). Recent commentators however (eg. Dr Judith Gill, Australian Women's Studies Association National Conference, Sydney, October, 1992) have pointed to the difficulties faced by male teachers in single sex girls schools where girls are said to "gang up" on teachers, "bear grudges" and "tend to behave emotionally". She concluded that "the single-sex school emerged as a far from gender-neutral environment".

Rowell (1971), and Spear, (1984, 1987) suggest that science teachers are biased in favour of boys; English literature and history are thought best for girls and there are more discipline problems from boys in co-educational classes. According to Sampson (1989), girls in mixed classes achieve less, are passive, lack motivation, and are unwilling to participate. Clearly matters of curriculum content and teacher strategies need to be addressed in the practice of co-educational change.

Marsh et al (1989) reported different patterns according to the ability levels of students in mixed classrooms: classrooms containing all students of high ability and classrooms containing all students of low ability seem less of a discipline problem. Single sex schools are more likely to contain high ability students from high socio-economic localities. Fennema and Peterson, (1985) and Spender, (1982) seem to support differences associated with level of achievement. They found that high achieving boys get more teacher interactions than high achieving

girls and boys in general have more interactions with their teachers- both teacher and student initiated, get more direct questions than girls, more discipline, and are praised more often for correct answers. On the other hand, where socio-economic issues are concerned, Steedman, (1983; 1984, p.98) reports that once pre-existing characteristics such as intelligence and social class (sic) are controlled, the differences between achievement levels of girls and boys in co-educational and single-sex schools, which favoured single-sex schools, tend to be small or non-significant.

Researchers have also investigated the perceptions of students and found that boys' perceptions of their own ability to learn mathematics show greater confidence than girls (Joffe and Foxman, 1986) and while girls say they achieve by expending effort, and fail because of low ability, boys say they achieve by ability and fail through lack of effort (Leder, 1984). Girls view boys as dominant, noisy and rule breakers in the classroom and as interrupting and dominating classroom interaction (Sampson, 1989).

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The perceptions of parents have not been neglected. Marsh et al (1989) points out that without being prompted, parents report being worried about girls' concentration in co-educational classes and report that girls are more confident and less

pressured in single-sex schools. Single-sex schools, according to parents in their study, have less disruption, are more relaxed, and girls talk more while in co-educational settings, in experiments in science, they watch boys doing the experiments, rarely initiate discussion and are disparaged by boys.

Implications for the research project

This has been a very brief review of research on co-education. Its purpose has been to indicate issues that are relevant to the process and the investigation of co-educational change in this study. The research has shown that the design for this study of co-educational change should include investigating the current perceptions of parents as well as students, and that the information gathering from students (attitudes, achievement levels, socio-economic background, etc) should include prospective girl entrants, prospective boy entrants and students currently enrolled across all the year levels.

The research has also shown that besides studies of classroom

Project Purpose

ORIENTATION

B. THE SCHOOL'S` DEFINITION OF EFFECTIVENESS TO

CO-EDUCATIONAL

is coherent with...

PRACTICE

Inputs and Outputs

UNDERPINS

C. THE SCHOOL'S THEORY AND THEORY PRACTICE OF LEADERSHIP

AND

(eg.choices about PRACTICE

curriculum) is coherent with...

Inputs and Outputs

LEVELS

D. THE SCHOOL'S THEORY AND PRACTICE OF TEACHING

(eg.teacher

choices about

Experiential instructional method)

level

* The basis of the coherence between the statement of Program Goal and Project Purpose is the set of assumptions (the dominant orientation to co-educational practice) which is the touchstone for all levels in the coherence model.

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Our coherence model of school effectiveness proposes that the assumptions which back up each of the four levels of the model (the levels of teacher practice, leadership practice, the school's Definition of Effectiveness and its Mission Statement) are interrelated vertically in a logical system (see Figure 1). Significant changes at one level of the system will produce changes at other levels.

Our task in respect of identifying teacher assumptions is to discover the dominant orientation to co-educational practice that is the touchstone for theory and practice at all levels of the school's operation.

