

GENDER SWITCHING IN ENGINEERING: A MICRO-ANALYSIS FROM A LONGITUDINAL STUDY

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Abstract:

Early research on women's entry to the engineering profession focused on individual women's experiences. Over time a body of feminist research has developed to address the benefits, dilemmas and obstacles faced by women engineers as a group. This paper examines the biographical experience of one a-typical woman engineer over the first five years of her career. The data are taken from two interviews which were tape-recorded and fully transcribed 3 years apart as part of a wider longitudinal study of the career development of young Australian professionals. Drawing on literature on 'new' professional identities, and following Bruni and Gheradi (2002) in particular, this paper looks at the development (or not) of competence in gender switching in the enactment of a gendered professional self which is appropriate to a particular workplace. The limits to the acquisition of affiliation and the devaluation of expertise in specific workplace contexts are further examined.

Introduction:

Early research on women in the engineering profession focused on individual women's experiences in a male dominated 'non-traditional' occupation. These accounts identified the benefits gained such as challenging and well-paid jobs and the obstacles encountered such as sexism and harassment. They showed women engineers were often encouraged to enter the profession by family members (eg, fathers) and had concerns about continuing their careers after child-bearing (Bielski, 1989). While research on women's entry continues (Thielen, 2002), following a shift in emphasis, a substantial body of macro-level research literature now addresses these dilemmas in terms of the woman unfriendly culture of engineering (Stonyer, 2002:392; Ayre, 2001). The idea of a 'pipeline' (Cano et al, 2001) (albeit often a 'leaky' one) in engineering education and employment has gained acceptance, although this metaphor there as elsewhere can obscure as well as explain (lack of) change (Castleman & Allen, 1998:23-44). Women engineers in Australia as elsewhere continue to face a spectrum of career related obstacles from the development and employment requirements for continued registration and access to maternity leave to workplace stereotyping of women as female and feminine as well as gendered, hence lacking the necessary attributes of the professional engineer. While starting their careers with similar salaries and promotion prospects to men, over time the salary gap widens, women become confined to expert rather than management roles and leave the profession in greater numbers than men (Ayre,

2001). Ongoing research on women's entry experiences and on the obstacles of engineering culture to career progression is important in identifying global areas for change. Recent studies of professionalism, however, allow a different light to be shed on some aspects of women engineer's progress within their careers that can extend understanding and potentially further policy development.

This Study:

This study departs from macro-analyses of women in engineering to present a micro-analysis of the career development experiences of one 'atypical' woman engineer. She is one of a cohort of young Australian professionals taking part in a longitudinal study (Castleman & Coulthard, 1998). An electrical engineer working in telecommunications, she completed an initial questionnaire in 1997 a year after completing her university studies and was interviewed in 1998 and 2001 at her workplaces. The interviews addressed decision-making about career and work and family issues. The data for this paper which is limited in scope to her attempts to develop her career, are taken from the transcriptions of the interviews. The analysis is located between modernism and postmodernism and recent literatures on 'new' professional identities (Casey, 1995; Dent & Whitehead, 2002). Particular attention is paid to Bruni and Gherardi's (2002) concept of competence (or not) in gender switching. It explores the processes of gender and professional identity construction, limitations of the concept when applied to a telecommunications engineering workplace and the potential to enact an acceptable professional self.

Career Development:

Career remains both a contested and useful organizing principle to understand the development of professional working lives (Wajcman & Martin, 2001). As used here, it includes elements of uncertainty and the need to enact a career (Arthur et al, 1999) from educational experiences into and through workplace experience. As Dryburgh (1999:664-682) points out, women engineering students undergo a process of adjustment in learning to manage its masculine culture by portraying themselves as competent to employers, clients and colleagues. The latter is achieved through solidaristic practices of affirmation of the 'work hard, play hard' masculine engineering identity while not necessarily participating individually. On entry to the workplace further negotiations and adjustments are often necessary as post-industrial (if not postmodern) organizations with 'designer cultures' often require 'designer employees' able to transcend more traditional occupational or professional identities (Casey, 1995:6). These identifications take on greater complexity and fluidity as new

entrants are simultaneously called to a professionalism marked by discourses of flexibility, teamwork, lifelong learning and the increasing managerialism of the 'real world' (Dent & Whitehead, 2002:3-5). Women professionals entering this context have 'to negotiate, assume or where possible dismantle, sets of masculinist knowledges, beliefs and assumptions around their sexuality and gender' (Dent & Whitehead, 2002:6). This is a huge task when undertaken in organizations simultaneously gendered, sexuated and violenced (Hearn & Parkin, 2001).

Gender is a widely acknowledged part of the structuring of organizations. Hearn & Parkin (2001:6-18) have taken this further showing how gendered subjective identities incorporate forms of sexuality which reinforce and contradict each other. They argue for recognition of organizations as 'sexuated' – a concept encompassing inter alia domestic infrastructure, sexual labour and sexual harassment. Gender and sexuality (which is not necessarily overtly manifested) are further implicated in organizational violence. Violence here includes harassment and bullying but also more subtle violation, a process of 'damaging' which is 'embodied, material and discursive' (ibid, p.18). Violation at work can include practices such as monotonous work, rigid hierarchies, harmful work cultures, blaming/scapegoating, restructuring crises, time pressures and teamworking against deadlines (ibid, p.98). Taken together gender, sexuality and violence 'contribute to the reproductions of masculinities and femininities in organizations and elsewhere' (ibid, p.102).

Bruni and Gherardi (2002: 174-198) used participant observation to track the processes of workplace adjustment for a female consultant, 'Omni'. In their account, hers is a very accomplished performance of professional adjustment against a background of on-going sexual and gender pressure including references to pornography and sexist innuendo. 'Gender switching' here refers particularly to a means (and ability) to address the 'crosswise' presence of gender identity and professional identity when they clash in a male-dominated culture. It involves the ability to assume, reject or hybridize a masculine subject position (ibid, pp.178-9). Social competence at gender switching for a woman is to succeed in 'being able to take up the male subject position in discursive practices and at the same time trying to save her gender competence' – 'a social practice, that, in male dominated environments only women are forced to perform in order to maintain gender and professional alignment' (ibid, p.195).

While power is acknowledged as implicated in gender switching, I would argue that there are constraints experienced in many workplace organizations (and by many professionals) resulting from the sexualized and violence nature of organizations that place limits on achieving the desired optimum professional identity which also result from the 'micro-politics of everyday life for women and for those men who do not wish to reproduce hegemonic masculinity' (Bruni & Gherardi, 2002:195).

Felicity's Progress:

'Felicity' (not her real name) is the youngest of four children. With her parents and brothers, she has been involved in the scouting movement. She had no partner at the time of either interview and little social life. While hopeful of finding a suitable partner she is satisfied with nieces and nephews as contact with children. There is nothing stereotypically 'feminine' about her; her presentation of her professional self/appearance would not invite sexist masculine responses. Almost by definition, she is a career/work oriented woman although neither a careerist nor a workaholic:

I would (like to) get into a more managerial position. Do ... more study at university ... Masters or PhD ... to be in business or management related to engineering. ... Have a nice house, car, just relaxing living standards basically. ... Work from home or something (like consultancy) ... being able to choose when to work. Just being in charge of my life instead of work being the focus point. (First interview)

Felicity has had two technical positions in two telecommunications organizations since completing her undergraduate engineering education which included work experience. Despite advancing through her change of employer and a restructuring, her opportunities to progress have been below her expectations, given levels of educational achievement and experience. She wants challenging work to develop technical competence that will provide a springboard to management rather than to become a technical 'expert'. She is more likely to be allocated routine technical tasks, little training unless she demands it and despite proven team and team leadership experience outside paid employment, is not seen as a potential manager. This is best illustrated by her second employing organization's response to her enrolment in an MBA facilitated through her trade union:

(A)t first they didn't help me ...HR (don't) see me at a level that I should be doing an MBA. ... The wage they were offering me was much lower than what I wanted. So I took the lower pay on the condition that they pay for my studies thinking that maybe they'll help with support basically. ... So it was really only a minimal cash reimbursement, but the recognition I felt was important. (Second interview)

Management in this organization is very male dominated and Felicity has questioned this:

... (A)bout the restructure, the meeting that we had. Every single manager – not group leader – but every manager in the ... centre was male. I asked why and what are you doing to address this and he said he's been talking about it since (three months ago). It's been an issue for 5 years. ... and the way he talked about it wasn't very nice at all. ... He was suggesting that women would go off and have babies or family commitments and that. That's all the more reason to fast track women into the management position rather than pushing them back. (Second interview)

Added to this discouragement about her management aspirations, Felicity also questions the value of her professional education in telecommunications. Three year trained technicians and general IT professionals have as much status as a six-year (sandwich course) educated professional engineer. While having planned her career to include technical competence and experience as well as management education to complement her leadership experience to put her into management by age 30, at 28 Felicity is somewhat disillusioned if not depressed with her career experiences to date:

I thought with a degree behind me that it would be easy to move up, but I think it's much more hard work and being in the right place at the right time. ... Sometimes I consider just leaving professionalism and moving out and doing something like that ... (Second interview)

Her response to this organizational disappointment is to think rather of starting her own business and being the one to employ the required professional expertise.

Career and professionalism:

With the exception of a reference to the logic of 'fast-tracking' women's career development rather than denying opportunities because of potential family responsibilities, Felicity's experiences are not shaped or coloured by stereotypical femininity and family responsibilities except in the sense that all organizations are gendered, sexuated and violenced. This is the only instance of anything like feminist commitment (cf. Stonyer, 2002). Many of her dissatisfactions such as with lower pay and lesser career progression are not unusual among women engineers (cf. Ayer, 2001; Phipps, 2002; Roberts & Ayer, 2002; Wolff, 2001). Successful women engineers appear to make a series of job changes until they find their niche which can include self-employment (Bielski, 1989; Geppert, 1999). Her presentation of self is

neither stereotypically feminine nor masculine (eg, 'butch'); she is familiar with masculine cultures in the family and institutionally/socially via the scouting movement. Furthermore, there is no evidence that she found her educational experiences either discriminatory or alienating. She accepts the engineering culture in the sense described by Dryburgh (1999). Five years after graduation, she does not have a partner and is a career oriented life-long learner, pursuing further studies with a professional/ management focus. It is, therefore, not appropriate to attribute her perceived plateaued career to the result of early socialization, educational limitations, family and household location or other extra-organizational factors.

Felicity's attempts at 'gender switching' do not share the accomplishments of Omni as described by Bruni & Gherardi (2002). Clearly, participant observation data allow a more nuanced reading of individual moves by organizational novices which are not available from longitudinal interview data. It is also the case that we were not specifically using this lens at the time of the interviews. Only later did her experience appear to signal some aspects relevant to assuming an organizational professional identity. Her attempts to assume, negotiate and/or challenge masculinist knowledges appear to generate obstacles and opposition as much as to integrate a professional identity. Gender switching as outlined by Bruni & Gherardi appears to be a more hazardous enterprise than their study suggests, particularly in a profession like engineering with a more deeply embedded masculinity than (management) consulting. Nevertheless, I would not want to predict her future on the basis of this less than successful attempt at professional integration, because as she suggests, she has made career progress if not as much as expected or in the desired direction. She does have alternative options and in terms of the wider study of which she is a part and other engineering research, she is not unusual. Slower than anticipated career progress may be attributable to wider social contextual factors or, as Felicity noted, unrealistic expectations at graduation. It may be that her success in consultancy is something to be achieved further down the track and more likely to come with further study such as a research Masters or PhD to accompany her (non-work) leadership experience and management education. In the meantime, however, there remains the sense of professional marginality within her employing organization.

Discussion and conclusion:

This analysis was prompted by the limitations of modernist collectivist professionalization studies on the one hand and the (unfulfilled) promise of post-modernist analysis of the 'new' professionalism. Researches such as those of Dent

and Whitehead (2002) and Bruni and Gherardi (2002:174-198) in particular, present an optimistic picture of female novices transcending the sexism and subordination of masculine workplace cultures. They tend to underplay the nature and implications of organizational power and politics beyond the interpersonal in shaping career outcomes. If there was a type of woman engineer who 'should' be able to negotiate a masculine workplace to enact a career in engineering, then Felicity would appear to be a candidate because she is 'atypical' (ie, not easily stereotyped). However, her experience during the first five years of her career affirms the gendered, sexuated nature of organizations.

Her experiences are gendered because all women regardless of orientation are perceived as potential wives and mothers (Phipps, 2002:411). Publicly questioning women's under-representation in management, however, produces both sexism and a form of violation – a repudiation (as does her educational initiative). While clearly discriminatory promotion practices occur, it appears that more subtle forms of violation rendering Felicity invisible as a potential manager operate. All her attempts to further her professional integration meet some form of rejection whether it is to request in-house training related to her work or pursuing external 'life-long' learning. Open to change and new challenges, she is given routine (and monotonous) work. Organizational rules preclude promotion or job changes inside twelve months further entrenching hierarchical rigidity. All of these fit Hearn & Parkin's (2001) definition of organizational violence as violation. The outcome of these embodied, material discursive practices is the devaluation of expertise and competence and a diminution of professional identification. While not necessarily undermining affiliation at the Institutional level, its effects are a loss of organizational commitment and motivation. Identity and the politics of identity are increasingly built into new organizational regimes of accumulation particularly through programs of 'productive diversity' (Adkins, 2002:36). This gives new opportunities for marginalized groups. Similarly the requirements for new 'designer' professionals allow transgressions of old macho masculine cultures. But who really benefits from these new discursive regimes? As Adkins (2002:36-8) points out, new forms of visibility serve to obscure the class relations which underpin exploitation and domination. They do, of course, have contradictions. The continuity which allows for unionization in a masculinized workplace also provides the learning opportunity for Felicity under new professionalism. New but also marginalizing forms of femininity (if not masculinity) are being reproduced – at least within specific organizational contexts. If workplace

struggles are increasingly to be defined in terms of identity politics (Adkins, 2002:36) their analysis requires concepts sensitive to both the micro- and macro-politics of professional identification.

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PRODUCTION AND CHARACTERISATION OF BREAD MADE FROM EPURIPUR SORGHUM

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ABSTRACT

A new breed of Sorghum (*Sorghum bicolor*), locally known as *Epuripur*, was released by Serere Agricultural and Animal production Research Institute (SAARI) in 1995. This sorghum was used at different levels of substitution of wheat (0%, 10%, 15%, and 20%) to produce bread of acceptable quality using the Activated Dough Development method. *Epuripur* sorghum was bought from SAARI, sorted, cleaned, dried, milled, and proximately analyzed for crude Fat, Crude Fiber, Protein and Ash. The baked samples were also chemically analyzed for the above including moisture to determine the trend in nutrient composition with increasing substitution of wheat flour with *Epuripur*. The loaves were in addition; scored for crust color, crumb color, taste, texture, and overall acceptability using the 9-point Hedonic scale. Specific volumes of the different loaves were also determined. There was significant difference in nutrient content of the different loaves but there was no significant differences in loaf attributes save for specific volume and overall acceptability. Generally the panelists accepted the bread with the different levels of *Epuripur* but preference reduced with increasing levels of substitution.

1.0 INTRODUCTION

1.1 BACKGROUND.

Sorghum (*Sorghum bicolor*) is the third most important cereal crop grown in Uganda after maize and finger millet, covering 350,000 hectares (NARO, 1996). Accordingly it is widely grown in the drier short grass areas of Northern and Eastern parts of the country and is particularly important in drought prone Karamoja where it occupies over 80% of the total crop hectarage, and in Kigezi and other parts of Uganda. Sorghum, as reported by FAO (1988), is one of the main staple food crops of Uganda with an average daily per capita consumption of 132 kilocalories. There are a number of sorghum varieties grown in Uganda which include: Serena, Seredo, Sekedo, Hijack, Lulu D, and *Epuripur* (Kyarisiima, personal communication). FAO (1995) reported that although in the early 1960s a very large part of the sorghum output was used directly as human food, its share as human food (worldwide) had continuously declined since then. In fact consumption of sorghum as animal feed had more than doubled while the volume of total food used had remained unchanged or had slightly declined. In addition, world food consumption of sorghum has remained stagnant, mainly because, although nutritionally sorghum compares well with other grains, it is regarded in many countries as an inferior grain, mostly consumed by disadvantaged

groups (FAO, 1995). Further more, sorghum is not usually traded in international or even local markets in many countries probably due to its low demand.

1.2 JUSTIFICATION

As more and more people leave the countryside to live in towns and cities, the demand for convenient staple food such as bread continues to increase and so many developing countries like Uganda are importing a lot of wheat to meet this demand (FAO, 1984). In Uganda, sorghum has been solely used to make porridge and beer (very cheap products, almost priceless) and its potential of making other products like bread is yet to be fully utilized.

