TEACHER'S UNDERSTANDING OF GENDER IMPLICATIONS FOR LEARNING WITH COMPUTERS

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INTRODUCTION
This article reports on research implemented by CLIPS (Computers and Learning In Primary Schools). CLIPS is an ARC funded longitudinal research project formed in 1991 with a team of five primary school teachers and five University lecturers working together.

In order to reflect on practice, develop networks, provide mutual support and share their learning about computers and metacognition, teachers and their university partners meet fortnightly at the school site and the whole CLIPS team meets monthly at the Bennettswood Technology for Learning Centre. This methodology reflects the work of Baird and Mitchell (1986) by recognising teachers existing professional knowledge in a legitimate context. While the CLIPS project has this a common framework it is expressed differently at each school according to the needs of each individual teacher. For instance one school site is examining the metacognitive potential of different software packages while another school site is experimenting with the impact of various styles of classroom organisation on learning with computers.

CLIPS is investigating how teachers learn professionally with a focus upon promoting metacognition (defined as knowledge, awareness and control of one's own learning) with computers. Analysis of gender issues in computing forms one distinctive element of the collaborative research effort.

This article analyses teacher interviews and classroom observations revealing that teachers did not seem to recognise the gender issues in computing which existed in these classrooms.

LITERATURE REVIEW
Many have argued that technology can compound gender inequities (King & Alloway 1992; Clarke, 1990; Siann, 1988; Porter, 1988; Bigum, 1987; Anderson, 1984). Indeed Cockburn's frequently cited critique of technology claims that: 'machines are male territory ... control of technology is one key element of male power' (Mackay, 1991, p. 10). Similarly Wajeman (1991) offers a commentary on technology saying that looking for gender issues in technology is difficult given the success of gendered socialisation.

CLIPS seeks to examine the gendered learning environment of computers in spite of the 'obvious irony that the computer is intrinsically non-discriminatory' (Schubert, 1984, p. 28). While gender equality in computing is an important element of State and Federal Education policies, it is agreed that 'changes in legislation ... have not really improved the situation for girls' (Reimann, 1986, p. 337).

A gender exclusive curriculum in computing is described in the literature. Sexist software is seen as a central concern with software packages criticised as exhibiting sex bias in symbols and images. This is exacerbated by the sexist use of generics in language (Rose, 1984; Vale, 1993). Such software leads girls to feel that computing is not for them - computers are neither interesting nor meaningful.

In addition computer books/texts which are commonly found in Australian schools were found by Fitzgerald (1988, p. 42) to portray the sexes differently:

We found seventy two pictures depicting people interacting with computers... Males were using the computer in thirty nine pictures, females in seventeen pictures, and both males...
and females in sixteen pictures. In most instances, males were alone when using computers whereas females were typically in groups (33 per cent). Of the sixteen pictures with males and females, seven were males in the dominant role (e.g., using the keyboard, fixing the computer) and the females passively watching. There was only one case when the female was more active, and eight were neutral. Typically, males were portrayed as fixing computers, using them (not watching) and working alone. Females were pictured as passive, looking at computer print outs, receiving messages and working in groups.

The impact of this role-modelling would seem detrimental to gender equality in computing with the active female being less visible.

CLIPS FINDINGS ON GENDER TO DATE: First Stage Interviews

CLIPS teachers were interviewed initially on a range of questions including gender issues. Interviews sought to reveal whether these teachers perceived any differences between boys and girls in their learning with computers and how they usually dealt with any recognised differences in learning.

There is a paucity of research on gender differences in learning with computers (Fitzgerald, 1986). However, Webster (1992) makes some helpful observations about adults. Webster believes that women utilise the computer as a tool and thus underestimate the full capacities of the technology, whereas men seem to need to explore the uses and power of both the software and the hardware. Webster explains this by claiming that men have more opportunity and more time to 'play' with the technology which increases their confidence and experience.