The Mission Statement or Program Goal provides the rationale for

the school's existence, or at least for its main purpose. This statement reflects the set of values which the school embodies and is much more resistant to modification (programmatic) than the value statements signifying goals or purposes at lower levels of the structure which we have referred to as experiential to represent the view that at these levels modification is a response to contingencies.

The Definition of Effectiveness, like the Mission Statement is value filled although it has also connotations of rational and technical analysis as we shall see. Competing values and political debates within and outside the school characterise the process of defining the effectiveness goals of a school (Firestone, 1991). The final agreed-upon definition represents the motivation, and justification for decisions about curriculum and the choice of appropriate instructional methods (among other things). The Definition of Effectiveness is locked into the highest level of our coherence model, the Mission Statement.

For example, if the Mission Statement or Program Goal for the school, undergoing co-education, were: "To establish a co-educational residential high school", and given certain assumptions about co-educational change such as that it requires modified instructional methods and changed curriculum content, the statement which defines effectiveness might well specify a Project Purpose such as: "To successfully develop instructional methods and curriculum content which optimise learning for girls and boys in co-educational settings".

The Inputs and Outputs which encompass the school's Theory and Practice of Leadership and Theory and practice of Teaching (teacher choices about instructional method) as well as Inputs such as girls and boy students, appropriately qualified staff and so on, would be coherent with program and project purposes for the school.

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The identification of touchstone (assumptions for the model)

From an examination of the literature on co-educational change we identified three issues that seemed to be basic to the co-educational solutions adopted at least in Australian examples. These were:

1. Decisions about appropriate curriculum content;
 2. Choices of the most appropriate instructional method;
- and
3. Decisions about the settings most conducive to co-educational

instruction (segregated within the co-educational school, un-segregated or partial segregation).

We then devised a 43 item questionnaire based on combinations of these issues with the addition of several social and demographic items. This questionnaire was administered to teachers in a co-educational high school and to postgraduate students attending the university. The data from these administration of the 43 items were subjected to factor analysis (oblique rotation) by category and the subsequent reduction in the number of items finally produced a five factor solution (see Table 1), which accounted for 72.4% of the total variance.

An account of the assumptions comprising the content of each of the five factors follows.

Factor 1 "Segregated/affirmative action"

The items with substantial loadings (.46 and higher) on this factor present the view that separating girls from boys in some classes gives girls the chance to develop greater self confidence (item 12) which they cannot develop adequately in joint classes with boys (item 13). Indeed to teach girls and boys separated entirely in classrooms helps to try to take account of the differences between them (item 26). and gives girls a better chance (item 10).

Factor 2 "Non-segregated/adapting teaching strategies"

A rational response to meeting the different learning styles of girls and boys is to teach them differently (items 5,4 and 7)

Factor 3 "Non-segregated/adapting strategies and curriculum"

Teachers can recognise differences between girls and boys and modify their teaching strategies and the curriculum content accordingly within the mixed classroom (item 38). Because girls are less responsive to some teaching techniques that work well for boys (item 17), teachers should integrate various strategies to take account of these differences (item 16).

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Table 1

FACTOR STRUCTURE-ASSUMPTIONS ABOUT

CO-EDUCATIONAL PRACTICE

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
12	0.87				
10	0.76				
13	-0.74				
26	-0.77				
5		-0.90			
4		0.87			
7		-0.80			
38		0.83			
17		0.74			
16		0.66	-0.48		
25			0.80		
41			0.59		
24			0.46		
31				0.88	
28				0.77	
30				0.77	
36				0.65	
19				0.55	
<hr/>					
eigenvalue	5.51	2.96	1.72	1.6	1.16
% variance	31.0	16.5	9.6	8.9	6.4

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We are faced now with the task of demonstrating the logical relationship between assumptions and goals. We propose that when any one of the five components of assumptions is clearly dominant, it will be logically aligned with a different set of Program and Project Purposes, Inputs and the Outputs from those pertaining when any other one of

Factor 4 "Non-segregated/ female teacher affirmative action"

It is not a matter of integrating various teaching strategies to take account of girl/boy differences (item 16), only female teachers can understand the feminine experience in education and hence use optimal educational strategies for girls (item 25). Furthermore female teachers provide essential role models for girls (item 24). Separating girls and boys in content areas of

the curriculum recognises their essentially different interests (item 41).