Researchers at Serere Agricultural and Animal Production Research Institute (SAARI) developed a new variety of sorghum locally known as *Epuripur*, in 1995, which they said could partially replace wheat in making bread and other snacks, as reported by Nangotti (2001). It has been reported by FAO (1995) that replacing wheat with 20% non-wheat flour for the manufacture of bakery products would result in estimated savings in foreign currency of US\$320 million annually. At 30% substitution, the savings would be US\$480 million annually, thus composite flour technology holds excellent promise for developing countries like Uganda. Nangotti, a Research Officer at the Soroti based Institute, reported that *Epuripur* which had been scrutinized by relevant agricultural committees and released as a variety could be mixed with wheat flour in certain proportions without changing the taste of bread significantly.

Despite the great potential of *Epuripur* sorghum in terms of yield and variety of snacks it could make, the proportions in which to mix the *Epuripur* with wheat flour to make the most acceptable and yet economical bread were not known (Nangotti 2001). Basing on the above knowledge therefore, research on the potential for *Epuripur*, one of the new sorghum varieties in Uganda (NARO 1996), to partially replace wheat in bread making was investigated.

1.3 OBJECTIVES

1.3.1 Overall objective.

The overall objective of the study was to produce and characterize bread baked from wheat/ *Epuripur* composite flour.

1.3.2 Specific objectives.

- i. To bake bread with different levels of *Epuripur* Sorghum substituting for wheat.
- ii. To evaluate the acceptability of the bread in terms of its taste, texture, crust color, crumb color, and loaf volume.
- iii. To determine the nutrient composition of *Epuripur* flour and the baked bread

1.4 HYPOTHESIS

Different levels of *Epuripur* flour can be used to substitute for wheat to make bread of acceptable quality.

2.0 MATERIALS AND METHODS

2.1 Baking

The following levels of substitution of wheat with *Epuripur* were used: 0%, 10%, 15%, and 20%, this was because previous work done by Aluko and Olugbemi (1989) and Olatungi (1989) showed that substitution above 30% produced unacceptable bread.

The bread was baked using the Activated Dough Development Method as described by Odong (Personal communication). Baking was done from the Uganda Industrial Research Institute (UIRI) in Nakawa, Kampala.

2.2 Proximate Analyses.

Proximate analyses were carried out on both the raw Sorghum and the bread as recommended by AOAC (1999), but with some modifications and the following parameters were determined: Crude Fat, Crude Fiber, Crude Protein, Moisture and Ash.

2.3 Statistical Analysis.

Data analysis was done by Two-way Analysis of Variance (ANOVA 2) in the MSTATC statistical package. A One Factor Randomized Complete Block Design at alpha level 0.05 was used to determine if there was a significant difference within the parameters; crust color, crumb color, taste, texture, overall acceptability and nutritional composition (Fat, Crude Fiber, Protein moisture and Ash) with varying levels of *Epuripur* Sorghum. The means were then separated using the Least Significant Difference (LSD).

3.0 RESULTS AND DISCUSSION

3.1 Fat content

The % fat content of all the bread samples increased with increasing substitution of wheat flour with *Epuripur*. This increase was significantly different at $p < 0.05$.

Since all other ingredients were at constant levels for the different bread samples, the difference in fat content was due to difference in fat content of the different flours with varying levels of *Epuripur*.

Epuripur grain flour contains 3.5% fat, which is in agreement with Deyoe and Robinson (1979), Kent (1990) and Hansen (1998). Wheat flour on the other hand contains about 2.0% fat, according to Deyoe and Robinson (1979). Therefore since *Epuripur* flour contains more fat, then this is the most probable reason why the fat content of the bread samples increased with increasing substitution of wheat flour.

3.2 Crude fiber content

The % of fiber content of all the bread samples increased with increasing substitution of wheat flour. The increase in crude fiber with increased substitution of wheat flour was in agreement with Aluko and Olugbemi (1989), who reported that proximate comparison of composite bread showed that it contained much higher fiber than 100% wheat bread.

3.3 Protein Content.

There was a significant difference in the protein content of the different bread samples at $p < 0.05$. This was in agreement with Aluko and Olugbemi (1989) who reported that proximate composition of the sorghum composite bread showed that it contained much lower protein.

Epuripur contains about 8.7% of protein on dry matter basis, which is low compared to the findings of Hansen (1998) and AACC (2000) who reported protein content of sorghum as 11.0% and 11.3%. however, 8.7% closer to the 9.5% that was reported by Kent (1990) and West (1987).

Protein content of sorghum however, as reported by Hansen (1998) varies considerably but more from environmental and cultural factors than from breeding.

The range of protein content of different wheat varieties is 10-14% protein. That is why protein content of 100% wheat loaf was higher than that of the composite breads.

3.4 Moisture content

There was significant difference in the moisture content of different loaves at $p < 0.05$. This difference was mainly due to the substantially high gluten content in the wheat flour as compared to *Epuripur* Sorghum flour. FAO (1984) reported that wheat was the most widely used cereal for the making of bread due to its unique properties based on gluten. During the baking, because of the poor film forming property of the less gluten dough, in composite bread, the water vapor escapes easily accounting for the decreasing moisture content of the composite loaves.

3.5 Ash content

There was no significant difference in the ash content of the different loaves, as shown in Table 6. However, proximate composition of the *Epuripur* showed that it contained 1.55% ash on dry matter basis. This was in agreement with Purseglove (1972), Kent (1990) and Hansen (1998) who reported the ash content of sorghum flour was 1.5-2%, 1.5% and 1.7% respectively.

3.6 Loaf Assessment.

Loaf assessment and scoring done by the Researcher and highly trained panelists at the Uganda Industrial Research Institute.

Attribute	Level of Substitution with <i>Epuripur</i> . %			
	0	10	15	20
Volume	Well risen and bold	Well risen	Slightly smaller	Poor rising
Crust color	Golden brown	Golden brown	Dull	Dull and streaked
Symmetry of Form	Even	Even	Un-even top	Low middle (some flat)
Character of crust	Crisp and light	Light	Thick	Thick
Internal grain	Uniform and fine	Uniform and fine	Non-uniform	Many cores and thick cell walls
Aroma	Appetizing bread aroma	Appetizing & acceptable	Quite mealy	Strong and mealy
Crumb color	Bright	Bright	Dull	Gray
Taste	Pleasant	Pleasant	Slight sorghum taste	Strong sorghum taste
Texture	Soft	Soft	Loose and crumbly	Very porous and grainy

The specific volume of the bread decreased with increasing substitution of wheat. This is in agreement with Aluko and Olugbemi's findings in 1989, who stated that the volumes of bread made from composite flours were less than those made from the control wheat. The greater the level of *Epuripur* in the composite mixture the less the

level of gluten in the dough and so the less the ability to rise because of the weak cell-wall structure. However the specific volumes of the 15% and 20% levels of substitution were not significantly different because at these levels, even the improver (Ascorbic acid) could not overshadow the effect of the weak gluten structure.

4.0 CONCLUSIONS AND RECOMMENDATIONS.

4.1 Conclusions

Overall acceptability of the bread with the varying levels of *Epuripur* Sorghum (0-20%) decreased with increasing levels of substitution of wheat.

The higher the level of *Epuripur* Sorghum in the bread, the higher the crude fiber and fat content and the lower the Protein content of that bread.

The coarsest fractions (more *Epuripur* with higher fibre) gave less loaf scores.

The higher the level of substitution of wheat with *Epuripur*, the lower the scores of crust color, crumb color, taste, texture, and volume, protein and moisture, but higher in crude fibre, and fat. However breeding of *Epuripur* sorghum did not result in significant differences in the chemical composition of this newly bred variety in comparison with other sorghum varieties.

4.2 Recommendations

In the substitution of wheat flour with *Epuripur*, a limit has to be set to the substitution percentage so as to avoid significant deviation of the bread characteristics from those of common bread.

The prospects for commercial production and wide spread consumption of this type of bread in different areas of Uganda, will depend in the first place on local acceptance. The question will be whether the taste and the characteristics of the bread do appeal to the people and at what price the bread is available. To explore consumer acceptability of the bread in the different regions, pilot bakeries will need to be established to prepare the market for the bread.

Ready-made composite flour-mix, may be supplied by the millers to the different bakeries and consumers. The milling techniques to produce *Epuripur* flour with particle size comparable to that of wheat flour will increase the possibility of higher substitution.

Epuripur-wheat composite flour is a viable alternative to 100% wheat flour at levels less than 20% substitution, provided that in future there will be adequate supply of *Epuripur* and good marketing.

A GROUP-ORGANIZED E-MENTORING PROGRAM FOR FEMALE ENGINEERING STUDENTS

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Introduction

In Denmark there has been a severe shortage of engineers especially within the classical disciplines during the 1990-ties. At the same time the distribution by sex at engineering universities is very uneven. Within the traditional classical engineering disciplines as electrical, electronic, mechanic and civil engineering the rate of female students is about 15% and it is going down. Typically the admission to Aalborg University is given to one, two or none girls at all, in addition the drop out range of female students is double the rate of male students. Some of the reasons could be traditions, few women within the area creates few roll models for female students and besides they have to adapt to a very male-dominated study environment dominated by soccer and computer game discussions.

To meet the shortage of engineers the industry wants a higher education rate of engineers, and they would especially prefer to attract more bright girls.

In the light of this, the Faculty of Engineering and Science at Aalborg University decided to make a special contribution to the female students. This decision caused the establishment of a mentoring project. The aim of the project described in this paper was not to attract female students for an education in which they were not interested in, but to help the girls already enrolled at university to get a better study environment implying a higher retention rate.

As the above described tendency is seen in many western countries, it has been an obvious idea to look for solutions internationally.

In the USA e-mentoring programs are introduced as part of a solution. Within the program an engineer from the industry is mentor for a student/mentee from the university. The mentee can via e-mail consult the mentor questions concerning the study program or her future career and in that way get advises and become a roll model in industry.

It was found that the e-mentoring program idea could be useful in creating roll models for the female engineering students, and at the same time prepare them for the labour market. Consequently a pilot-mentoring program for these students was established. To meet the need of a better study environment by creating a network between the female students, an extended version of the American program has been developed and at the same time an adaptation to Danish culture has been carried out.

This paper is based on the experiences and results obtained during the mentor program at Aalborg University. The concept of the mentor program, which is inspired from the Aalborg University tradition of group work, is described. In addition some of the issues which have been raised during evaluations of the program with the participating students and mentors will be given, and the changes they have caused within the program will be discussed.

Organizing the program.

In Denmark the use of mentor programs is something quite new and the idea of basing a program on e-mail communication only seemed to be insecure. To introduce the idea and to evaluate the results it was decided to arrange some evaluating meetings during the first year of the mentoring program.

The first step was to invite all faculty female students to a meeting, where the mentor idea was presented. Within the same period an introduction meeting for the mentors was arranged. After the introduction meeting the students could sign up as mentees. At the notification the students handed in an individual profile descriptions to be used for mentor/mentee matching.

The organizing committee matched mentors and mentees before a launching mentor program meeting where all participants were invited. At this meeting the program ideas were discussed and the mentees were introduced to their mentors. During the next period the correspondence between mentors and mentees was supposed to be e-mails.

A midterm evaluation meeting was established after about four months. Here again it was possible for the mentees to meet their mentors in person and additionally an

evaluation of the first month was carried out. Finally, after one year an evaluation meeting was established.

The program only asked people to make a commitment for one year, of course all mentors and students were free to continue the program after the first year if they liked. A new program with new students and mentors has been launched every year in continuation of the existing program. In the newer programs there have been made changes based on the response received through discussions at the evaluations, through e-mails and other conversations with mentors and students. The meetings within the program were emphasized as very important, as the participants found it much easier to communicate by e-mail after actually having met each other. In the light of this, by the three program meetings are decided to be part of all launched programs.

Traditionally the organization of mentor programs is one mentor supervising one mentee. This concept is e.g. used in the American Mentor Net program. We found that this concept made a high probability of mentor/mentee mismatch e.g. within engineering disciplines, type of career or inter personal communication. To overcome this problem an alternative organization inspired by the organization of the education at Aalborg University was developed.

At Aalborg University the engineering educational program is based on a special pedagogical model with focus on group-organized problem-based learning. Within the mentor program established here, the organization of the mentors and mentees is partially based on the same model. Consequently the organization of students into groups is transferred into the organization of the mentor program. In the pilot program one mentor is matched with two mentees within the same area of engineering- if possible a fresher and a graduate. After the evaluation of the pilot-mentoring program the groups were expanded as the participants suggested that it would be easier to fulfil all the ideas in the program. Each mentor/mentee constellation is now matched with another mentor/mentee constellation, preferable within the same area of engineering, forming a group of two mentors and four to six mentees. The group members can then exchange experiences, the mentors can assist each other and if one mentor is extremely busy for a period of time, the other mentor can take over prime responsibility. Likewise the mentees is invited to exchange their experiences - our aim

is that the older students in this way can do a kind of mentoring for the fresher, as some of the problems related to studying at university are more present to older students than to graduated engineers.

In the later evaluations the mentees have pointed out that they are happy about the organization, groups including a fresher, someone in the middle of her study and a graduate facilitates a good exchange of experiences. Additionally it was stressed that using this organization the mentors get the opportunity to get in touch with engineers from other parts of the industry and it is a help to have another mentor to exchange ideas with.

Organizing the groups.

A major problem within the program is a good matching of mentors and mentees as this is supposed to be the main condition for a well functioning program.

The group organization within the program makes the matching of mentors and mentees rather difficult. The ideal constellation is supposed to be fresher and older students and mentors all within the same engineering disciplines. A typical program includes about 12 -18 mentors and 35 students representing four or five different disciplines. Mostly it does not exactly match. A combination has been too many electronic engineers and few electronic students and likewise many civil engineering students and only few mentors. This is partly due to the fact that the main mobile communication industry is situated in and around Aalborg and consequently many electronic engineers joined the program, at the same time there is only about 5% female students joining this program.

In the late programs a new problem arose namely to get fresher and older students in the same program. Usually the students sign up the first year at university implying that the older students who want to attend a program already are participating in existing programs.

One solution is to drop the demand on older students in the group. In those cases the program will be without important elements. The impact to the study environment and the networking aspect are lost, as the three or four newcomers within a discipline usually know each other in advance, additionally the mentor/mentee relation between fresher and older students is disappearing.

An alternative way to compromise in composing the groups is to neglect the demand on the same engineering discipline. In such cases questions concerning problems related to special study disciplines can not be answered within the group. This is a very important aspect for students wanting to join the program, and this lack will be a problem in motivating the students to participate. Through the evaluation of existing programs other items have been stressed. It has been said that the most important benefit in participating in a group is to get information on the working environment at engineering companies. An other important item is how to handle the combination of family life with children and a carrier as engineer, and last but not least to get a network of female engineers. All these issues do not relate to specific engineering disciplines. Problems related to the study curriculum can be solved by direction to the study board or the student guide office. The evaluation concludes that equality in engineering disciplines is of less importance.

A third solution to this problem could be to add fresher students to the existing groups; this concept has been working in some situations. Problems to this solution are that some of the groups only are working for a year, and some groups already consist of 6 students in which case an extension will imply very large groups.

Furthermore an issue has been the static aspect of this type of organization. Suggestions have been that mentees should be able to circulate in a wider group of mentors. Depending on the project the mentee is working on or the problems she is engaged in, she should be able to temporarily to adopt another mentor who could help her with the specific question in mind. This would mean a better use of the mentors' skills and abilities, give the students better and varying opportunities for help and advice, but would also mean a lot of extra work for the mentors. This increased flexibility might limit the difficulties involved with matching students and mentors; many students have been critical of their match with a mentor of different disciplinary background than their own which it is difficult to avoid unless many more mentors join the program.

Within the program the specific matching of mentors and mentees are made by the project committee, the above mentioned demands are taking into account at the highest possible degree.

Means of communication within the program.

Mentor programs are something quite new in Denmark and in our program it has raised the issues of how the mentees can use their mentor. Which questions may the mentees ask, how much can they demand from their mentor. Likewise the mentors have been insecure as to how often they should get in touch with their students, how they should react when students do not answer e-mails etc. This leads directly back to the question of the information material available for mentors and mentees and the overall training and preparation of both mentors and mentees.

In the pilot program American information material was used but did not work very well in a Danish context. Many of the specific details in the American handbook (such as instructions about behavior etc.) simply do not fit the Danish mentality. Furthermore the fact that the materials was in English caused that some mentors and students put the material away; not because they do not read English, but because they found that this did not fit the information they needed.

Initially the communication of mentors and students was intended to be only through e-mail apart from the meetings, which are part of the program. In that way participating in the program would mean that the time consumption and the personal engagement would be on limited scale. This model did not suite the participants in our program. Many mentors have invited their students on company visits, even those mentors who work in companies that are situated far away from Aalborg. Furthermore some of those mentors who work and live in Aalborg also invite their students out for lunches and dinners. This means that the communication in many ways has been more personal and direct than the originally intended e-mail communication.

The need for physical meetings has been stressed at all evaluations. Both mentors and mentees find it a lot easier to communicate through e-mail if they have met their counterpart and also these meetings add another dimension to just writing through e-mail. Most mentors and mentees conclude that actual meetings are necessary in order to establish a good relationship. Compared with the American Mentor Net, which is based solely on e-mail contact, the response in Denmark has been that e-mail does not work on its own. Mentors and mentees both have to find out how to establish a mentor relationship via e-mail and at the same time they have to figure out what the specific content of such a mentor relationship is.