Without exception, these teachers began by stating adamantly that in their experience gender differences in computer learning do not exist. For instance, having denied the significance of gender in learning one teacher identified as Charlotte went on to tentatively suggest some observed differences saying:

Their purposes were perhaps a little bit different. Perhaps the girls wanted the end result. It's not obvious at first. There are probably subtle differences. The only common thing that I have found over three years, is the male idea of having to get to the end of the game. They would really try to beg and barter with anybody for the computer time. It was not true of all of them. It was probably the only marked difference. Initially they probably used differently, but then it evened out. Girls are usually quicker at looking at the word processing. That is a starting difference that fades. They are usually equal in the games' (Charlotte)

This teacher appeared to imply that her pupils seemed to have gender differentiated goals for computer learning. Apparent female aptitude with word processing may have potential for gender stereotyping the labour process of technology (Wajeman, 1991). In addition acknowledging the different use of computers by the sexes may prove a gender inclusive method of catering for differences in learning style. Yet another teacher identified as Marita who previously dismissed gender as a pertinent variable seemed somewhat surprised to concede:

'The only thing I find is that boys tend to want to dominate when on the computer. That is what one has to be aware of and to make sure that the girls get equal access to them, so I just have to be aware of that. The boys tend to muscle their way in and try to take over.' (A clarifying point is that this is an upper grade where the teacher is aware that the children particularly the Grade six boys are at a more assertive stage.)

(Marita)

Thus she identifies a central issue for girls in their learning with computers. Equal opportunity principles are cognisant of the fundamental need for equitable distribution of desirable resources such as computers and the role of harassment when identifying sexist classroom relations (Spender, 1984).

Interpreting the rationale for CLIPS teachers on the one hand deflecting gender as an influence in computer learning and yet on the other describing such phenomena is interesting. One teacher stated that the reason why gender differences in enthusiasm for computers may not be evident in her current class was probably because due to an unusually high proportion of girls in this grade. Another teacher reasoned similarly citing access to computers as a problem in her classroom primarily due to the grade having many more boys than girls. Certainly these ideas accord with current debates on the value of single sex classes for computing, which evidence the particular and additional disadvantage girls experience if they are outnumbered significantly by boys. Reimann (1986, p. 240) concurs saying that 'there is an initial need to have single sex groups so that girls... can have access to computers in a non-threatening environment.' Other reasons employed by CLIPS teachers to justify their comments centred on extended rejections of male—female dichotomies underscoring the belief in equal capacity for competence with computers—irrespective of sex.

However, the controversial issue of whether schooling practice takes up this challenge and translates equal opportunity into equal outcomes with computers has not yet been considered by this forum. The developmental contention evident in another teacher's rationale is to be qualified then too, given that she implicitly notes that sex differentials are not present in the Junior Primary levels. Although contradictory tensions must be noted here as this teacher also argues that any observable gender differences 'even out' (Charlotte).

In addition although research has shown otherwise (Gribbin, 1984), some CLIPS teachers noted that any potentially socialising and sexist stereotypes are no longer applicable as most children have access to computers in the home anyway. However Gribbin's study of 'primary aged children in London showed that the majority of girls who wanted a computer... did not get one (the reverse applied for boys) and some of these girls stated that their brothers (not always older brothers) got a computer instead, meaning they had occasional use of it' (1984, pp. 16-17) seems to contradict the conclusion of these teachers.

Added to this is Gribbin's study of boys who when interviewed replied that computers in the home would be predominantly for male use. Sexist role-modelling in the home may add further qualifications given his conclusion that girls who did have access to a computer were taught to use it by their fathers. Fitzgerald's Australian research corroborates this finding stating that 'fathers were not likely to encourage daughters to use computers in the home' (1986, p. 12).

Similarly Willis in Bigum (1987, p. 66) comments about 'the number of times I've heard my brother has a computer at home but I'm not allowed to touch it.'

The CLIPS teacher's statements of the strategies they employ to deal with observed gender differences in computer learning is thus a problem.
Given that many of these teachers do not seem convinced that gender is necessarily an issue for learning, mixed sex classes are often perceived as a viable approach to accommodate these 'hypothetical' differences in learning. However, in subsequent interviews, a few counter sexist strategies were described. Nevertheless the most representative response of these teachers may be described as an apparent rejection of interventionism:

'How do I deal with it? It's not really my place... just watch it a bit more as an interesting thing and leave it alone.'