Factor 5 "Non-segregated/ transformed content and strategies"

The mix of girls and boys in the classroom changes the content of the teaching in ways that are different from those produced by girls and boys taught separately (item 31). Thus when taught together they demand different teaching strategies than when they are taught separately (item 36). Each group's differences are important and should be met (item 28) by making special provision within the same setting (item 30). And in particular, to be fair, teacher strategies should be changed to meet the different learning styles of girls (item 19).

In summary it seems that all the above five factors reify assumptions involving a recognition of difference and the need to cater for this, that is, a concern for equity. The preference, according to one category of assumptions, is to achieve equity by segregation of girls and boys, and according to another, by placing them in mixed classrooms and modifying teaching techniques and/or changing curriculum content. Another set of assumptions proposes that girls' differences may be better met in mixed classes where female teachers who can respond to their different needs and act as role models are preferred: a kind of affirmative action for girls. Yet another set of assumptions is that a transformation of content occurs when girls and boys are taught together and that this demands changes in instructional strategies so that special care may be taken for girls.

Summary of the steps to date

We have made the point above that the goals of the school are interrelated vertically in a logically coherent system such as that proposed in Figure 1. We have also proposed that the basis of the coherence among the four levels of Program and Project purposes and Inputs and Outputs is provided by a set of assumptions which is the touchstone for all levels in the coherence model. We have referred to this touchstone as a dominant orientation of assumptions and in this case the dominant orientation refers to co-educational practice. Our next step was to identify the structure of assumptions about co-educational practice held by teachers. In fact, we identified five components.

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The logical relation between assumptions and goals

We are faced now with the task of demonstrating the logical relationship between assumptions and goals. We propose that when any one of the five components of assumptions is clearly dominant, in the profile it will be logically aligned with a different set of Program Goals, Project Purposes, Inputs and Outputs from those pertaining when any other of the components of assumptions is dominant. The relationship we propose is systemic in the sense that a significant change in the dominant orientation of assumptions will change the Goals, Purposes, Inputs and Outputs. Expressing the same relationship in school-based terms, we propose that a significant change in the dominant assumptions represented among school staff, will result in changes at the level of the School's Theory And Practice Of Teaching, (the level at which teachers' choices about instructional method are made), at the level of the School's Theory And Practice Of Leadership (eg. the level at which choices about curriculum are made) and at the level of the School's Definition of Effectiveness.

In Figure 1 we indicated that the issues of theory and practice at the lower levels of the model are experiential and the higher up the levels, the less experiential and the more programmatic the issues of theory and practice become. This is to say that changes at the lower levels are more likely to be made than changes at the higher levels. Expressed in another way, the coherence model is anchored at the top level: at the level of the Program Goal or Mission Statement. For this reason it would be possible for changes to be made at the lower levels of theory and practice and a change not to be made in the Mission Statement for the school. The Mission Statement is likely to be sufficiently inclusive to encompass modifications in theory and practice in response to a significant change in the dominant assumptions held by school staff without the need for modifying the statement of the ethos or "grand purpose" of the school.

Constructing a Logical Framework Analysis Matrix

The logical framework matrix drawn to express the systemic and coherent relationships among assumptions and the levels of theory and practice that are discussed above, is derived from the technique of Logical Framework Analysis (LFA) presented by Anderson (1990). In our application of it, we propose it as providing a structure for planning, conducting and facilitating the process of co-educational change and also serving as a framework for research.

The logic of the matrix of the LFA resides in its interrelatedness in the vertical columns and across the horizontal levels. The classical LFA model has Inputs at its

lowest level, Outputs at the second level and, at its third and fourth levels, are the Project Purposes and the Program Goals respectively. The levels of vertical logic assume causal inference, that is, it is assumed that if the school staff change the Inputs to the school, the Outputs will change and if the Outputs are achieved, the likelihood is that the Project Purpose will have been achieved.