At the evaluations, a suggestion was to make a small guide introducing various activities that mentors and mentees could do together. This could also be activities such as company visits where e.g. also the male students from the mentees' project group or class could be invited. A Danish handbook is now written, primarily on the basis of the experiences from the pilot program. A group of mentors and mentees have been involved in part of this, e.g. sketching a mentor contract and presenting various activities for mentors and mentees. A selected group of mentors and mentees has read and commented on the handbook, before it was printed for use in the programs.

Recruiting Mentors

As in many other countries Denmark is today facing a severe shortage of engineers and scientists - and the number of female students within this field is very low compared to the fact that more women than men are engaged in higher education in general.

This dilemma is a growing headache of politicians, the industry as well as lower and higher educational institutions. Initiatives that can stimulate the interest of primary school children into science and technical areas are discussed as well as initiatives more directly aimed at primary and secondary school girls.

Concerning this it was decided that it was important to hold on companies as responsible partners within the program, implying that recruiting mentors was done by direction to companies instead of by direct direction to female engineers. In addition it was chosen not to use female engineers employed at university, as they already were visible and could be roll models to the students.

Letters were sent to a number of companies asking them for female engineers who might be interested in participating in this program. These letters were sent to the Human Resource Departments, because we wanted the companies' official support and acceptance since the participating mentors would have to spend some of their working hours participating in the program. Engineers from a wide range of companies signed up and the response from female students was overwhelming and some even had to be put on a waiting list.

Within the program the mentors were chosen based on their engineering disciplines. In the evaluations other qualifications and characteristics have been pointed out as at least as important from the mentees. Recent graduated engineers are very relevant in questions concerning the master thesis and application for the first job and in general, mentors with seniority have experiences related to carrier planning in combination with family and kids. The ideal combination would be a mentor representing each of the above mentioned categories. This makes it even more difficult to form ideal mentor groups.

The issue of Gender

The issue of Gender has been highly debated in relation to our program and it gives the impression that somehow in Denmark it is not quite legitimate to make initiatives focusing on only e.g. female students.

First, quite a few of the companies contacted were not interested in participating in activities with a gender focus. Secondly, some of the female engineers themselves also reacted towards this mentor program and thought that the program tried to make a problem out of being a female engineer and engineer student. Thirdly, the participating mentees wanted male students to be given the same opportunity of participating in a mentor program.

Despite the criticism towards the program being a gender program which both mentors and students expressed at the first program evaluations, the discussion has taken a different turn at the later evaluations. Here it has been stated that the communication in mentor groups had worked very well, and that the communication could not have been this easy and also personal if men had been involved as well. The general conclusion was that though it would be great if men could have this same opportunity, the program works very well without the male students or male mentors.

However, some of the participating mentees have been bullied by their male co-students and teased with having a need for a "nanny". Other male students have been rather jealous and find it unfair that this opportunity is offered only to female students. This problem attempts to be solved by preparing the participating students for such reactions by discussion at program meetings and in smaller mentor groups

Summary and evaluation

The mentor program has been working for four periods and in the general the impression is that the participants are satisfied with the program.

Everyone agrees that the group organization of participants is great. The mentors have pointed out that they get the opportunity to get in touch with engineers from other parts of the industry and that it is a help to have another mentor to exchange ideas with. However most of them see the general meetings as an opportunity to get together and establish an informal network among these female engineers. In the project committee we will try to establish special activities for these engineers in the new program and thus substantiate and support the basis of the network.

The students likewise are happy about the organization, but for those groups including only fresher and graduating students the gap in maturity and experience is simply too big. The graduates are already focussed on getting a job whereas the fresher is slowly getting to know the world of university. Consequently the best groups are formed by mentees consisting of fresher, someone in the middle of their studies and graduating students. Unfortunately in the later programs it has been hard to form such groups as many of the attending students are fresher.

A complete examination on the drop out range for the participating students has not been carried out, but within the first two programs only one student from each program dropped out which is much lower than the average drop out rate for female students. Obviously the reason could be a well functioning mentor program, but the fact that well functioning students most likely are the most motivated to attend such programs, may also influence the result. In addition it should be taken into account that the above mentioned result is based on a very small number of students.

We find it strange or rather curious that in a country as Denmark, appraising the equality of the sexes, there still is this very marked gender difference concerning the fields of engineering and science.

The mentor program is now known outside the university. A Danish refuge council has lately adopted the idea of group organized mentoring model. They want to set up a mentoring program to help the integration of women refugees.

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KENYAN AND UGANDAN WOMEN ENGINEERS AND SCIENTISTS IN TODAYS MOBILE SOCIETY

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With a slow collapse of the old-fashioned patriarchal society where male hegemony lasted, there is a creep of women in Kenya and Uganda who have aspirations to reach the top and to sacrifice everything for it. Being part of a mobile society has motivated many to realise themselves in interesting and challenging work that earn them enough to have a good life. Pressures of life affect their lives and the outside world intrudes every waking hour. Time formerly spent in family activities is now spent on the internet, in front of the TV, on the phone in the car and on the run. This paper is focused on a statistics taken on women in the engineering profession in Kenya and Uganda aged between 26-40 years, their motivation to join the career and the influence of the current society upon their lives. Interviews with some revealed that the stimulation of their work is a means of economic security and a drive to achieve stupendous success in life. Since women have to perform a dual role, they find themselves in conflicting expectations, their obsession with work and career costs them large on the homefront. The general obstacles to women engaging in and pursuing engineering careers can be summarised as due to the factors of traditions and Cultural norms, Attitudes and Prejudices, Ignorance, poverty and Religion. Such women are a dynamic force at the centre of a changing world positioned to help shape and mentor girls who have career aspirations in the field of engineering

INTRODUCTION.

Career choices are difficult decisions to make as students are always divided on which career choice to go for, beginning to orient oneself in the career as early as possible is important so as to help one make up their minds. In the society today, as more women break the glass ceiling in the corporate world, their greatest challenge is striking a balance between career and motherhood. In Kenya and Uganda it is a great challenge for a woman to advance in career and educational advancement. In this paper I interviewed 30 female scientists and engineers in Kenya and Uganda to find out how they got into their careers, the challenges they faced and the effect of the current mobile society in their lives. Such women are a dynamic force at the centre of a changing world positioned to help shape and mentor girls who have career aspirations in the field of science and engineering.

CONTEXT.

Catherine stands out as one of the role models for many young women to emulate, her position as Electrical Engineer has an unwavering mission to encourage many young ladies to join engineering and technical professions. It is really possible for

girls to excel in engineering and science without losing their femininity, moreover these are areas with great opportunities and potential,' she say's.

The industry is in dire need Of skilled persons and girls are least advantaged in engineering skills pool. East Africa is still handicapped by the absolute and inadequate equipment. Due to lack Of tangible experience a lot Of students miss out on excellent opportunities. Students graduating from Local universities and colleges feel inadequate compared with their overseas counterparts who are conversant with the latest equipment, developments and solutions to problems.

The level of gender sensitivity among both men and women is significantly higher. There is general acceptance Of the principle Of women's rights as human rights. The gender agenda has finally claimed space at the centre Of East African policy making arena and it seems destined to transform for better not only in the political landscape but also the socio-economic.

Contrary to many peoples views, gender issues are not exclusively about women but also involve men, just as there are men who are gender sensitive, so there are women who are gender insensitive. There is nothing wrong with women, it the environment, women must guard against fighting one another.

One aspect Of African life which reflects on society in transition is gender in relation to development. In many respects the past century has opened up many opportunities for women. The introduction of western education has meant that people acquire knowledge, skills and attitudes meant to enable them survive in society. The traditional gender roles therefore can not work as they did in the traditional societies. Yet progress in women's emancipation continues to be stifled by cultural and traditional norms. I took a statistics Of women in Uganda and Kenya who aspired to advance in male dominated careers. The lane assigned to them in this race was filled with obstacles right from starting block to finishing lane, but their achievements play a significant role and contribution to the current society.

HOW THEY GOT THERE.

The Engineering and Science profession are very competitive and performance oriented. To be successful, girls need to be dedicated to continuos improvement in their performance and be inspired to achieve beyond what they perceive limits Of their ability.

At the age Of 12, Florence decided she wanted to be an Computer Engineer, true to the stereotype Of Bagandas, she never changed her mind. She chose to ignore alot of

prejudice from both men and women in her society when she ventured to study Physics Chemistry and Mathematics at high school. Luckily her parents were supportive of her decision to study Electrical engineering at University and were able to finance her studies. ` women must be assertive and aggressive to achieve their goals` she says. Getting the degree however was a major challenge. But she did work hard to ensure she was good at it, she eventually landed herself a good job with an Internet service provider who are now sponsoring her Masters studies today, she is doing a masters programme in Computer Engineering, something she dreamed Of at an early age.

Decades ago, it was a great challenge for a girl to get an Education, today the gender gap in schools has narrowed significantly, although technical women in industry and business are still some distance from achieving parity! **The road is even difficult in academia**, University leaders need to make a firm commitment to change this. The 1998 world conference on higher education underlined as a key function of higher education the enhancement of participation and role of women in higher education. The conference recognised various socio-economic, cultural and political obstacles that continue to impede women's full access and effective integration in higher education, employers should also promote a more diverse and family friendly work place providing role models for young women engineers. From statistics, most of women who are practising engineering and science related courses or are studying engineering at the University have a brother or relative who pursued the same career fields.

For Mary a food scientist with an NGO in Uganda, there are no limits to her ability and she has no fear in taking big assignments! She emphasises that she always could grow into the job. Her solid academic background and her confidence in taking challenges aided her ascent to where she is today.` I always set the bar high` says Mary, ` Stretching myself to achieve what was thought to be unachievable

CHALLENGES OF A WORKING MOTHER.

Jennifer a mechanical engineer with KENGEN power company believes in excellence and desires to do everything to the best Of her ability, so when she goes to work, she gives her employer what he expects from her, though this is difficult at times because she worries about her child at home.

She keeps in touch over the phone when at work, for example, she always calls at about 10am to ask whether Cathy her 3 year old daughter has had her breakfast, what

she ate etc, then she evaluates the information given. She is an example Of women who juggle career and family relationships, well, and just about anything that is handed to them!

Other challenges Of a working mother is that at times they want to take care Of certain chores at home but they can not because they are at work, they are not at home to be the first teacher to their children. `When you have energy, you are at the office. By the time you come home, you're pooped, exhausted', she says.

Women professionals are expected to perform their traditional roles of mothers and wives. The great professional women everywhere suffer great tension in their attempts to reconcile their professional and traditional roles. Moreover their careers are dependent on the grace and favour of their spouses. From my interview with most of the married women scientists and engineers, Family responsibilities featured as the main obstacle that they face. Some women found had to combine the conventional role of wife and professional expectations.

EFFECT ON SOCIAL LIFE.

Beatrice chose a road less travelled by women when she decided to study Physics Chemistry and Mathematics. Years Of obstacles led her to travel another less appealing road, Engineering. This has really made a difference in her social life, she has friends she only sees only once or twice a year. `My work as a Computer Technician is very demanding, sometimes I have to make choices which result in my loosing friends. I have learnt to live with my choices' she says. At 28, single, having worked for 5 years, she enjoys her work immensely and finds joy in spending an evening working on a clients computer than hanging out with friends. Fortunately for her, her family was very encouraging as she decided to study to be a computer technician, inspired by her uncle who is a programmer, Beatrice opted to specialise in Computer hardware maintenance and repair.

ATTITUDES AND PREJUDICES.

Beatrice being the only woman technician at Directorate for ICT Support at Makerere University, Says that most people are usually surprised to see a lady technician and sometimes she feels as though some people would rather not trust her with their equipment. But most times people do not mind trusting her with their equipment if she portrays confidence about what she does. In some cases people take advantage of the fact that she is a lady to give her little or no pay for work done. For many qualified women, there is a glass ceiling blocking their aspirations allowing them to see where

they might go, but stopping them from arriving there. Women miss out on great opportunities to advance in their career, not because they do not meet the overt criteria for the job, but because the management teams comprising mostly of men, imagine women will not fit in the structure. So such excuses as "we need someone to fit into the team", "it is a hard job", "we must have someone totally committed to the job" are given for not employing women. Women must share in understanding and creation of our technology in order to improve the standard of living for our people.

CONCLUSION

Every year more women are achieving success in science and engineering professions. Each Of these extraordinary women have a special quality that inspires others to reach out and achieve their best. I believe that such women can reach out to give moral support to girls to get them interested in pursuing careers in sciences and engineering. Women should work towards their empowerment and equality in all spheres of life, science and engineering being no exception. Most women confessed that in order to succeed as a woman in these professions, Vigilant bulldog determination and fierce independence are necessary defences against subliminal messages of inferiority indifference and isolation that are often sent by society.

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ASSESSING THE WISE INVESTMENTS SUMMER INSTITUTE IMPACT ON EDUCATORS

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Abstract

The Women in Science and Engineering (WISE) Investments Engineering Saturday Academies introduce engineering to young women in middle school and high school. The WISE Investments (WI) Summer Institute gives middle and high school teachers and counselors the opportunity to develop engineering lessons, which they present to the girls at the eight Saturday Academies. The educators who attended the summer institute were exposed to the many factors that create a chilly climate for girls to pursue engineering as a career. The teachers and the WI Team work with 30-75 girls in each academy. This paper will report on activities that the educators began at their schools after attending the WI summer institute. These educators were empowered to present engineering to their students using several different formats.

Introduction

WISE Investments (WI) is a National Science Foundation funded program established in 1999 that introduces middle school and high school teachers, counselors, and their students to engineering and computer science. During a two-week Summer Institute, the teachers and counselors attend hands-on engineering and computer science laboratories given by the engineering college faculty [1]. The institute also includes gender equity [2] and a follow-on optional one-week industry internship [3]. General descriptions of the program can be found in previous papers [4, 5]. Various assessments of the program have been conducted through its existence, including an assessment of attitudinal change in the teachers and counselors [6, 7].

The WI Summer Institute

The Summer Institute gives middle and high school teachers the opportunity to develop engineering lessons, which they present to young women at Saturday Academies. The Saturday Academies are a series of eight workshops in the following areas of engineering: biomedical, chemical, aerospace, civil, electrical, industrial, materials science, and computer science. The teachers and the WI Team work with 30-75 girls in each academy that focuses on one of the 8 areas of engineering. During the first two years of the program, Community College instructors also participated in the program.

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The Summer Institute includes gender awareness training for the teachers and counselors. Each year of the program (five years including a pilot) the gender diversity section has been presented in a different manner. The training in 2003 was presented in the form of practical applications of gender equity in curriculum, instruction, and classroom climate. This is an approach that included enlisting three PhD science education majors and one PhD education policy and leadership major. The PhD student team presented the current findings in the literature in the form of facts and myths through an assessment quiz. The student teachers also led gender equity based discussions with the teachers and counselors. The description of gender equity training for the summer institute is discussed in detail in earlier papers. [2, 8]

Engineering Saturday Academies

The goal of the WISE Investments program is to encourage young women to pursue a career in engineering. The teachers and counselors who have attended the Summer Institute have the opportunity to practice what they have learned in the summer institute by presenting the engineering lessons and activities they developed at the Saturday Academies.

The WI Saturday Academies are designed to introduce middle school and high school girls to engineering, to show them examples of engineering as a helping profession, and to help them understand the value of engineering as a profession. One component of the Saturday Academies is the “hands-on” engineering activities that focus on finding a solution to a technical problem. Each Saturday Academy emphasizes how engineers help people by creating products or applying engineering principles in the areas of: biomedical, chemical, aerospace, civil, electrical, industrial, materials science, and computer science. The students come one Saturday morning each month to participate in the engineering academies. Each three-hour Saturday Academy focuses on a different area of engineering.

Another component of the Saturday Academies is to provide these young women with female role models in engineering. The engineering mentors are women enrolled in undergraduate engineering programs at ASU. By providing role models to the girls, this assists to address the misperception that engineering is for boys and not girls. Having regular exposure to engineering mentors helps to dispel negative perceptions of engineers as “nerds, boring, or antisocial” [9]. The mentors provide the girls with information about “what to expect in college” which may reduce the fear of high girls

transitioning to college. The Saturday Academies provide exposure to female engineers in industry through tours of local businesses.

The third component of the program is to give the teachers and counselors, who attended the WISE Investments two-week Summer Institute, an opportunity to practice introducing engineering to students in the Saturday Academies. By presenting the material in a girls-only environment, the teachers are more likely to be aware of making their presentation gender neutral and of interest to girls. Teachers gain experience presenting engineering activities and develop more confidence before presenting engineering activities to students in their classroom. It is expected that the teachers will now include engineering in their classrooms and do so in a manner that will be of interest to all students.

Teams composed of a mathematics instructor, a science instructor, and a counselor from the same school were encouraged to enroll together in the WI program. Sometimes this not possible and teachers from nearby schools would begin to work together. In some cases these teams continued beyond the WI year and the teachers worked together on engineering activities and projects. For example, the first part of an activity could be done in a math class and the activity completed in a science class. The teachers and counselors found it enjoyable to work together.