(Charlotte)

Second Stage Interviews

Follow up interviews were conducted six months later as a way of monitoring teacher development. These interviews focussed more on teacher concerns about gender issues in computing than on perceived gender differences in learning. Nevertheless some teachers responded by echoing previous sentiments reiterating a rejection of gender differences with computer learning:

'I don't think I could make any gender claims... I don't have to be worried about the girls having equal access. I do like girls and boys working together.'

(Helen)

A gender critique of this classroom would want to examine whether mixed sex pairs consistently allowed girls real access to computing given results showing the contrary. For instance Underwood's (1990) research found that while teacher's preferred mixed gender groups, this clearly disadvantaged the girls. This was expressed by male dominance, a fall in female motivation and a very rigid task demarcation between the sexes.

Another teacher continued this emphasis on gender differences again. His response emphasised earlier statements about perceived gender preferences in software selections when he proposed that his female pupils seemed to prefer software which gave them more freedom to create pictures. Indeed this has been observed in the literature (Moondt, 1984; Reimann, 1986).

However some CLIPS teachers did respond as anticipated to the follow up interviews by revealing their concerns. For instance one teacher offered an extended glimpse of her possible concerns:

'I am quite happy with how the dynamics in the classroom work with computers. I put a very strong emphasis on equal access... I have been really aware of, and concerned about those issues. I have stressed that girls would have the same opportunities as boys. In some respects the boys have gone on and got on with the job of learning this... a lot better than the boys. The boys tended to clown around for a few weeks... whereas, the girls just went on with what they wanted to do. They knew exactly what they wanted to do. They got on with it. Maybe that is a concern the other way... that the boys had taken longer to settle in to what they are doing. In terms of their actual learning, I think much the same is happening. Girls are a lot more mature at this age. You give them a task to do, and they take that on board, they have a more mature attitude to it. I have some boys who are doing wonderful things with it. They are creating an adventure game and are totally absorbed by it. There is a small group of boys who still don't have a focus of what they are doing and where they are going, yet... Some of the boys may take a little longer to decide on a topic, than the girls. I think, basically, it is much the same. They seem to be producing much the same output.' ['A clarifying point is that for this classroom the quality of the games being made on HyperCard and the level of experimentation is equal both for boys and girls.']

(Marita)

Again while beginning with a denial of gender related problems much could suggest otherwise. At the very least Equal Opportunity Units hypothesise that there is nothing to suggest that the work of Spender (1984) does not apply to computing when she indicates that significant gender discrimination occurs when males construct the classroom agenda by their negative behaviours. This can lead to girls receiving less teacher attention, meaning lower self-esteem and the reinforcing of sexist stereotypes of behaviour which for females is passive. Certainly Clarke (1990) believes that girls receive less positive rewards in co-educational computer classes.

These second stage interviews also tried to trace relevant aspects of teacher cognition, asking them whether they had been thinking about any concerns about the differences between girls and boys in their learning with computers since the previous interviews. In most cases teachers indicated that they had been thinking about CLIPS and gender:

'I think! find myself thinking about it a lot... constantly. I don't know if it is anymore than in the start. I have done a lot of reading on it.'

(Marita)

This was somewhat of a surprise given that nearly all teacher responses were prefaced with an apparent denial of gender concerns. However not all responses would be regarded as positive for gender:

'When I really think it through, I can't make a blanket statement. If you start saying those things you can lock children into it, so I shy away from making blanket statements... All I can say is that it is true for this group at this given time. I basically see children as individuals. My concern is that it could swing to an extreme situation... I am concerned that the pendulum could swing in favour of girls in every situation. I am very much in favour of equal opportunity.'

(Charlotte)

In this response we could assert the relevance of Clarke's, (1990) discussion of the popular celebration of the individual as antithetical to gender equality. Apart from not wishing to generalise and reduce the debate to sexual dualities of male and female, this teacher has concerns about any frameworks for gender which go beyond notions of access and merit.