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The school however cannot just assume that the Inputs, Outputs Goals and Purposes, that it has specified have been achieved. Objective indicators are required to specify the conditions that must be present to prove that this is the case, that is, that the required Inputs have indeed been "inputted" and that the Outputs that were specified have been "outputted" and so on. Not only do we need to propose Objectively Verifiable Indicators, we also require to state the specific Means of Verification (see Figure 2).

For example, Verifiable Objective Indicators of the magnitude of Output are stated in Figure 2 as "Year 7 and 11 girls' and boys' academic and social attainments at satisfactory levels". The Means of Verification include: students' reports, teachers' reports, school records, standardised tests, self concept measures and so on. These measures would provide specific evidence of the magnitude and also the quality of Outputs. Thus the LFA matrix not only provides a logical association between assumptions and goals, it also shows how the achievement of the purposes may be assessed.

Assumptions, purposes and verification

A prior step in the formulation of a Logical Framework Analysis and the construction of the matrix, must be the identification and specification of the assumptions that are entered at each level (in the right hand column) of the matrix. Our preliminary work on this has led us to propose that there are five categories of assumptions that represent different but to some extent overlapping value orientations to co-educational practice. Any one of these categories may indicate the dominant value orientation of the school staff. The condition of the LFA matrix however is that the assumptions be vertically coherent among the four levels and horizontally consistent across the rows. The

condition that there be a logical relationship among the four columns demands that the assumptions, purposes and Means of Verification be consistent.

Figure 2 provides an example of a LFA matrix based on the assumption of "Transformation" that we identified as Factor 5. The assumption was that the interaction or transaction among girls and boys taught together transforms the content and strategy of the teaching. The matrix shows the implications for purposes and indicators, that would logically flow on from the staff's identification with a "Non-segregated/Transformed content and strategies" dominant value orientation. The matrix in Figure 3 is based on the dominant orientation presented as Factor 3 "Non-Segregated/adapting strategies and curriculum".

It should be made clear at this stage that because of the overlapping of the dominant assumptions (they were derived from an oblique factor analysis) we are more likely to be dealing with profiles comprising values on all five categories rather than on one category alone or even perhaps on one very dominant category. The construction of the LFA matrix therefore would be more appropriately based on the range of weightings (eg. mean scores) calculated on the basis of staff attributions in respect of each of the five categories, for example:

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Figure 4 Mean scores by category(simulated data)

Mean Scores on factors	*	*	*	*	*

Categories (factors)	1	2	3	4	5

In conclusion

The Logical Framework Analysis, which is taken to include the various matrices that may be derived from the analysis, has considerable potential in this investigation of co-educational change. It provides in its horizontal logic, a coherent basis for relating value assumptions to goals. It also establishes a basis of justification for the selection of the means of verification of goal achievement. In addition, it demonstrates, in its vertical logic, the coherence among levels of assumptions (touchstone), levels of goals and to some extent, consistency among the levels of the indicators of verification of inputs, outputs and goals. It serves therefore as a logically consistent summary statement that depicts in tabular form, a state of

affairs that is grounded in the profile of values derived from the responses of the school staff to the questionnaire.

The LFA matrix is more than a picture of the present. It is emergent in the sense that it discloses the potentiality for underwriting change. While only two matrices have been constructed in this preliminary study by way of illustration, clearly a number of matrices may be created, to represent the "shape" of the five category profile of value assumptions constructed from a school staffs' responses to the questionnaire items. The school staff may wish to construct their profile, translate it into matrix form, and then deliberate judgements about preferred outcomes, inputs, goals and purposes. If the current outcomes are not their preference, they can at least see other possible and other preferred outcomes.

The means for achieving new goals and purposes may also be tested with the matrix. It may not necessarily be the case, for example, that the touchstone of value assumptions is formed prior to, change taking place or in order for change to take place. The determination and installation of the mechanics of change (eg. mechanisms of verification,) and justificatory arguments supporting certain inputs against other inputs, and similarly comparisons of outputs and purposes, .may initiate changes in value assumptions.