Mentoring Teachers and Counselors

The WI program includes an opportunity for the teachers and counselor participants to be assigned a mentor team, which could include all or any of the following: an engineering faculty member, an industry representative, and an engineering student. There have been a variety of different mentor teams depending on the needs of each teacher and counselor. The program coordinator encourages the participants to contact the engineering faculty mentor (who presented the appropriate engineering material during the Summer Institute) during the planning of the academy they are to present to the girls. Most teachers and counselors did not want to contact their mentor for assistance in planning the engineering activities. This was especially true in the later years of the program. The program coordinators who were engineers could provide the teachers with the “technical coaching” they needed to design an activity with enough technical content to be considered an engineering activity. The following examples are how technical coaching assisted the teachers to plan engineering activities for the Saturday Academies.

One example of technical coaching was helping a teacher develop a technical activity for a large group of girls to build a telegraph circuit during the academy. A teacher presenter at an Electrical Engineering Saturday Academy wished to have the girls design the best electromagnet for a telegraph circuit. It was a great idea and the teacher could easily design and build one individual telegraph. The difficulty was adapting this activity so the girls could build their own telegraph, which was a total of 20 telegraphs during the academy. Another difficult task was to select the equipment needed to accomplish this task in a 50-minute activity. The WI staff worked with the teacher and the engineering faculty mentor to create a circuit design board on which they could easily build their telegraph circuit. By, using alligator clips with long wires, the girls were able to connect their circuit together quickly. The teacher also demonstrated electromagnets using different sizes of wires and nails. This activity for the electrical academy gave the girls a great hands-on activity to design and build a telegraph circuit themselves.

Another example involved coaching a teacher for the Civil Engineering Academy to include technical information by using a Civil Engineering student to present the technical content. The teacher used a no-bake cookie recipe to simulate mixing asphalt used in the construction of roads. The WI staff teamed a civil engineering student to work with the teacher to describe how asphalt is mixed. The civil engineering student who is familiar with the process of how asphalt is mixed described the process to the girls. The civil engineering student also discussed how the asphalt is stress tested to withstand certain loading conditions. The technical information helped the girls to decide how to design a road with their simulated “asphalt” mixture. This is another great hand-on engineering activity in which the girls were introduced to the engineering design process.

The challenge of coaching teachers and counselors as established professionals is to provide them with technical information on engineering in a non-threatening way. The tendency of the teachers and counselors is to use activities with which they are already familiar. The activities, which are familiar to the teachers, are not designed to be engineering activities. The teachers must modify their activities to be engineering activities. It appears that assigning an engineering mentor to the teachers left the responsibility of communication up to the teachers to call if they needed assistance. In future programs, assigning a technical coach to the teachers may be more beneficial to them. The coach would call and follow up with them to see how things are going, to see what they needed, and to help solve problems that could arise before the

teachers present their activity at the academy. A technical coach can help teachers modify their activities to be engineering activities.

WI Participant Reunion

The participants of the WI summer institute were invited to attend a reunion to discuss the impact of this training on the activities in their classrooms. The survey included 8 teachers and 1 counselor of both middle school and high school professionals. The participants were asked about the engineering activities they are presenting in their classroom, the barriers that limit them from presenting more engineering activities, and what additional resources would assist them to present engineering in their classroom. The participant responses to these questions includes:

What engineering activities are you presenting in your classroom?

- **My entire course, future quest, is structured around science, math and engineering technology and schoolwork career development.**
- **I use problem solving activities and activities where students work in groups.**
- **Bioengineering – P610 plastid transformation; Construction – bridge building; Mechanical – mousetrap cars.**
- **Not doing engineering activities because I am a counselor, but I am inserting engineering career information into career presentations.**
- **Since I don't teach science, I just try to make**
them more aware of the field of engineering

through career research.

- **Draw an engineer.**

I always try to make sure I include science lab a minimum of 2-3 times a week. Students in my classes of crime scene in my classroom – mystery powder lab, DNA, Fingerprinting and many more electricity, Robotics and others.

What are some barriers that limit you from presenting more engineering activities in your class?

- **Counselors have limited access to classrooms. Sometimes event planning time is limited. Counselors need event ideas for engineering and science careers.**
- **State standards, Aim's reading and writing standards.**
- **I don't teach engineering activities, I like the idea of newspapers and engineering, I will try this idea.**
- **Class management with materials when we have 50-minute class sessions. Structured math curriculum that requires so much planning to add engineering activities.**

- **Need volunteers in engineering that want to come to the West valley. Reluctance due to location, reputation... Far from technology centers. Money for supplies.**
- **Money prevents me from incorporating more activities on a daily basis. I rely heavily upon**
professionals bringing in supplies.
- **Money for supplies, a list of who can call for engineering presentations.**
- **Sometimes money, but I am always on the hunt for less expensive activities.**

What additional resources would assist you in presenting engineering in your class?

- **Current lists of contact information for faculty that want to come out and do things at the schools.**
- **Activities that relate reading/writing and math to engineering.**
- **I don't need any.**
- **Help in aligning activities with state math standard; someone who would be willing to come in and help.**
- **List of volunteers to contact with ideas validating of concepts and area of expertise. Bulletin boards to store lessons, ideas, etc.**
- **My concern is that you need to spend less time concentrating upon content and more upon using the content on real world applications.**
- **More lesson plans demonstrated to me.**
- **Lesson plans to match state standards with supply lists as mentioned today. Continue teacher exchanges (is it possible?)**

The educators were excited to see and to share with other teachers about how they are using information from the Summer Institute in their schools/classrooms.

Summer Institute Impact on Educators

Many of the educators began implementing engineering programs and activities in their schools after attending the Summer Institute. Some of these programs include: Engineering Day, Engineering club, and an Engineering class. As the years passed, there has been more of an emphasis to create engineering activities for the Saturday Academies that meet the K-12 science standards. The program directors realized after the first two years, that teachers needed help to understand how hands-on engineering activities could satisfy science standards. Once the teachers understand that the engineering activities can meet the science standards required in the classroom, there

would be a greater chance that these engineering activities would be incorporated into the regular classroom.

In talking to teachers who have gone through the program, it is clear that many of them might not have applied their newfound engineering understanding after attending the institute if they had not been “forced” to develop lesson plans and activities for the Saturday Academies. Most of the teachers were then able to continue to include engineering in their regular science and math classrooms after leaving the WI Program.

Broader Impact of the Summer Institute on Educators

Additional classroom changes that have resulted due to the WI program have been reported to the WI staff team. Some of the applications are very simple. One middle school teacher who attended the Summer Institute was later assigned to teach fifth grade. Due to the WI program, he continues to help make his students aware of engineering and technology. Each week he has his students read Newsweek, select an article on engineering and technology, read the article, and make a report on the article. This is a very low cost budget. Other teachers bought tinker toys for their classroom as part of their stipend for materials that are used in their classroom after the Summer Institute. The teachers then have tinker toys for their students to experiment with and also have them available to do other activities.

A community college mathematics instructor, who attended the WI program is now designing a pre-engineering community college curriculum for junior and senior high school students to begin while they are still in high school. The plan allows a student to earn an associate degree in pre-engineering one year after they have completed high school. This instructor is talking about engineering to his students, and brought seven students to the ASU campus to talk to engineering professors and advisors. These students were assisted in their enrollment as engineering majors. The instructor believes the WI program helped him to develop more confidence to assist students to pursue a career in engineering.

Summary and Recommendations

The WISE Investments program is a pilot project that has been successful and that has already been replicated by other institutions. The program participants give good assessments of the program. Many parents report that their children have had good experiences in the program and are now considering or have chosen engineering as a

career.

We recommend a technical coach to assist the teachers and counselors to develop and to present engineering activities. The educators are familiar with their own subject area, but with support and guidance will develop new engineering activities and are eager to present these activities in their classrooms. The teachers gain confidence in their technical skills by presenting the engineering activities at the Saturday Academies. The WI staff and engineering faculty gave the teachers guidance, support, and direction as needed, when they presented their activities in the Saturday Academies. Some teachers tried academy activities in the classroom before presenting them at a Saturday Academy.

A continuing need is that more resources become available to help the teacher understand how to match engineering activities to math and science standards.

Several teachers have implemented the engineering activities in their classroom as a result of the WI Summer Institute and Saturday Academies, so more information about engineering is being made known to middle school and high school girls and boys. At the same time, the teachers report to us that their newfound knowledge about engineering has made teaching more interesting for them.

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USING 'COMMUNITIES OF PRACTICE' AND SOCIAL CAPITAL THEORY TO CHALLENGE THE GENDERING OF SET.

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Gender in work communities - a continuing problem.

In the mid 1990s Woodfield (2000) carried out a very sobering research study at a high tech UK software company that had a commitment to equality of opportunity and which declared that they wanted employees who combined both technical (masculine) and social/emotional (feminine) intelligence. But what she saw in practice was that women employees were perceived as less technically skilled or creative than their male colleagues even when their technical qualifications were at high levels, and male employees who were acknowledged to have poor emotional/social skills were given higher status jobs. This sounds very familiar. Cynthia Cockburn (1983) documented it historically in traditional British heavy industries, Moss Kanter (1977) described it in big US corporations of the 1960s and 70s. My colleague and I (Carter and Kirkup, 1990) described it in the engineering profession in the UK and US in the 1980s.

But why does the situation continue? Despite new management literature stressing the value of social skills and emotional intelligence (Goleman 1996) and the importance of diversity in the workforce (Roosevelt 1992), SET communities continue to leave women at the periphery. Feminist literature has also argued that organisations should be valuing non-formal skills, and non-formal learning. But the vagueness of the notion of these soft skills, illustrated by Woodfield's study, allows senior men to promote other men, and valuing non-technical skills become a problem for women employees rather than a help.

Woodfield's case study is a finely detailed example of the situation in the whole SET sector internationally (Millar and Jagger, 2001). In the UK the Greenfield Report (Greenfield, 2002) and the Government's response to it (DTI, 2003) attempts to address the continuing under-representation of women in SET educational and vocational areas, by an extensive set of structural measures. While these are very welcome, the experience of the last 30 years suggests that they will not be enough on their own to create radical change. They need to be supported by an analysis of the operation of gender at the level of social interactions. For this we need social theory to

provide analytical tools, and in this paper I suggest that we could use two complementary frameworks: communities of practice (Wenger 1999) and social capital theory (Putnam, 2000) to uncover the hidden operations of gender in learning and work. To conclude I speculate on whether we could make GASAT a community of practice and an organisation where we create social capital.

'Communities of Practice' produce and re-produce gender

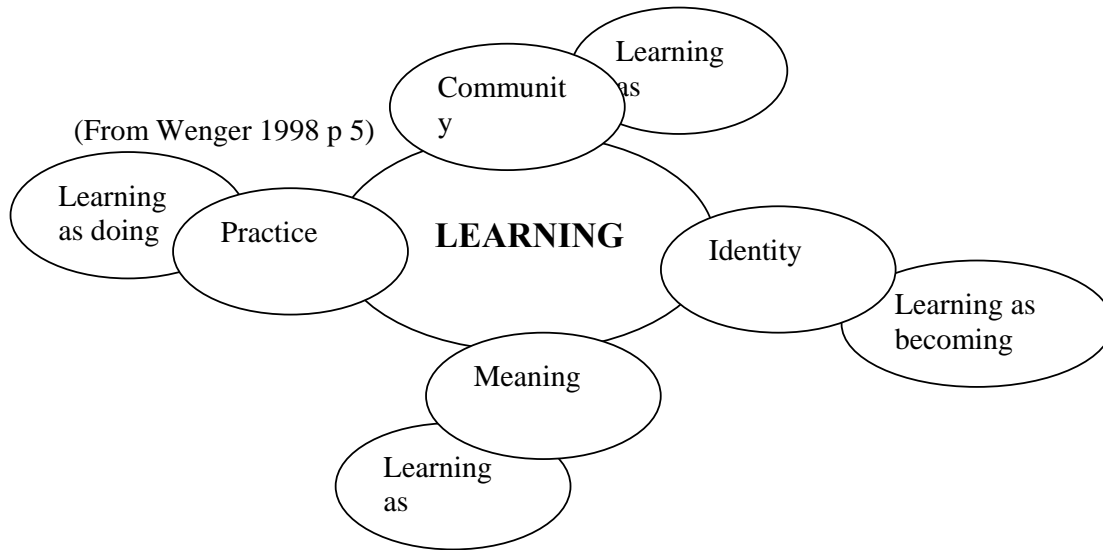
Although feminist educators have long been interested in learning as a social, rather than as simply an individual activity (Gilligan 1982, Harding, 1991); only recently have social and cultural theories of learning become popular among post-school educators and trainers. This is due partly to the technical and economic changes that make life-long learning and continuous professional development vital to any successful economy. 'Learning organisations' and 'learning communities' have become popular phrases. The use of the Internet as a source of information and of networking has also played a part by expanding the notion of community to the 'online' and the 'virtual' (Rheingold, 2000). As gender scholars and activists we have a particular interest in how gender operates in our communities.

A community of practice (Lave and Wenger 1991; Wenger 1999; Wenger, McDermott et al. 2002) is a particular kind group/network where members are mutually engaged in a joint enterprise, using a shared repertoire of skills, discourses and artefacts. Communities of practice tend to form around sets of skills, or activities, they do not map onto the formal organisational structures of the workplace, but often overlay them, providing an extensive network of support and resources. Skilled crafts organisations have provided the historical model. Unfortunately, with their hierarchy of 'Master' craftsman and male apprentice they have also been an archetypal model for gendered training and employment. A modern professional society is another example, and an organisation such as GASAT (which I will come to later) has the potential for being a community of practice. Communities come into being for the benefit of members, and both learning and identity develop for individuals as they participate. But, there is little analysis at present in the literature that the impact of gender on such communities could be producing inequalities.

Figure 1 shows the components of a community of practice. In this model learning is at the centre of the community, and the four components of learning are the

experiences of: belonging, identity (which Wenger describes as dynamic with a trajectory: a history and direction), meaning making, and practice.

Figure 1. Components of a social theory of learning



When new members enter a community they are in the position of 'legitimate peripheral participation' (Lave and Wenger, 1991). They stand at the edge: watch, listen and learn, not because they feel excluded, but because they are learning the skills necessary to be included. As they engage with the community they learn to align their identity and their practices with those of other community members. If learning is not taking place, if the new member becomes alienated from the community, if she leaks from the 'leaking pipeline' (Alper, 1993), the place to look for cause is not in any deficit of the individual, or in a particular event, but in the processes of the community. Why do some new members move from the periphery to the core - an ideal situation for professionals - and some stay at the periphery; and others become not just peripheral but marginalised and eventually excluded? And why, in SET communities, does this happen more to women?

When new communities develop and expand, skills are shared and developed informally - for example in new ICT areas - and participants are effectively sucked in by centripetal force to a core which needs populating. The force of this pull can be greater than the influence of gender. This was part of the story for women in the early years of ICT, and led to some over-optimistic predictions for ICT work as a non-gendered area. (Deakin 1984). But when communities and practices are well

established (as Woodfield's research illustrates), there can be quite a crowd of experts at the core and a well established sense of community identity, and it is harder to move from the periphery.

What we know from 30+ years of scholarship on gender is that gender operates at a number of levels. At its most simplistic it is a property of individuals, often described as what society makes out of sex. But gender is also a relation between groups, and therefore a property of all communities and socio-material structures. This is exemplified in the gendered workplace. More subtly gender is also a property of the symbolic systems, language and imagery that communities use to produce situated knowledge (Haraway 1988).

Consequently, all the components in Wenger's model (Figure 1) are dynamically involved with gender, as are the individuals who participate. These individuals are active agents and can act separately and collectively to change a community. But we need a better understanding of the dynamics of specific communities to be effective in this.

Social capital and gender

Another way of looking at the importance of social activity and the value it produces for societies and for the individuals in them is through the concept of social capital. At the same time as technology enthusiasts (like Rheingold 2000) have argued that the internet provides the means for everyone to participate in online communities which transcend all barriers, spatial, cultural and gendered, others like Putnam (2000) have tracked what they describe as a significant reduction in community activity of all kinds. Community engagement produces social capital. Social capital is both a private and a public good. Social capital increases the reciprocity between individuals and therefore increases trust and efficiency. People with greater social capital have access to more social resources. Putnam describes social capital by comparing it with other kinds of capital that we are more familiar with:

'By analogy with notions of physical capital and human capital- tools and training that enhance productivity- the core idea of social capital theory is that social networks have value. Just as a screwdriver (physical capital) or a college education (human capital) can increase productivity (both individual and collective), so too social contacts affect the productivity of individuals and groups' (Putnam 2000, p18/9)

In education we have understood that we are producing human capital, but we also need to understand that education is a community activity which produces social capital. And, unsurprisingly, gender is involved with the ways social capital is produced and kinds of social capital produced. Putnam describes how in the USA men and women have traditionally been involved in different social activities. He distinguished two kinds of people: those who tend to be more involved formally with social activities, for example being on committees, and those who are more involved with informal activity such as neighbourhood gossiping and 'helping'. The first activity is sometimes described as 'hard' social capital and the second as 'soft' social capital. Those more formally involved in social networks tended to be better educated and male. On all measures of informal social capital women Putnam found women to be more active. But it is 'hard' social capital which is most useful to professionals.