These follow up interviews highlighted another site for gender analysis. Gender issues have not yet been exposed in the single sex school participating in CLIPS and gender issues in computing occur in an all-girls' school. While not directly asked about gender concerns, on analysing the interview transcripts the feminist lens can see some potential questions. For instance is the emphasis upon word processing a concern? How will Lawrence's (1985) image of girls as conspicuously absent in the computer era except when they use computers as 'glorified typewriters' be avoided? Certainly many (for instance Reimann, 1986 and Willis in Bigurn, 1987) agree with Webster (1992) who establishes the need for a critique which demonstrates how gender shapes technology and how technology shapes gender as an example of what ought to be included in all girl's schools. This is regarded as particularly important if technological determinism is not to merely reproduce the sexist division of the labour process via word processing classes. Wajeman (1991) elaborates further by outlining gender inclusive strategies. These include noting how and why the contribution
of women to computing is omitted and how social relations influence some technologies to be fostered and others inhibited.

**CLASSROOM OBSERVATIONS**

Data which warrants gender scrutiny also developed from the extensive observations implemented by a member of the University research team. Gender profiles can be constructed from one of these case studies investigating computer learning in a Grade Two classroom utilising Logo.

One particular case study of a girl identified as Belinda is especially interesting as one can see a complex and contradictory series of images where a change in the learning relationship seemed to occur with the change in gender of Belinda’s computer partner.

Analysing Belinda’s learning with computers in a single sex pair identifies both girls talking vigorously, taking turns, working co-operatively and covering a lot of conceptual ground. Yet these observations also show that Belinda’s partners had to insist on access to the keyboard and resist her continual ideas and directions. Belinda ignored the suggestions of her partner, frequently provoking disagreements with Belinda usually winning.

Observations of Belinda with a male partner, identified as Anthony, exposes gender dilemmas too. On the one hand gender equality seemed evident as Belinda began computer tasks enthusiastically, taking risks and generally showing persistence and confidence in her decisions. Consultation was observed with this mixed sex pair reading the screen together, discussing strategies at length and making plans and choices co-operatively. Indeed Belinda’s male partner Anthony seemed willing for Belinda to make mistakes restricting comments to reminders. When successes eventuated both seemed to delight in their computer learning.

However in this context Belinda did not seem to achieve equity — particularly in comparison with the single sex pair. For instance in this mixed sex pairing Anthony frequently pressed keys without explanation and took a dominant advisory role suggesting how Belinda should proceed. At first Belinda was unable to gain access to the keys and seemed happy to rely on her male partner’s instructions. Initially Anthony appeared to confuse Belinda and though puzzled she was willing to accept his directions, while he actively searched for a solution. Belinda’s suggestions seem to be ignored and in spite of failures, Belinda was prepared to persist. Belinda’s role seemed to be limited to agreeing with his strategies by repeating them and encouraging most of his suggestions. Even the described successes need to be clarified as they were accompanied by comments by Anthony such as, ‘I said... I knew. I knew... I just know how to solve the things.’ Fisher (1985, p. 25) comments that boys are more likely to intimidate girls with interference observing that ‘boys commonly would reach over to press keys on the computer when a girl was using it. I never saw a girl press keys when it was a boy’s turn.’

What this data seems to demonstrate is that significant gender issues may have existed in the computer learning of this classroom. This gender profile can be supplemented by reviewing observations of other children in this grade. Firstly a textual analysis of Anthony when working on his own shows the level of his confidence:

> ‘I was going to make a city kind of thing. I’m going to start on the road. LT 90 yeah that’s what I want. How far should I go? Do 80 see how it goes. Oh no do some more. Oh well I didn’t think it would do that. That’s a good building now. I can just draw a line down there.’

As established in his working with Belinda, he does not look for errors and quickly and happily accommodates them. This is confirmed in research cited by Clarke (1990, p. 58) explaining that ‘girls attribute failures as indicative of their own lack of competence ... boys attribute their successes to their good strategies; girls attribute them to luck ... girls are gaining little positive benefit from their success and a lowered self image from their failures.’ Teague’s study of tertiary computer science students suggest significant and long term implications for learning here. Her research concluded that males were twice as likely to state that they had not experienced failures having ‘higher expectations of success and greater confidence in their computing ability, but there were in fact no significant gender differences in academic results’ (Teague, 1991, p. 378).