Logical Framework Analysis is value filled. It is not possible therefore to determine what profile is the most appropriate for any particular situation without explicating the values which support such a view. Specifying the values may lead to consensus and action for change from the status quo, or it may confirm current practice. It seems however, in the light of our comments on equity and our analysis of the wider context of co-educational change in Australia, that a contingency view is not appropriate. Our values and practice must be forward looking; oriented to a better future; based on preferred processes and outcomes rather than on what is imminently probable in terms of the continuity of past experience, and only in the light of that experience, logically possible.

Future plans

The next step will be to profile the dominant value assumptions of the school staff towards co-educational change using the factor score matrix. This will provide the school staff with

information which will allow them to match their now explicated dominant value orientations with current plans and priorities in respect of the Project purposes and also Inputs and Outputs. It is unlikely that the Program Goal will require modification. Mismatching which violates the horizontal and vertical logic of the Logical Framework Analysis matrix will become clearly apparent. This information would provide a basis for discussion and possible revision.

Acknowledgements

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Figure 2

LOGICAL FRAMEWORK ANALYSIS FOR CO-EDUCATIONAL CHANGE

(based on Factor 5: "Non-segregated/transformed content and strategies assumptions which propose that the content and strategies of teaching are changed when girls and boys are taught in mixed classrooms. These changes are different, from those that occur when boys and girls are taught in single sex classrooms. Each groups differences are important and merit special provision within the same setting but to be fair, teacher strategies should be changed to meet the different learning styles of girls).

Goals and Purposes	Objectively verifiable	Means of
Verification	Important	Assumptions
Inputs and Outputs	Indicators	

PROGRAM GOAL

To establish a co-educational residential school

GOAL ACHIEVEMENT
MEASURES

1. School has sufficient numbers
2. Parents remain positive to co-educational change

1. Enrolments
 2. Retention rates
 3. Attitude measurement
- FOR ACHIEVING GOAL TARGETS

Co-educational settings facilitate the optimum acquisition of knowledge and social development

PROJECT PURPOSE

To successfully develop instructional methods and curriculum content in co- educational settings which recognise the differences between girls and boys and the need to justly meet the different learning styles of girls.

END OF PROJECT STATUS

Teacher strategies and curriculum content which make provision for the differences between girls and boys and make special provision to meet the different learning styles of girls will indicate that the project has been achieved

1. Student reports
2. Teacher reports of their modified teaching strategies modified content
3. Teacher accounts of meeting learning styles of girls

FOR ACHIEVING PURPOSE

Teaching methods and curriculum content should meet the important differences between girls and boys which emerge when they are taught together and in fairness to girls, teachers need to change their strategies to meet the different learning styles of girls.

OUTPUTS

MAGNITUDE OF OUTPUTS

FOR ACHIEVING OUTPUTS

Boys and girls who are achieving at optimum educational levels in a co-educational, program
Year 7 and Year 11 girls and boys whose academic and social

attainments are at satisfactory levels especially comparatively

1. Student reports on their progress and attitudes
2. Teacher reports about progress
3. School records present and past (previous school)
4. Standardised attainment tests

5 .Self concept measures (cf Marsh, SQ2/3)

Girls and boys taught together can produce optimum academic and social outcomes

IN PUTS
IMPLEMENTATION
TARGET

FOR PROVIDING INPUTS

Program implementation resources (including physical)

Staff professional develop-ment

Development of appropriate welfare provisions

Parental participation

Enrolment of girls

Staff (and teacher) selection

Etc

Girls' and Boys' enrolments as scheduled (fifteengirls at year 7 and at year 11 for 1993)

Another 30 girls in 1994

Boys' numbers as scheduled but in response to optimum use of facilities.

Parental participation involving parents of girls

1. Student evaluation of facilities and other provisions (eg welfare)

2. Parental assessments of provision both educational and physical

3. Staff evaluation of the appropriateness of their own professional developemnt

Principal's reports

4. Student numbers

5. Teacher numbers & areas of expertise

Etc

Staff can be recruited who are able to recognise and respond to the differences that emerge continually when girls and boys are taught together and who are especially sensitive to equity issues which demand that the different learnng styles of girls be catered for.