Putnam was looking at the US population at large. When smaller well defined populations are examined the gender distinction is not so clear. Emmerik (2002) has researched the different social capital used by academics in a university. She found that female and male academics were just as good at creating and using soft social capital but men were better at creating hard social capital; these were the kind of relationships that produced professional products such as research and publications.

Social capital can also be classified not only as 'hard' and 'soft' but as 'bridging' (inclusive) and bonding (exclusive). Putnam argues that bridging networks are better at linking across groups and generate broader identities and reciprocity. Bonding offers stronger ties within groups. Norris and Englehart (2003) looked at the relationship between bridging and bonding social capital, and gender. They argued that sex segregated communities provide less social capital because what exists is not available to others outside the group. They discovered that much social activity is still done in sex-segregated groups, so making the social capital created unavailable to the other gender. When this is hard social capital, created around work, women have less access to it. What is needed for gender equality, they argue, are communities that produce 'bridging' social capital.

Making GASAT a community of practice and a source of social capital.

What SET needs are communities of practice which draw women to their centres, and opportunities for women to increase their stock of hard social capital that they can use in their careers. Of course, both these things need to be addressed in the local

professional communities and workplaces where SET women operate, but we can also look at what GASAT could do play a part in this.

Mature individuals often belong to a number of communities of practice. For adults these contribute to creating a multidimensional and robust identity. We draw strength from one community at times when another is causing us stress and anxiety. The authority we have in one community can get us respect in another. For a number of long term GASAT members GASAT is a community of practice, for others it is just a conference. Where it is a community of practice members can complement or challenge activity in other communities, functioning to support SET women more. Could we strengthen GASAT to do this?

Wenger et al (2002) argue that the key component of a community of practice is '*a domain of knowledge which defines a set of issues, a community of people who care about this domain; and the shared practice that they are developing.*' (Wenger et al 2002, p 27). '*A community that does not focus on building a shared practice will remain a diffuse friendship group that may be socially satisfying, but ineffective.*' (Wenger et al 2002, p 46).

GASAT certainly brings together a community of people who care about gender and SET, we share analytical tools for understanding this, and we share our practices. It is not clear that we have a shared practice. GASAT activity needs to focus on developing shared practice, which should then contribute to the production of hard social capital , as well as the soft sort that comes from simple friendships.

Wenger at al. suggest that seven principles for 'growing' communities of practice, and I suggest, to conclude this paper, that these principles could be the start of a review of GASAT and a foundation for the future:

1. Design for evolution
2. Open a dialogue between inside and outside perspectives (bonding and bridging)
3. Invite different levels of participation
4. Develop both public and private community spaces
5. Focus on value
6. Combine familiarity and excitement
7. Create a rhythm for the community (through conferences, newsletter, online forums and projects)

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DEVELOPING GENDER FRIENDLY RESOURCE MATERIALS AND STRATEGIES IN SCIENCE AND MATHEMATICS AT LOWER SECONDARY LEVEL – MAURITIAN CASE STUDY

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Introduction

This project was initiated in response to problems addressed at the Commonwealth meeting of ministers (1997) regarding the popularisation of science and technology using the local context and addressing in particular gender equality and equity. The Halifax meeting of Commonwealth ministers (Canada, 2000) further addressed the need for developing resource materials for learners and teachers. The consultative meeting organised in Malawi (2000) further stressed the need for developing such materials. At this meeting, the following issues emerged:

- (1) there is a desperate need to encourage the popularisation of science and technology addressing gender issues and local context
- (2) there is a need to develop exemplary materials that will respond to the needs of teachers and learners
- (3) The project should supplement and enrich existing programmes and not compete with them.

Rationale

Materials utilised in many Commonwealth countries were devoid of local culture and neither teachers nor students could see the value of science, mathematics and technology in their daily life and adapted to local knowledge and culture.

Consequently, students tended to reject science subjects as it was perceived to be for the selected few, elitist in nature and more appropriate for boys.

It also tended to create the impression that there was no science and technology in the cultures of developing countries. We are all aware of the realities of daily life where there is tremendous amount of science in the simple things we do.

The project has therefore focussed in bringing forward the scientific reasons underlying our daily activities and make science more relevant, contextual and more gender friendly. As revealed from studies, science curriculum in many Commonwealth countries have focussed on boys and many girls believed that science and mathematics are difficult subjects and consequently there is low enrolment and achievement of girls in science and mathematics and technology. Genderisation of science curriculum and use of appropriate genderfriendly innovative strategies will make science and mathematics more interesting and related to issues of everyday life.

Therefore, by exploiting existing local knowledge, learners will be able to use new information in ways that would become meaningful to them and help towards the achievement of an enhanced scientific literacy.

Objectives of the project:

1. To develop gender friendly, resource materials related to local context and everyday life.
2. To use innovative gender friendly strategies to teach the science and materials
3. To promote a culture of science, mathematics and technology

Methodology

Exemplary materials developed in earlier workshops(Mauritius 2001, Swaziland 2002,) were used as templates to develop locally adapted additional resource materials. About 12 pilot schools both state and private schools were chosen representing a population of 400 students of different abilities at Form III level (age 14). Teachers who have an awareness of active learning strategies were invited to attend workshops at the Mauritius Institute of Education and assist in developing materials for Form III level which reflected the following:

- (1) local context
- (2) gender friendly
- (3) related to everyday life.

The teachers, after developing these resource materials prepared lesson plans that would involve active learning gender friendly strategies. These included active participatory approaches, cooperative learning and hands on experiences.

The materials have been trialled in schools for a period of 3 months and teachers are keen to carry on to develop additional materials that will respond to the particular

needs of their students. An evaluation of the implementation of the project was carried out by teams set up at the Mauritius Institute of Education.

These included (1) resource materials
(11) teaching/learning related to
(111) aims and objectives of project

Four different groups were set up for the following science disciplines:

- (1) Biology
- (2) Physics
- (3) Chemistry
- (4) Maths

Each group consisted of 4 teachers except for chemistry where 10 teacher trainees following TD programme at MIE were involved.

The teachers also produced some low cost models and other resources to support their teaching.

The following academics from the Mauritius Institute of Education acted as facilitators in the workshops that were held:

Mrs J Naugah
Dr Y Ramma
Mr A Ramful
Mr H Bessoondyal
Mr J Beeharry
Miss S Saddul
Mr M Cyparsade
Dr R Bholah
Mrs A Ramdinny
Mr P Parmessur } evaluators

Visits have been made to schools to obtain feedback on the implementation of the project.

The teachers also attended a workshop in June, during the visit of Dr Ved Goel. As, Deputy Director of Commonwealth Secretariat interacted with each other in group works and refined the materials further. Meetings of the project coordinators were also held with Dr Ved Goel to discuss various issues arising out of the implementation of the project.

Evaluation of the Implementation of the Resource Materials

Introduction

This report is an evaluation of the implementation of the curriculum resource materials in science and mathematics for the lower secondary schools in Mauritius; in line with the objectives of the project, which were;

1. to develop gender-friendly materials,
2. to contextualise the science and mathematics curriculum, and,
3. to relate the materials to everyday life situation.

A first workshop was held from 21 to 23 April where 12 teachers were trained and provided with guidelines to develop low cost resource materials in line with the above objectives.. A first evaluation on this workshop has been documented in the report submitted to the Commonwealth Secretariat. This second evaluation report deals with the implementation of the project at school level. The reaction of the 12 teachers who participated in the project and the response of the pupils to the materials developed in science and mathematics are summarised below. At the end of the second workshop held from 26-30 May 2003 a questionnaire was administered to each participating teacher, where they were asked about their general reaction to the implementation of the materials at the classroom level, and the major constraints they faced in the implementation of these materials which they themselves had developed under the guidance of the MIE academics.

Classroom observations were carried out where pupils' reception of these materials were recorded, as well as the teachers' ability to transact with these materials in class.

The report below is based on the response of the 12 teachers who participated in the project, observation of 4 teachers and students at work in the classroom., and on informal interviews with 3 different groups of students. This paper which reports the findings related to objective 1 of the project, is presented under the following headings;

Section A: General Comments on the Evaluation

Section B; Specific comments

Section A: General Comment on the Evaluation

There is no doubt from the data obtained from the participating teachers, classroom

observation and group interview with pupils that the implementation of the resource materials at classroom level has proved to be very successful. However, there is also a general predominant feeling that it would be very difficult to continue with it a **implementing it is very time consuming, and moreover 2 periods per week is not at all sufficient for this purpose as there is a bulky syllabus to complete.**

Classroom observation confirmed the response of the teachers participating in the project who described the enthusiasm, interest and motivation of the girls when working with the curriculum resource materials developed in a previous workshop.

Informal interviews with the girls also revealed that they were motivated to continue with their study of science and mathematics subjects. Some of the girls even pointed out that science was not as difficult as they thought, and that they did not know that it could help them to understand better certain things in their daily life.

Section B: More specific Information

1. Reaction to the implementation of the Project

60% of the respondents felt satisfied with the implementation of the materials. The main reasons for those who were not satisfied were that most of the time the resources were limited and sometimes outdated. The range of response below provides a picture of the situation.

The girls showed lots of creativity; Lots of interaction from students; Team spirit was high.

Because they motivate the pupils to learn more on science.

The Instructional strategies catered for the different learning styles of the students, and also the different ability level of the students.

They were both relevant and useful, because they catered for the different teaching/learning styles.

No. The resource materials are more often limited and sometimes outdated.(4 respondents)

2. Objectives of the Project

All the respondents agreed that the materials helped to achieve the objective of making the materials gender-friendly.. Their response included the following comments.

Students worked in groups to set up the resource materials, using materials available locally, which hardly cost much.

We worked hard to incorporate the above into the topic of mental computation.

Students will be engaged in co-operative learning. Hence they can develop lateral thinking skills.

The girls were engaged in group activities where they interacted with peers and investigated the physical properties of metals related to everyday life.

Materials brought were gender friendly and related to life as the pupils can even try it at home. (2 respondents)

The materials were gender friendly: For example, the topic" Metals" was well understood in group work where things being used in daily life were brought: jewels (for girls), tools (for boys).

3 Girls' Reaction to the Project

The participants were unanimous in their response to the reactions of the girls regarding the materials. They all expressed the increased interest, enthusiasm, and motivation of their pupils. They expressed this in different ways as follows;

Lots of enthusiasm and eagerness shown; pupils preferred working this way than the traditional way.

They are very excited and they want to discover more.

Pupils are enthusiastic and eager to learn more.(5 students) They interact and share ideas with each other. They also develop skills- manipulation skills, observational skills and thinking skills.

They were interested/motivated to learn the main concepts about the lesson. They like very much the hands-on activity, games and learning games. Although the class was a bit noisy, they participated actively.

Pupils are very enthusiastic and have the willingness to do science. Their interest in science has grown.

4. Major Constraints in the Implementation of the project

There seemed to be general agreement among the participants that the major constraints in the implementation of the project are the time factor and a bulky syllabus. The project if implemented properly would most definitely enhance the quality of teaching and learning, as revealed by all the respondents. However, 2 periods per week, are not enough to implement such projects., as they are time consuming. Some of the responses of the participants are given below.

Time., problem from the administration; bulky syllabus.

More co-operation from external groups e.g. release of teachers in government schools. Funding is a constraint - it would help if you had a workshop where you could develop more materials.

Class periods are not sufficient. Schools must provide more materials for preparing strategies to be taught - like cards, games, etc.

Time consuming and syllabus constraint.(2 participants)

Time is limited as we have to complete a bulky syllabus.(3 participants)

Time constraint: additional working periods must be given at Form III level.

Time factor, which is limited. Bulky syllabus. Limited resources at school.

Time factor - more time and space should be made available for science teachers.

5. Teachers' Perception of the Effectiveness of the Project to bring about enhanced Learning.

All the participants felt that such an approach, as developed in the previous workshop would most definitely bring about effective learning on the part of the pupils. Different reasons were given to support their responses, as follows;

Better understanding of topic. Students are more involved.

Because it will arouse more interest for the subject, and more and more pupils would like to study the subject.

More strategies will lead to more effective learning. This will cater the needs for main stream, average and poor learners.

These strategies will develop independent learners, and solve the difficulties students met in learning.

Such an approach is helpful for both teachers and pupils.

It will motivate pupils to participate and become independent learners.

Pupils will be engaged in activities where they will involve themselves by bringing materials related to life.

Abstract understanding may often lead to misconceptions. By linking topics with daily life uses, gender and encouraging cooperative learning, precision on the topics promotes better understanding.

This will help both students and teachers to perform better in their task.

6. Some general Comments From Teachers

The participants also expressed their wish to have a follow-up on the Project.. On the whole the participants very much enjoyed collaborating in the project, because among other things they enjoyed the workshop session and learned from other colleagues.. It provided the teachers an opportunity to discuss issues relating to the teaching of science and mathematics, which had been a long-felt need, and which they hoped would continue to happen in different ways, and through different projects. One participant even suggested that this kind of project should be extended to other subject areas.

Conclusion

From the evaluation exercise carried out and the data analysed from the two workshops organised, visits to schools and interviews with pupils, there is no doubt whatsoever that the project has been very successful. Both the participating teachers and the girls found much value in it. It has also become evident that there will be enhanced gains on the part of the girls if the strategies as elaborated in the project are implemented. The data revealed that materials can be made to be gender-friendly, and some girls voiced their feeling as follows;’’ Science is not as difficult as I thought’’, ‘‘Science is fun to do.’’ Or’’ I am going to take up science for my ’O’ level.’’ Ultimately, the girls would be motivated to take up science and mathematics at higher levels. This much-felt need of strategies to promote science subjects in the Mauritian schools would, no doubt, be most eagerly welcomed by the policy makers.

This project has also brought some additional gains for teachers. They were all very happy to having been given the opportunity to come together and discuss issues relating to the teaching of science and mathematics. The wish for more such projects, workshops and seminars, where teachers are brought together was evident from the data., as it increases their self-confidence at the classroom level.

However, the data also revealed that there were certain major obstacles which needed to be overcome before the project could be implemented in the Mauritian schools. An overloaded syllabus, allocation of two and three periods per week for the teaching of science and mathematics respectively, .have been two obvious ones. The question which one is tempted to ask is whether the enhanced gains in the implementation of this project is a case strong and important enough for policy makers to take the necessary actions to enable the implementation of the project at National level? A starting point would be to make science subjects compulsory up to the age of 16 in all secondary schools in Mauritius.

Evaluators of the Project

Anita.N.Ramdinny and Pritam.V.K.Purmessur

POSTER PRESENTATION

'FERMINIZATION' OF TEACHING: REPRESENTATIONS OF TEACHERS IN FILMIC TEXTS

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The "Feminization" of teaching constitutes a process which implies, not only a greater number of women in teaching positions, but also a stronger bond with the ideal of teaching the meanings of "socially feminine". Assuming as an axle with which to analyze the category of gender as a relational concept (which is constituted in the relationship between female and male) and using the theoretical reference of cultural studies, this study seeks to investigate the representation of feminine and masculine perceived by teachers through their interaction with texts of films, focusing on the matter of profession and teaching.

Interviews were conducted with primary and secondary school teachers, using texts from two films as subject of discussion in the interviews, "Erin Brokovich", Steven Soderbergh, 2000 and "Not One Less"- Zang Yimou, 1999. These films were selected because of the approach related to the question of gender, profession and teaching as well as the difference in construction of the respective languages (commercial X authorial).

Contradictorily, despite the critical "discourse" of "feminization of the teaching profession" as a historic cultural process, a link between teaching, motherhood and affection still remains. The construction of various central characters of the films generate reflection about the differentiation of behaviors and attitudes between men and women in the exercise of the teaching profession, relating attributes like dedication, love, care, patience and sensibility to the construction of "being a woman". Thus, it is important to develop these questions as problems among teachers, creating the possibility of developing new constructs representing teaching and feminine/masculine.

TO BE A BOY – THE BODY LEARNS ABOUT POWER IN THE BRAZILIAN HINTERLAND

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In the last years, discussions about gender acquired new nuances. Today we see the ingenuity of positions that blamed only men for women's oppression. Men did not escape, unharmed, the model that society constructed for them. As put by a Brazilian author, a boy is educated in the precarious situation of a cell so that, once he is born, he will become his own jailer. The masculine question today is seen in effervescence and leads us to reread literature classics in order to develop research about a boy brought up in the hinterland of the Brazilian Northeast, autobiography of one of the most important writers of modern times, Graciliano Ramos, in "Infancy". Based on this reading, we ask ourselves: in a situation of extreme poverty, in which the family and school are a distant echo of the bourgeoisie of the large urban centers, what scars were imprinted in the bodies of the boy by the family and the school? What were the paternal and the maternal role in the infantile imagination to construct the idea of a masculine and a feminine gender? How did the silence and violence to which the boy was submitted influence the construction of the model of male? School appears in these books as a place of immobilization, submission and death. The relevance of this study is that it affords the educator the opportunity to reflect upon the meaning of power and freedom and to review the position of women as "the oppressed", bringing man into the scene, thus increasing the complexity of understanding the gender issue.