Other single sex pairs working with computers in this classroom extends the case study of Belinda too. Girls were observed as taking care to show their female partner how solutions could be obtained. A high incidence of agreement and discussion was observed with equitable turns of the keys. Consultations with each other were characterised by private whispering of suggestions when the other girl was in difficulty.

Another observed single sex female pair did not seem as collaborative in their learning as may be seen from the researcher’s observation notes:

> ‘I had to remind Donna several times to let Elaine have a turn using the keyboard which she would do, coaching from the sidelines until she couldn’t stand Elaine’s hesitancy and would take over again. Elaine seemed happy about this arrangement.’

However it is very important to note that the researcher’s interventions over the sessions succeeded in a co-operative partnership developing between these two girls. This highlights the importance of the teacher’s role in promoting gender equality in computing which Clarke (1990) implied when she concluded that male domination is most apparent in computer activities where there is little or no teacher supervision.

Another mixed sex pair observed is interesting also. Although this pair showed some evidence of working together, the general pattern does not seem to reflect gender equality. For example minimal discussion or cooperation between the children was evident even though the researcher attempted to make the children at least explain their choices to each other. Demarcation was intensified when the male pupil announced his ability to master this software package. Voluntary consultation of his female partner never occurred and when insisted upon the researcher noted his added reluctance, even disinterest, in his female companion. This was combined with his racing through instructions on the screen even though questioning he had to admit that he did not know what some of these instructions included.

These observations of this male pupil are especially poignant when placed in the classroom context. According to both the class teacher Helen and the researcher this child is not an effective learner. Yet he is very interested in computers, willing to take risks and adaptive upon making errors. Even though he has been described as taking a long time to produce very little he frequents the computer corner of the
classroom. This strategy and added experience seems to give him a lot of extraneous information as he watches others with the computer programs. Clarke (1990) has noted this strategy of male pupils describing boys as more likely to 'tinker' with computers.

On the other hand a female pupil in this grade who has also been regarded as less competent with her computer learning presents as a very different learner. She is observed as highly passive and relying on others — working best when she works with the support of her female friends. This has been noted by Clarke (1991, p. 58) who states that, 'Females ... rely on others to assist when they experience difficulties, believing that ... others ... have the information they can use.' Reimann (1986) proposes a similar hypothesis suggesting that an important reason for gender inequities in computing was girls being dependent on others for information and feeling intimidated by computer knowledge. Although many would argue that such blaming of the victim is indicative of a female-as-deficient model, most would be more likely to agree with Moondt when she comments that 'boys seemed to feel their own power in relation to computers more than girls did ... [and] only girls showed strong negative feelings about computers' (1984, p. 42).

While some strategies of this female pupil to seek help are viewed as efficient, overall she was seen by the researcher to 'freeze' with a nervous grin in front of the computer screen — unable to take any risks or manage any unexpected results. Reimann (1986) describes sex differentials in responses to difficulties with computing proposing that boys will be more aggressive and demanding in their need for help whereas 'girls will sit and wait for assistance.' Clarke (1990) commented that poorly performing males were less likely than poorly performing females to admit to being scared of a computer or uneasy about using them.

CONCLUSION

In conclusion, computers may be viewed as a problematic site for gender. This research reflects the literature which describes a gender exclusive curriculum in computing. The analysis of teacher interviews has revealed that while these teachers state that gender is not an issue for learning, they go on to describe and discuss how gender is relevant to pedagogy and computing.

This is confirmed by the presented classroom observations which demonstrated that significant issues for computers and gender existed — particularly in relation to mixed sex pairs.

Nevertheless the view that gender is not an issue for learning leads to the conclusion that teachers cannot be expected to accommodate these 'hypothetical' gender differences whilst maintaining these contradictory beliefs about gender and computing.

Notes

1 An earlier draft of this article was presented at the 1992 Annual Conference of the Australian Association for Research in Education with the research team including Dr Diane Maschette, Dr Maurice Robson, Richard Johnson, Prue Anderson, Elizabeth Stacey, Cheryl Woollard and Judy Latta.

2 Comments in square brackets record CLIPS teachers points of clarification made on a second reading of interview transcripts.

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REFERENCES


Webster, J. (1992). Gender and technology and work. CIRCIT seminar, March.