CINEMA AND PROSTITUTION: A LOVE LESSON

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This study examines some questions of extreme relevance, such as gender, sexuality and prostitution and their representation on the Brazilian cinema, establishing a comparison among films, inovating in terms of language and content, with some of the so called hollywoodian productions. The analysis was done under the spectator's point of view, obviously involving the researcher's subjectivity into the interpretation. Greater attention was given to the film "Lição de Amor" (Love Lesson, Eduardo Escorel, 1975), portraying the intricate relationships among an aristocratic family of a large southeastern Brazilian city in the beginning of the XXth century and a foreign language Polish teacher, who was invited to work at this family's home as a governess, with the specific task of introducing an adolescent into his sexual life. The film is considered paradigmatic in the development of meanings that break away from historically established dichotomies about prostitution. In this production the characters are constructed in a more complex manner, inviting the spectator to reflect on their identities. Most of the hollywoodian films have authoritarian and closed narratives, erotizing women and making use of a language that aims at seducing, and avoids the interaction with the spectator. The study is based on some notions introduced by postmodern authors, where meaning, identity and subjectivity gain an important role and the essence notion of human beings is questioned. Engaging into this type of analysis that involves a critical images reading is considered crucial for teachers. Results of this research will be included in an interactive site for school teachers.

THE PEDAGOGICAL APPROACH TO MALES IN REPRODUCTIVE HEALTH IN NON GOVERNMENTAL ORGANIZATION IN RIO DE JANEIRO

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Elements that constitute the masculine identity - how to be courageous, not to show fear - make difficult the sexual education of young males. In the absence of the State, the NGOs occupy an expressive place in the development of educative practices regarding reproductive health in the young population, particularly in poverty-stricken areas. It deals with a population exposed to situations that make it vulnerable, such as violence, the lack of an educational and health systems, and the lack of professional perspective. With the central category being the Freirean binomial "Action - Reflection", this research investigates how the educative practices in reproductive health developed by NGOs represent the gender and sexuality questions, from the perspective of young males: how and to what extent are concrete situations in the lives of young males being problematized? Is there a contextualization of the gender-related questions in relation to the wider socioeconomic cultural determinants? How does the adolescent signify the transmitted knowledge and information? The research, conducted in conjunction with a sample from the NGOs, is of a qualitative nature, using observations and semi-structured interviews between the adolescents and the educators. Preliminary results indicate that these practices generally don't fit with the scenarios in which the daily routines of the youths' lives unfold: taken out of context, these become ineffective in the development of preventative projects in this area. In spite of the advances happening within various official programs, like the Integrated Program for Women's Health and the Program for Adolescent Health, there is still a clear presence of a biological slant in the orientation of Reproductive Health, resulting in the sole "responsabilization" of the feminine body.

SEXUALITY AND GENDER: REPRESENTATIONS BY ELDERLY WOMEN

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The increasing number of elderly people in Brazil represents a challenge. This is particularly true for women, who enjoy greater longevity. However, women have a secondary role and are often dependent and submitted to men's decisions. This makes women's longevity particularly difficult to manage. Attention should be given to the historically constructed meaning of "old age" and ways in which they are internalized by people. Socio cultural taboos and prejudices, such as the "myth" that older people are sexless, are taken as natural and therefore not questioned. As put by Foucault, control is not only in the body, but has moved into a control society, and the more it becomes invisible, the more powerful it gets. This study aims at identifying the social meaning of gender and sexuality by elderly women. The methodology used was qualitative. Data was collected through interviews and focus group discussions, FGDs. The study's subjects are a group of retired women who attend the geriatrics and gerontology services at the "Universidade Federal Fluminense", Rio de Janeiro State. This study has the potential of bringing to evidence sexuality and gender as cultural constructs and offering important information to back up actions to facilitate social inclusion of older women.

MAURITIUS TELECOM: MEETING THE CHALLENGES OF NEW TECHNOLOGIES”

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Higher bandwidth lies at the heart of modern information and communication technologies. In anticipation of a multitude of such applications, Mauritius Telecom has judiciously invested in the high-speed digital information highway - the SAFE fibre optic cable. It has further deployed robust domestic infrastructures capable of sustaining a vast number of new technologies in accessing value-added services. This has been done in the intention of permitting the nation and each and every citizen of Mauritius to better exploit its competitive advantages. With the help of its strategic partner, Mauritius Telecom has internally restructured its organisation and adopted a total quality management (TQM) approach, aimed to infuse quality into its every activity through continuous improvement. New technologies and applications currently under study and/or testing phases include xDSL, Voice over IP, CDMA 1x and SMS and CNI for fixed subscribers. Mauritius Telecom employees, who embrace people of both genders, relentlessly work towards achieving the company vision “*To be a Premier World Class Infocom Services Provider*”.

OTHER CONTRIBUTIONS

SUSTAINABLE AQUACULTURE DEVELOPMENT FOR POVERTY ALLEVIATION IN NORTHERN UPLANDS WITH EMPHASIS ON GENDER ROLES: A VIETNAM PERSPECTIVE

Md.Ghulam KIBRIA¹ and Runia MOWLA^{2,3}

1. Introduction

The UNDP project “Aquaculture Development in Northern Uplands” (VIE/98/009/01/NEX) is being executed by Vietnam’s Ministry of Fisheries, the department of Fishery Extension as the implementing department with the following co-implementing agencies: Provincial Department of Agriculture and Rural Development (DARD) of the provinces of Son La, Lai Chau & Hoa Binh; the Research Institute for Aquaculture No. 1 (RIA 1) and Food and Agriculture Organization of the United Nations (FAO). The project aimed at poverty alleviation in the 3 pilot provinces by diversifying rural development through viable sustainable aquaculture activities, increment of building capacity of the project staff, for increasing the household food security, reduce malnutrition of disadvantaged ethnic minority and women as well as improving their quality of life, empowerment of women community in their families as well as in the society, giving high priority to gender education & women’s involvement in all activities of the project. It included components on resource assessment, participatory planning and implementation of an action plan of aquaculture activities. It also stressed on strengthening an extension network and improvement of seed production and delivery system improved, micro-credit & savings schemes established to provide direct support for aquaculture activities to the upland ethnic minority farmers living in remote & isolated areas. This project had launched in July 1999 and phased out in December 2002. A total of 50 communes from 3 pilot provinces (Son La, Lai Chau & Hoa Binh) of 6 districts (Thuan Chau & Song Ma of Son La province, Tuan Giao & Sin Ho of Lai Chau province, Da Bac & Mai Chau of Hoa Binh province) and involved 151 Result Demonstration farmers (RDFs) of which were 72 grow-out & 35 nursing including the integrated household farming methodology VAC (horticulture-aquaculture-livestock), 41 rice-fish, & 3 cage culture farming and more than 5900 poor ethnic minority farming households (Fellow farmers) were the project target groups (Siriwardena, 2002) and especially 50% of them were women.

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2. Methodology of the Study

Study area

Fieldwork had been carried out between July to August 2002. It focused on 6 districts under the 3 pilot provinces: Son La, Lai Chau & Hoa Binh. The team studied one commune per district. So, Chieng Ly & Na Nghiu commune from Thuan Chau & Song Ma district of Son La province, Quai Cang & Sin Ho commune from Tuan Giao & Sin Ho district of Lai Chau province and Tong Dau & Tu Ly commune from Mai Chau & Da Bac district of Hoa Binh province were selected for this study.

Research Methods

The methods used in the study were Focus Group Discussion and Key informant interviews.

Focus Group Discussion

Focus Group Discussion is one of the best approaches used in Participatory Rural Appraisal (PRA). The members of each focus group discussed aquaculture among themselves with the help of an outside facilitator and in the presence of one or more outside observers. The focus groups such poor women, middle and better living standard women who already took Aquaculture activities (5 to 7 woman are in labour age and married. 95% of them are ethnic minority people of each group) were selected. An attempt was made to conduct the group discussion with no sense of formality. Initially the team was to so closed and made rapport with the participants, introducing the facilitators and providing background information on the purpose of the visit and focus group discussion. The team then explained the general purpose of the meeting, emphasized that the group's assistance is needed to ensure the VIE/98/009/01 project meets their needs.

Key Informant Interviews

Semi-structured interviews were conducted with the key informants: selected stakeholders

(Head of CAGs, Commune Women's Union, DAGs, CEWs) to the project who had a particular knowledge of aquaculture and gender issues. A checklist was prepared for this purpose. Secondary data were collected from PMU office and PIUs of 3 pilot provinces for the application in this study.

Gender Roles

Gender is the social differences between men and women but to the social relations between them that define their roles. Gender roles are therefore not determined biologically, but are constructed socially and can differ between cultures and environments. As a whole gender roles have a major impact on production, reproduction, consumption and distribution in aquaculture.

3. Research Findings

Gender division of labour

It is implemented clearly at commune & district level through the field study. The role of male & female is different in production activities. In fact labour division between two sexes are suitable to physical culture and mutual social relation between male and female. Gender division of labour is cooperative and supplementary to each other to be achieved efficiently at production level.

Cultivation

It had observed through this study that woman did all stages of rice production. Man merely performed some stages like ploughing, transporting rice after harvesting. Woman carried out most of the stages such transplanting, daily caring, watering, apply pesticides, harvesting, drying etc (Thao, 2002).

One of the woman of Tong Dau commune stated **“Women do main part of cultivation & husbandry while man assisted women for only heavy work like ploughing, spent more time for sowing, fire wood collection, take part in building house or public construction”**.

Husbandry

It created a significant income generation for most of the households. This is one of the best way to raise income and improve the poor household's livelihood through have capital or borrow loan from the micro-credit schemes. Popular livestock raising at farmers level are pig, poultry and cattle. Women spent much time in husbandry like cultivation than men. Women often get up early and spent time for cooking food for poultry & pig before going to rice field or after finishing farm work. Cattle (Buffalo, cow etc) care is usually done by older or children of the family. One of the woman of Chieng Ly commune reported **“Husbandry is often done in the early morning or at night for time saving. Before going to field feed**

(grass) for fish is being applied. During the field work I usually collect vegetables for pigs and prepared food for pigs, poultry once returned at home in the evening”

Small-scale handicraft industry, services and hired labour

There are differences and similarities in labour division of small-scale handicraft industry, service & hired labour. It can be divided into 3 following terms of labour:

- Weaving is the most popular traditional labour type for the mountainous ethnic women (Thai, Muong, H'mong, Dao etc). At Tong Dau commune there are 60-70% of women are doing this business on weaving and made bedding as reason it is not only a self demand-supply activity for using in their family but create a good source of income. One of the ethnic woman of Tong Dau commune quoted **“We earn 200-250,000 VND²/month if only in evening while an unmarried girl (not busy with house work) can earn 400,000 VND/month very easily”**.
- Labour in service activities like making cakes, tofu, selling miscellaneous goods through open grocery shops at village, commune level is initiated by the women. Women consider this service as an additional income for their family.
- Mainly man worked as a hired labour activities such construction building, road, wood workers etc.

So it is proved that at all communes level women are main labour force in agricultural production, husbandry, additional work for their family.

Gender in income contribution to household

It is noticed through this study that women playing a vital role to develop their livelihoods. It is found in many ethnic families both husband & wife actively involve at economic activities to earn more income for their family. Commune leader of Tong Dau informed **“My wife contributes her earning 80% for family purpose albeit I have salary but spent much for social maintenance so, I have to use family’s income”**. Another woman from Na Nghiu commune reported, **“If any Thai ethnic family have a hardworking limber wife, the living standard of that family will be better. In contrary, living standard of that family will be deteriorate if posses lazy and not limber wife”**.

Gender in resources control, or asset possession and decision making related production activities

² 15,000 VND = 1 US\$ (April, 2003, Vietnam)

Most of asset such as land, house are used but not possessed by women in ethnic minority society. So most land or house owners are male but after husband expire, his land or house will belong to his wife. Most of the decision making related production like production pattern, labour division, inputs purchase, outputs selling belong to male as reason they possess higher education and they usually contact with other people, so that they have better knowledge than female. Actually this custom is being followed by Thai, DAO, Mong ethnic people who always consider the rights for man higher than women in the society. At this stage the decision-making activities are same to young couple. One of the Mong ethnic people from Sin Ho commune quoted **“Mong ethnic woman is not equal to her husband. Husband always possess bad impression on his wife as reason they always at home, they don’t know how to good approach with out side people and also they are illiterate. So, they also don’t have any right to make decision any kind of family affairs”**.

One of the Dao woman from Sin Ho commune stated **“Dao ethnic man is a leader of his family. When children want to do something them mother refer them father’s advice. Construction of building, door etc heavy works often initiated by husband but homestead activities like husbandry, household production are undertaken by wife”**.

Gender in household activities

Housework:

Housework like cooking, washing, bringing water, collecting firewood etc for women work. This is not only a thought of ethnic patriarchal man but also the attachment of woman to the works that is considered their heavenly mandate. At studied area, man also took part in housework but they can do at given time such as after his wife bearing children, illness or over busy etc and it means husband **“help his wife”** is not a work to him. It happened to husbands who are not healthy enough to do heavy works stay at home to do housework instead of wife go farming in field and hills but this is rare case. It always exist a concept that husband is more intelligent than wife is so that they have right not to do housework. One of the woman from Chieng Ly commune stated **“Husband does not do the works of woman. He feels shy. Husband never washes clothes of wife & children. He says to his mother to help wash as well as assist his wife hanging the washed wet clothes”**.

Taking care and teaching children:

Look after small children is also a solemn duty and obligation for women. Once children grow up, both husband and wife should concentrate to teach them for good education and behaviors. At present the parents are so busy at rural area, limited knowledge so that they can’t teach them properly but stressed on their study and merely send them at school. In general the role of woman is much than husband in teaching children (especially to daughter

to weave and do farming). One of the woman from Na Nghiu commune stated **“I’m a wife and being a mother I should have much responsibilities than my husband. Sewing cloths for children, feeding children, washing etc. Man doesn’t do or understand these type of work”**.

Managing household fund and expenses:

Women usually responsible for keeping and managing money in family as reason they spent money more economic than man, they also concerned to spend money for preparing the daily meals so that they preserved money more conveniently than man. Household fund is managed by woman and it doesn’t mean that they have right to spend the money freely what they liked. In this regard woman can only make decision by herself on expense of family daily meals, clothes and part of children learning (tuition fees, Tiffin etc). Also other family expenses (expensive family goods) are decided by husband or both husband & wife. One of member of Tu Ly commune reported **“Financial management is concerned with woman. If I keep money, I’ll spend much for various purposes and there is no limitation. So, I only advice my wife to follow up all daily activities but my wife smoothly run family expenses with her own capacity”**.

Gender Division of labour in the project areas:

a. Aquaculture

Tasks	M	W	B	C
Pond Preparation:				
Pond dyke compaction	√			
Removal of rocky/stones from pond bed	√			
Deweeding			√	√
Water draining	√			
Drying pond bottom	√			
Liming			√	
Stocking	√			
Feeding & Fertilization			√	
Fish health check & disease control	√			

Harvesting	√	√
Marketing	√	

M: Man
W: Woman
B: Both
C: Children

Source: Author's field survey (Kibria, M.G. 2001)

b. Agriculture:

Tasks	M	W	B	C
Land preparation			√	
Watering			√	
Transplanting			√	
Weeding		√		√
Pesticide spray	√			
Harvesting			√	√
Storing			√	√
Husking		√		
Package			√	
Transportation			√	√
Selling		√		

M: Man
W: Woman
B: Both
C: Children

Source: Author's field survey (Kibria, M.G. 2001)

Impact of Aquaculture activities through project intervention:

Before the project the fish farming in the uplands area was so traditional with out any technical/financial assistance. It was treated merely for man activity but women can assist them. It was not so transparent about women's role. So, after the project intervention "Aquaculture Techniques" training by the project for ethnic women at communes level was a pragmatic & needful activity and made good awareness on pond, cage & rice fish culture techniques among the women group of the uplands area. The ethnic women community learnt pros & cons of aquaculture through a series of Aquaculture technologies training from the project (Schmidt, 2002). They also agreed that fish farming brought many benefits to households like supplement nutrition to women and their children, make gender division of labour between man & women as well as make labour force of children (grass & local feed

collection), make use of by-products in pond farming, improve family's income.

Box 1:

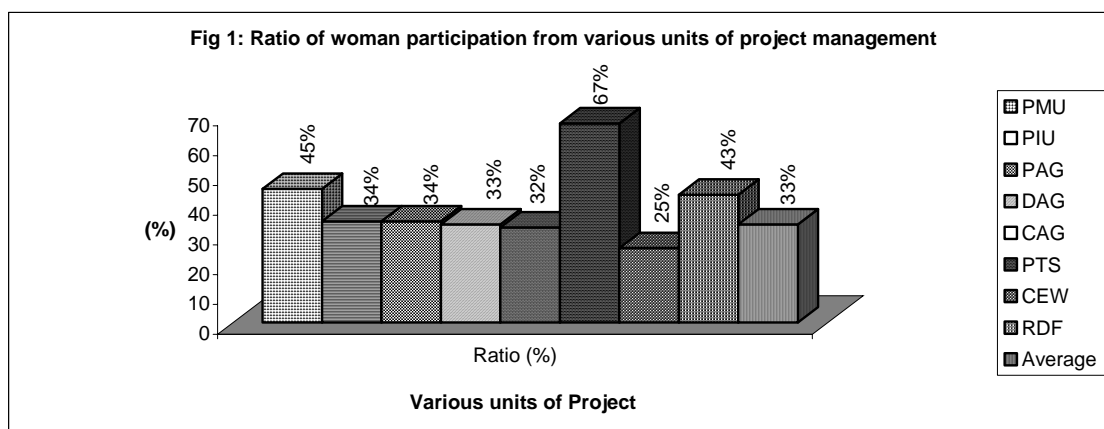
One of the households from Noong Heo commune of Sin Ho district of Lai Chau district Mr. Lo Van Ua reported **“before the project I don't have any clear idea about the stocking density, feeding rate, fertilizer dose etc albeit I usually released a certain number of fingerling in the pond. I only applied**

Box 2:

One of the project farmers from Mai Hao commune of Hoa Binh province Ms. Vi Thi Mung stated **“The Aquaculture Techniques training notified me fish culture easy and bring many advantages. Our rice fields not enough and so income very low. After starting the rice fish farming we have earned money**

Women advancement & gender mainstreaming:

This project clearly demonstrated that the poor ethnic minority women group played a vital role in small-scale aquaculture and received substantial benefits. This project succeeded in creating suitable opportunities and condition for women to be able to effectively participation in all activities such as providing loans, aquaculture techniques and micro credit management training. There also changed about the idea of women group the way to do economic & generally in evaluation of capacity, empower of women. The role and status of ethnic mountainous women had been improved through aquaculture activities. The role of women's Union had also been strengthened by several numbers of project meetings, workshops, study tours, cross-field visits etc. The project already proved & placed special emphasis on empowering women through aquaculture by improving the productivity and profitability of family aquaculture through introducing appropriate aquaculture technologies, training and by assigning them the lead role in homestead aquaculture. Similarly, active participation of local communities in implementation of the project had accorded high priority.



Box 3:

- At this stage ethnic women can part in discussion (stocking density/ratio, kind of feeds and rate, fertilizers, daily routine management of better farming etc) with their husband about the development of pond/cage/rich fish farming etc.
- It had been observed that the ethnic women fish farmers of the project now actively involve in aquaculture activities like purchase of fingerling, releasing fingerling, feeding, fertilization, daily routine management etc are being done by them. Only their husbands can help them in pond excavation, take part in guarding at pond site during the night.
- One of the project best Result Demonstration farmer (RDF) Ms. Ca Thi An from Quai To commune, Tuan Giao district of Lai Chau province stated that **“It is very good initiative of the project authority that they encouraged ethnic poor women community to join fish culture. I had been trained inside & outside country (Thailand) about the simple Aquaculture Techniques. So now I am capable to teach other interested fellow farmers around the commune. At this moment the dignity of women in the society very high and other outside people as well as their relatives rely and respect her”**.
- One of the project RDF Ms. Hoang Thi Mai from Sin Ho town of Lai Chau province reported that **“After the project launch the commune Women Union so intimated with us and if we feel any difficulties about the credit management we always inform them through the project Technical staff (PTS) and commune extension worker (CEW). Now, we interacted with them on interest payment, fish culture record keeping etc”**.
- Another project RDF Ms. Tran Thi Hien from Song Ma town from Son la province stated that **“After receiving gender training from the project we understood and realized that gender division of labour is good approach for family life where women have the right to take part in leading household economic development.**

Conclusions

- The ethnic women community of 3 pilot provinces played a great role in agriculture as well as in aquaculture activities. The income generation activities by ethnic women in many households were satisfied and quite equal to man. They usually do 3 types of work at the same time such as farming production, husbandry, additional work at home. The time & labour power of woman for production and family was more than man. Nevertheless, the role of women in making decision related production or other works in family was less worth than man.
- The project had tremendously succeeded in creating suitable opportunity and environment for ethnic women to be able to effectively participation in their facilities like providing loans, aquaculture techniques & micro-credit management training.

- The role and status of ethnic mountainous women had been improved through a series of aquaculture activities.
- Implementation of gender indicators were one of the remarkable successes of the project and it created the foundation for the enhancing the role and capacity of women in the community. So, this program will be replicated at local levels in the future.

Acknowledgements

The author would like to extended thanks & gratitude to project farmers, head of people's committee at provincial, district, and commune level, officials of the Department of Agriculture & Rural Development (DARD) of provinces, Agriculture Extension Centres (AEC) of districts, Women's Union at district & provincial level as well as to local people of the survey area of northern Vietnam (Son La, Lai Chau & Hoa Binh) for their sincere cooperation during the study period. Also the project VIE/98/009/01/NEX was funded and executed by the United Nations Development Programme (UNDP), Ministry of Fisheries (MOFI) of the Government of Vietnam (GOV) and Food & Agriculture Organization (FAO) of the UN were gratefully acknowledged for their financial & logistic support. **This paper is prepared based on the author's intensive field monitoring experience in the VIE/98/009/01/NEX project of Vietnam as a UNV-Project Coordinator during 2000-2002**

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ANNEX 1

Date: Monday 07 July 2003

Thematic Session

Venue: Conference Room B

Sub-Theme 1: New Initiatives in Science, Technology, Mathematics Education at the Formal level

Chairperson: Dr Jaysree Mehta, Director, SATWAC– INDIA

Time	Presenter	Country	Title of paper
1515-1555	Deirdre BILLINGS	NEW ZEALAND	Women's ways of knowing and the digital divide
1555-1635	Francine DIECKMANN Dr Barbara EARTH	THAILAND	Action plan for gender equality at the Asian Institute of Technology
1635-1715	Dr Felizitas SAGEBIEL	GERMANY	Masculinity cultures in engineering departments in institutions of higher education and perspectives for social change
1715-1815	Home Group Session		

Monday 07 July 2003

Venue: Conference Room G

Sub-Theme 2: Meeting the Challenges of the New Technologies/ Round Table/Workshop

Chairperson: Dr Valerie Johnston, ICT Officer and Web Coordinator – CANADA

Time	Presenter	Country	Title of paper
1515-1555	Ann HOLMES Marta ECSEDI	CANADA	Ways to attract and retain female faculty and graduate students in engineering
1555-1715	Dr R REED Dr G REED	AUSTRALIA	Gender Crisis in the Australian veterinary profession
1715-1815	Home Group Session		

Date: Monday 07 July 2003

Venue: Conference Room D

Sub-Theme 3: Women, Science, Technology and the Workforce

Chairperson: Dr Krishna Athreya – Cornell University, USA

Time	Presenter	Country	Title of paper
1515-1555	Dr Barbara Mary BAGILHOLE , A DAINTY , A GIBB , Christine PEPPER	UK	The potential of diversity for the on-going career development of women and ethnic minorities in the UK
1555-1635	Ms R Susan SMANDYCH , Dr K MARTINSON	CANADA	How successful are women in the engineering profession?
1635-1715	AGWUBIKE, C. C., Dr C N IKEOJI Presented by Dr UKPORE	NIGERIA	Meeting the Challenges of the New Technologies in science education in Southern Nigeria: The Gender sensitive approach
1715-1815	Home Group Session		

Date: Monday 07 July 2003

Venue: Conference Room C

Sub-Theme 4: Gender, the Environment and Sustainable Development

Chairperson: Dr Heila Lotz-Sisitka, Rhodes University – SOUTH AFRICA

Time	Presenter	Country	Title of paper
1515-1635	Helle GUDMANDSEN Presha RAMSARUP	SOUTH AFRICA	The Environmentally Literate Learner
1635-1715	S HAWOLDAR	MAURITIUS	Evolution of women in Mauritius
1715-1815			Home Group Session

Date: Tuesday 08 July 2003 MORNING SESSION

Venue: Conference Room B

Sub-Theme 1: New Initiatives in Science, Technology, Mathematics Education at the Formal level

Chairperson: Prof. Lesley Parker - AUSTRALIA

Time	Presenter	Country	Title of paper
1030-1110	Britt LINDAHL	SWEDEN	Changing the subject and teaching to get more students to science and technology?
1110-1150	Dhirendra RAMROOP	MAURITIUS	A gender inclusive multidimensional approach to the empowerment of learners (boys and girls) in Science Education

Date: Tuesday 08 July 2003 MORNING SESSION

Venue: Conference Room G

Sub-Theme 2: Meeting the Challenges of the New Technologies/ Round able/Workshop

Chairperson: Dr Barbara Bagilhole, Loughborough University – UK

Time	Presenter	Country	Title of paper
1030-1130	Prof Mona DAHMS	DENMARK	Refresher training course for afghan women engineers- professional development in the post-taliban era
1130-1230	Ms Liz WHITELEGG	UK	The use of indigenous knowledge in science classrooms: a useful strategy or impossible task?

Date: Tuesday 08 July 2003 MORNING SESSION
Venue: Conference Room D

Sub-Theme 3: Women, Science, Technology and the Workforce

Chairperson: Dr Mary Anderson-Rowland, Associate Dean – USA

Time	Presenter	Country	Title of paper
1030-1110	Dr Frances GRUNDY	UK	Women, power and progress
1110-1150	Dr Sheila BUNWAREE	MAURITIUS	Women on the margins of the Mauritian labour market – a view from a ‘cyber’ island to be!
1150-1230	Inga Lill STJERND AHL and Bulle DAVIDSON	SWEDEN	Women and girls reflect on the concept of technology

Date: Tuesday 08 July 2003 MORNING SESSION
Venue: Conference Room C

Sub-Theme 4: Gender, the Environment and Sustainable Development

Chairperson: Dr Abhor IGHOROJE Vice Chair, GASAT, NIGERIA

Time	Presenter	Country	Title of paper
1030-1110	Dr Krishna ATHREYA	USA	Engineers without frontiers
1110-1150	Dr J B BILESANNI-AWODERU	NIGERIA	A path-analytical of Nigerian High schools female seniors’ characteristics and their academic performance in Biology
1150-1230	Dr Meera MANRAJ	MAURITIUS	Gender-Related Difference of The Influence of The Paraoxonase GLN192ARG Polymorphism on Coronary Heart Disease in The Population

Date: Tuesday 08 July 2003 AFTERNOON SESSION
Venue: Conference Room B

Sub-Theme1: New Initiatives in Science, Technology, Mathematics Education at the Formal level

Chairperson: Ms Liz Whitelegg, The Open University – UK

Time	Presenter	Country	Title of paper
1330-1410	Xiangyun DU	DENMARK	Problem-based learning, female friendly?
1410-1450	Dr. B. A. UKPORE	NIGERIA	Influence of gender on secondary school students’ attitude to vocational education
1450-1530	Brinda OOGARAH-PRATAP Dr R BHOLAH M CYPARSADE K MATHOOR	MAURITIUS	Food and nutrition teaching: its impact on Mauritian male adolescents
1530-1630	Home Group Session		

Date: Tuesday 08 July 2003 AFTERNOON SESSION

Venue: Conference Room C

Sub-Theme 4: Gender, the Environment and Sustainable Development

Chairperson: Dr Ann Holmes, Principal Consultant – CANADA

Time	Presenter	Country	Title of paper
1330-1410	Dr A. EJALE and P KADIRI	NIGERIA	Gender gaps in information technology skills acquisition of science teachers in secondary schools
1410-1450	Prof N. PRAKASH	INDIA	Status of women in India society-issues and challenges in processes of empowerment
1450-1530	A RAMDINNY Dr Y RAMMA P PARMESSUR	MAURITIUS	Strategies for motivating girls related to performance in science and technology
1530-1630	Home Group Session		

Date: Tuesday 08 July 2003 AFTERNOON SESSION

Venue: Conference Room D

Sub-Theme 3: Women, Science, Technology and the Workforce

Chairperson: Dr J Nancy Lane,

Director of University's Initiatives for Women in Science, University of Cambridge,
UK

Time	Presenter	Country	Title of paper
1330-1410	Dr Barbara HODGSON	UK	Athena advancing institutional and national intervention strategies to retain and promote women in the scientific workforce in the United Kingdom
1410-1450	Shauna PAULL Helen LOSHNY	CANADA	Immigrant women professionals Canada's innovation strategy: the impact of social and economic policy
1530-1630	Home Group Session		

Date: Tuesday 08 July 2003

Sub-Theme 2: Meeting the Challenges of the New Technologies/ Round Table/Workshop

Venue: Conference Room G

Chairperson: Mrs Dominique Lan-Ng – Deputy Director, Min. of environment

Time	Presenter	Country	Title of paper
1330-1430	Nan ARMOUR	CANADA	Changing lanes: women in science and technology (an initiative of the Hypatia project)
1430- 1530	Valerie JOHNSTON	CANADA	21 st century solutions for sustainable education investments
1630-1630	Home Group Session		

Date: Wednesday 9 July 2003

Plenary Session

900- 1000 Chairperson: **Suren Bissoondoyal, Chairman, Mauritius Institute of Education Council MAURITIUS**

Asking Different Questions: Strategies for change from the Context Canadian Education - Keynote Address by **Dr Ann HOLMES, Principal Consultant – CANADA**

1000-1030 Tea Break

**Date: Wednesday 9 July 2003
SESSION**

MORNING

Sub-Theme 1: New Initiatives in Science, Technology, Mathematics Education at the Formal level

Venue: Conference Room B

Chairperson: Dr Barbara Hodgson, The Open University, UK

Time	Presenter	Country	Title of paper
1030-1110	Mrs RAMGUTTY-WONG	MAURITIUS	Barriers to carriers' professions of women in the service sector of Mauritius.
1110-1150	Dr Cecille MARSH	SOUTH AFRICA	Boosting computer self efficacy by teaching strategic use of computer applications
1150-1230	Dr D BHANA	SOUTH AFRICA	Doing mathematics Doing gender

**Date: Wednesday 09 July 2003
SESSION**

MORNING

Sub-Theme 4: Gender, the Environment and Sustainable Development

Venue: Conference Room C

Chairperson: Hon. Leela Devi Dookhun Luchoomun, MAURITIUS

Time	Presenter	Country	Title of paper
1030-1110	Prof V H FERRAZ DE SIQUEIRA C. M. De OLIVEIRA W R FERNANDES E PINA	BRAZIL	Relationship between gender and cinema - re assigning meaning by health educators
1110-1150	Dr Heila LOTZ-SISITKA	SOUTH AFRICA	Education for sustainable development and social change: case examples
1150-1230	U A. OKON Dr.C M. EKPO Dr. A Okon EKONG Dr.F ETIM	NIGERIA	Paradigm shift of Nigerian women towards science and technology advancement: a case study of gender socialization patterns of Ibibio sub –culture

**Date: Wednesday 09 July 2003
SESSION**

MORNING

Sub-Theme 3: Women, Science, Technology and the Workforce

Venue: Conference Room D:

Chairperson: **Prof S Bhoojedhur, Chairman, Mauritius Research Council**

Time	Presenter	Country	Title of paper
1030-1135	Dr Helen MADILL , Dr Margaret Ann ARMOUR , R CAMPBELL, I MEGLIS, D CULLEN, W COFFIN, B EINSIEDEL, C ROTHWELL, L L STEWIN, A L CICCOCIOPPPO, T C MONTGOMERIE	CANADA	Making choices & making transitions – creating a web resource
1135-1150	Dr Alice DEDE E O AKPAJA Catherine ADJARHO <i>Presented by Dr Ejale</i>	NIGERIA	Evaluation of the antimycotic activities of selected tropical tree bark extracts against colletotrichum
1150-1230	Olubunmi OMONIYI	NIGERIA	The effects of constructivism – based teaching approach on Gender related differences in solving students misconceptions in Chemistry

Date: **Wednesday 09 July 2003**
SESSION

MORNING

Round Table/Symposia

Venue: Conference Room G:

Chairperson: **Mr P Saddul, Former Director, Mauritius Institute of Education**
Adviser to Ministry of Education and Scientific Research

Time	Presenter	Country	Title of paper
1030-1130	Prof. Monique FRIZE	CANADA	Expanding in existing global network for women engineers and scientists (1964-2002)
1130-1230	Dr Karin WIKLUND	SWEDEN	Teaching gender to students of engineering

Wednesday 09 July 2003
SESSION

AFTERNOON

Sub-Theme 1: New Initiatives in Science, Technology, Mathematics Education at the Formal level

Conference Room B

Chairperson: Ms R Susan Smandych, Manager, Accenture – CANADA

Time	Presenter	Country	Title of paper
1330-1410	Dr J GRIBBLE H BESOONDYAL	AUSTRALIA & MAURITIUS	Mauritian student's perceptions of mathematicians and mathematics
1410-1450	Dr C M EKPO U A OKON T U EKUKINAM	NIGERIA	Gender socialization practices of the Ibibios and academic performance of girls in science and technology
1450-1530	Dr J DINDYAL	MAURITIUS	Positivist and feminist perspectives on gender issues in mathematics education: where are we headed now?
1530-1630	Home Group Session		

Date: Wednesday 09 July 2003
AFTERNOON SESSION

Sub-Theme 3: Women, Science, Technology and the Workforce

Venue: Conference Room C:

Chairperson: Mr P Parmessur, Associate Professor, Mauritius Institute of Education

Time	Presenter	Country	Title of paper
1330-1410	Yogita MAINI	BOTSWANA	The progressive path of women engineers in Botswana
1410-1450	Dr A O UZUEGBUNAM	NIGERIA	Gender, IDM strategy and retirement payment problems in Nigeria
1450-1530	Dr Rosslyn REED	AUSTRALIA	Gender switching in engineering; a micro-analysis from a longitudinal study
1530-1630	Home Group Session		

Date: Wednesday 09 July 2003
SESSION

AFTERNOON

Sub-Theme 3: Women, Science, Technology and the Workforce

Venue: Conference Room D

**Chairperson: Prof J Massaquoi, Coordinator,
African Network of Scientific and Technological Institutions – UNESCO**

Time	Presenter	Country	Title of paper
1330-1410	Fiona KYOMUGISHA	UGANDA	Production and characterisation of bread made from eburipur Sorghum
1410-1450	Prof Kirsten M NIELSEN	DENMARK	A group-organized e-mentoring program for female engineering students
1450-1530	Emily WERE	KENYA	Kenyan and Ugandan women engineers and scientists in today's mobile society
1530-1630	Home Group Session		

Date: Wednesday 09 July 2003
SESSION

AFTERNOON

Round Table/Symposia

Venue: Conference Room G

Chairperson: Mrs S Hawaldar, Deputy Director, Mauritius College of the Air

Time	Presenter	Country	Title of paper
1330-1410	Dr M ANDERSON-ROWLAND	USA	Assessing the wise investments summer institute gender equity awareness training
1410-1450	Gill E KIRKUP	UK	Social Learning Theory: Using 'Communities Of Practice' to Model Gendered Learning
1450-1530	Dr V GOEL, J NAUGAH, Dr Y RAMMA, A RAMFUL, A RAMDINNY, S SADDUL, H BEESOONDYAL, P PARMESUR	MAURITIUS	Developing gender friendly resource materials and strategies in science, mathematics and technology
1530-1630	HOME GROUP SESSION		

WEDNESDAY 09 July 2003

1630-1800: General Meeting for GASAT
1900-2000: GASAT Meeting (New Board)

THURSDAY 10 JULY 2003

0900-1030 Chairperson: **Jayshree Mehta, Director, SATWAC, INDIA**
Keynote Address by **Prof Lesley PARKER, Senior Deputy
Vice Chancellor, Curtin University AUSTRALIA)**

1030-1100 Brief expose by Najla Afzali
1100 Tea Break/Leaving for excursion
1800-1930 Outgoing Board Meeting
1930-2200 Dinner

FRIDAY 11 JULY 2003

Chairperson: **Mrs Jayantee Naugah, GASAT**

0900-1130 Presentation of Draft Final Report or Discussions and Recommendations
1130-1145 Tea Break
1145-1230 Closing Ceremony by Mr S Bissoondoyal, Chairman,
Mauritius Institute of Education
1230-1330 Lunch
Departure of Overseas Delegates

ANNEX 2

Outline of Home Group Process Plans for the three sessions allotted during GASAT 11.

Notes for the Facilitators.

MONDAY - Introduction

1. 5 minutes of information giving about what we will be doing and why.
2. Work with person sitting besides you for 10 minutes. Each tells the neighbour about themselves and why they are at GASAT. Neighbours introduce each other to the group for 1 to 2 minutes.
3. Facilitator gives a very brief overview about how home groups have worked in the past. The purpose of working towards an evaluation and feedback to be collected on Wednesday is discussed.
4. Work in groups of 3 for 15 minutes to discuss
 - What they want from home group? List 3 points.
 - What they want from the conference? List 3 points.
5. Gather discussion feedback – facilitators make flip chart lists/notes. Allow 10 minutes.
6. Choose/volunteer note takers for Tuesday/Wednesday

TUESDAY - Content of the conference

Facilitator gives a five minutes introduction about what we will be doing and why.

Suggested Probing Questions.

- What's been a highpoint?
- What's challenged you?
- What's disturbed you/made you cross?
- What's made you say A-HA!!
- What have you heard that might make you change your practice or help you develop in another direction?

Process. Discussion in pairs or threes for ten minutes.
Report to group for fifteen minutes plus debate

Facilitators' Role is to find a way to document delegates' responses/comments

Homework (a personal commitment).

Identify at least one person at this GASAT conference who could help you develop your work (collaboration, information, exploration of common experiences/work.) TALK TO THEM BEFORE GASAT ENDS!!!

(Write on the back of your name card "I will talk to..." before the conference ends)

WEDNESDAY – Evaluation Method

- Use of evaluation data. Who will use it, how and why?
- 2 sections – group and individual.
 - Group Discussion (document comments at group level)
 - Approx. 25 min – Facilitator to summarize

- Questionnaire (document comments at individual level)
Approx. 5 min – individuals to complete
- Group Discussion Questions
 - What did you learn from GASAT?
 - How will the information from GASAT impact your practice?
 - How will you integrate what you have learned into your practice?
- Questionnaire
Facilitator to provide overview i.e. context of intent of questions.

Notes from Home Group Facilitators

Home Group – Yellow

Day 1

Introductions and Intention of Home Groups

Personal Objectives

Participants expressed numerous personal expectations and objectives for GASAT 11:

- To learn from people’s experiences
- To create and expand networks
- To hear about gender policies
- To hear recommendations from other regions and identify possible applications “at home”
- To recharge batteries
- To gain new perspectives on gender issues
- To explore the future of GASAT

Day 2 – Focus on Content of Presentations

(At this time the yellow group joined with the red group facilitated by Jan Harding.)

Responses included:

There were many ideas presented and it takes time to reflect on them all and how they link together. There was not enough time for discussion and/or questions at the ends of the presentations – a frustration for most participants.

Participants talked about very positive responses to the presentations on indigenous knowledge (Liz Whitelegg – very thought provoking) and on Sheila Bunawaree’s presentation.

Day 3 – Evaluation (combined Yellow and Red Groups)

Participants discussed what they had learned from the conference, and how they might implement those learnings in their work at home.

Learnings included –

- New terminology being used in gender issues
- Concepts of “communities of practice and “social capital” from Gill Kirkup’s presentation. Several participants said they want to incorporate those concepts into their own work

- Gender issues apply to all walks of life, not just science and technology.
- Women must work twice as hard as men just to be seen to be equal to men.
- Women from western regions should remember that the gender issues they face are probably very different from those faced by women in developing countries.
- We need to be more vocal about our commitment to gender issues – we need to “yell” more. Several participants said they were going home to “yell”
- GASAT as an association needs to consider doing things differently if different outcomes are desired.

NOTE: Time did not allow for a fuller discussion of the integration of what’s been heard and learned into personal practice.

General comments –

Participants felt that the concept of Home Groups was a good one (otherwise they would not have attended) but that the time allowed for Home Groups was unfortunately squeezed between tea break and other meetings. We never had the full hour for discussion.

Participants expressed the frustration that there was too much emphasis (and time) on presentations (“being talked at”) and not enough time for discussion of ideas. Although a specific proposal was not developed, it was felt that GASAT conferences needed to better balance the need for academics to “present papers” with the need for all participants to dialogue on the issues and questions, and include in the balance time to examine examples of action strategies.

Facilitators: Nan Armour and Jan Harding. Report written by Nan Armour.

Home group – Pink

Highlights: To learn about the very different, and sometimes not so different, conditions for women in different countries and cultures.
To get ideas for strategies to be used in your own work (e.g. getting more women into engineering).

Could be better:

- Suggestions to broaden the spectrum of GASAT to include also how to inform the public in general – also parents should be informed of the importance of scientific knowledge – and of their girls being educated.
- The subject: indigenous knowledge should be more in the focus – We should more thoroughly discuss the break between formal and indigenous knowledge.

We discussed if GASAT has grown too big, if it wants to do too many things. The general opinion was that GASAT should be multifaceted – you can attend other conferences if you want it to be more specifically in your line of study. Often, you don’t know what you need to know.

But: There could be some possibilities to meet with researchers from your own line of study – maybe before or after the conference or at some specific time during conference.

Administration

In general, it was good but we missed having a list of delegates with their e-mail addresses provided at the beginning with the programme.

Loved the food!

Facilitator: Kirsten Grønboek Hansen

Home Group White

Expectations of the conference:

- Intercontinental networking
- Learning about other educational initiatives
- That GASAT will facilitate formal structures for research development, collaborative work and fund raising
- That GASAT will formulate an action plan, both short term and long term
- That GASAT will plan for “in between conferences” activities
- That GASAT will set up a database for members with, among others, examples of good practice

Expectations of the Home Group:

- Social interactions
- Socialization without no given structure or goals, let every meeting set its own agenda
- That the contacts can be kept up afterwards

Highlights of the conference:

- Many different speakers mentioned but especially Dr Sheila Bunwaree, who should be asked to give some suggestions for actions that GASAT can recommend to policy makers.
- All the interesting information about Mauritius
- Meeting people with same interests but with different backgrounds and perspectives
- The warmth and good service from all staff, both at the conference and the hotel
- Good food and accommodation
- The official opening ceremony

To be improved in coming conferences:

- There shouldn't be changes in the length of the presentations at the last minute
- There should be better information about changes in the program, especially the time table
- There should be more time for discussions in the sessions (worked out very well in some sessions but not in every one). As it often depends on the chairperson, they should be chosen very carefully.
- The papers should be available before the conference, on the Internet.
- There should be more time for networking. Cut down the number of presentations.
- Be more selective when admitting papers. The quality of both the presentations and the content varied a lot

- Stick more to the conference theme. What happened to “Economic paradigm shift”?

How to improve the function of the home groups:

- The concept is very good and special for GASAT
- To give the home groups more time to get to know each other they could stick together for the whole first day. Then meet for an hour at a time the following days. Preferably in the morning or early afternoon so the delegates don't run off or are too tired to discuss.
- To manage to keep the home group together during the first day they could be put together according to the sub-theme marked as one's major interest while signing up for the conference.

Facilitator: Gunilla Klinteskog

Home Group - Blue

There were 7 participants and the facilitator present.

1st meeting Monday

We discussed what we wanted from the conference:

- To receive feedback on our own papers.
- To acquire international recognition by attendance at an international conference.
- To publish in the proceedings.
- To gain contacts in other countries (particularly important for participants from developing countries).
- To exchange experience on gender issues.
- To learn more about appropriate research methodologies in gender and science research.
- To visit Mauritius!

The Home Group idea was felt to be particularly valuable because it was cross-cultural. (Participants only had one other cross-cultural experience, in the regional/national groups.)

In addition to the above points, participants introduced each other in pairs and then to the whole group.

2nd meeting Tuesday

Each participant (only one person didn't reappear) spoke about aspects of the sessions they had attended, and what they valued about the sessions. All felt they had learned something useful that they would be able to put into practice either in research, teaching or learning, but that it was hard to reflect on these issues at the end of a busy day, so soon after participation in the sessions.

3rd meeting Wednesday

An open discussion took place focusing on:

- What was learnt at the conference?
- How will the information impact on you personally?
- How will you integrate your learning into your practice?

Each of the 7 members of the group was able to contribute. Their individual responses were extensively documented on the evaluation forms, which were completed in detail.

Facilitator: Liz Whitelegg

Report from discussions of Green & Black Home groups

The Green and Black groups joined on the first day as neither group had many participants. We stayed joined throughout although we did have three additional members join us on Tuesday. Only one of the Mauritian delegates assigned to either group joined us. Apparently they were not expecting to join home groups and most had home commitments, which meant that they could not remain at the end of the day.

On Monday we explored our expectations of the Conference. Several members were attending their first GASAT conference.

Reasons for attending/expectations included:

- Finding out what is happening elsewhere in the world.
- Getting feedback on our work.
- Opportunities for networking especially internationally
- Presenting a paper and learning from others
- The location – socially and culturally
- Learn about the future of GASAT
- Meet old and new friends
- To participate in an academic conference.
- To have our ideas challenged
- For inspiration and rejuvenation
- Expecting to have a pause to reflect.

Tuesday

Today we shared our experiences of the conference programme so far. We agreed that the papers were of an excellent standard and the presentation and discussions following them were very good. All group members had gathered very real information and insights related to their particular areas of interest.

The keynote speeches so far all had an enthusiastic reception, African colleagues particularly welcoming this morning's by Professor J. Massaquoi, UNESCO Nairobi. We noted that wherever we came from women are still fighting these battles and wondered if we could do better at combining our efforts.

New GASATTERS were very enthusiastic about the atmosphere of the conference, which they found welcoming and supportive. There is the inevitable tension about parallel sessions – regret about missing other good things and some discomfort at moving from one session to another in order not to miss things. The dedication of long-term GASATTERS was noted and group members expressed their gratitude for that.

Some organisational points and queries:

- Will there be a participant list with e-mail addresses?
- Participants would appreciate information on local places of worship so they can keep appropriate religious observances.
- The proximity of the conference venue and the accommodation was appreciated.
- There was some discussion about different time plans for paper presentation and group discussion but no definitive outcome.

Wednesday

As well as filling in our individual questionnaire we reflected on the role of home groups and some aspects of conference organisation.

- We like home groups and the chance they give us to reflect on the day, think about new ideas, form friendships and networks at a different level from the more immediately professional level in a parallel session meeting.
- It would have been better to start them on the first evening – but not everyone has arrived and there is a need for a home group structure that is very flexible and continuously welcoming. We felt having them at the end of the day is probably right but it meant that local delegates could not / did not come. This is unfortunate as we felt that home groups are particularly important for non-resident conference members who miss out on networking at other times.

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With respect to conference organisation –

- We noted some inconsistencies in the programming and this meant sometimes a group of papers with not much connection. This makes discussion difficult and it can be unfortunate if a presenter is a young researcher hoping for informed feedback on their work.
- We wondered if a GASAT conference should be stricter about receipt of abstracts/papers/registration in order to make the programme planner's job more achievable.
- A minor point about the programme this time – tea was provided each afternoon but not scheduled on the programme, which rather messed up the start time of home groups.

Facilitators: Barbara Hodgson and Rosslyn Reed. Report written by Barbara Hodgson.

Notes from the Orange Home Group.

Comments on GASAT 11.

The group were keen to praise the organisers of GASAT 11, and to say what a good experience they were having. The following comments reflect suggestions for the future,

- Everyone appreciated the gender balance in the opening ceremony and the presence of the Prime Minister.
- Could 'chairs' of plenaries make sure that there is plenty of time for questions.
- Could we have a list of the participants as soon as possible in the conference.
- Noted that there was no plenary speaker from the Asian region. It would have been nice to have had one from each region.
- Would have liked the opportunity to visit the ordinary homes of Mauritians.
- Make badges clearer – with bigger fonts.

Suggestions for GASAT future developments

1. GASAT needs to do more to develop/support young researchers and practitioners. By the following kinds of activities:
 - a) Having a special session at a conference for people from local schools – teachers and students (this comment was made early in the week before people realized that there were school students present) but also that these students should present their work, or make some other kind of presentation.
 - b) Pair up a young researcher/teacher with a mentor for the conference. That mentor could help the younger mentee with her preparation of her presentation before the conference. This would improve the quality of GASAT presentations, and the skills of the young researcher/teacher/practitioner. This would improve the confidence and self esteem of younger GASAT members.
 - c) GASAT should encourage a young women’s caucus where younger women could get together to explore the issues that are of particular concern to them.
 - d) There could be a pre-conference workshop where practical skills were taught. For example:
How to produce a PowerPoint for your presentation.
Other ICT uses.
How to improve your paper for possible submission to a journal for publication.
2. GASAT needs to put more resources into publicising activities. Some Mauritian members only knew about the conference a few days before it happened.
3. GASAT needs a membership network directory.
4. It would be nice to have volunteer local hosts that GASAT participants could visit.
5. GASAT papers need more direction/instructions about what we want in the conference. GASAT does not need any more papers summarizing issues/data. We know all this. What it needs are more papers discussing and analysing both successful and failed strategies. We have a lot to learn from our failures. Come and discuss them.
6. An important issue that GASAT should address is that of refugee and immigrant women and their education and activity in SET, and ‘foreign’ or ethnic minority women students in the SET classroom. E.g. the large proportion of ‘overseas’ students in UK, US and Australian universities and how best to work in this multi-cultural environment, where styles of learning and gender roles might be different from the ‘north’.

The following is a list of objectives/outcomes that the group felt had been achieved in GASAT.

- Developed personal and intellectual freedom
- Shared experiences and networking
- See how other countries manage their gender issues
- Felt more empowered
- Learn new gender strategies
- Made new friends – some outside GASAT
- Found many shared/common interests
- Impressed by the Mauritian work ethic.

Facilitator: Gill Kirkup