Primary Children and Computer-Based Artwork: Their Learning Environment and Strategies

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Abstract

This article summarises a research project with a group of twenty Singapore primary students who were introduced to computer graphics in an eight-week programme. Their actions and artwork were closely monitored by participant observers to see how they interacted with the computers and with each other as they learned how to use the tools and exercise judgement and control. Three aspects of behaviour which seemed to be particularly significant were: watching and internalising, providing a running commentary and pointing. The children’s artwork showed that they could use the computer as a tool to create artwork and engage in high-level symbol-weaving.

Descriptors: Computer art, art education, primary children, learning strategies

Introduction

Learning with computers is an expanding field and is having an impact across the curriculum. The issues relating to art education and the computer as a tool are now receiving some focus and this article presents the findings of one such study. The development of a project is discussed along with a discussion on some of the artistic production problems and advantages of the medium. Particular attention was paid to the social interaction and learning strategies which emerged, and this is examined as a key issue in considering computer use in art classrooms. Although children’s art was a focus of the work, we were not primarily concerned with the development of children’s drawing per se although, where relevant, we cite appropriate references to the literature in order that further connections can be pursued.

The Study

The School Computers Art Media Project (SCAMP) was planned as an experimental set of workshops with primary children. The details of the programme were confirmed after consultation with the school personnel and the agreed objectives were:

- to engage children with computer graphics as an extension to their art programme;
- to plan and develop ways of working, informed by research, which would enable children to proceed confidently in developing and extending visual imagery on the computer;
• to work closely with teachers in a school to investigate curriculum-related possibilities of using the computer as the medium for instruction and exploration;
• to document and evaluate the children’s progress and the effects of the learning environment on their actions.

The authors operated in an instructor-researcher-facilitator capacity during the programme. The teachers from the school who assisted in the study were: the subject coordinators for Art and for Computer Learning and the teacher with responsibility for Primary 5. All personnel were involved in planning and developing the programme to meet the objectives as stated above and five staff were responsible for recording observations and collecting data for two pairs of students each.

Immediately prior to the project, the authors organised two training sessions for the teachers in the school. These sessions were intended to familiarise the staff with the software and its potential for artwork and to prepare them for their role as participant observers. As well as some technical background, our time with the teachers was also intended to boost their confidence with the computers and research approach. Largely, this was a question of demystifying both.

The children were all from Primary 5 (11-year-olds), the oldest group who were not affected by major national examinations. They were selected by the school as the students most likely to deal effectively with the project, and were also students with the highest art grades. Half were girls and half boys. The total programme was of eight weeks duration with one session each week of around three hours scheduled for the concentrated practical activity. The children also had supervised access to a Computer Laboratory for an additional two hours between SCAMP sessions.

The Programme

The programme consisted of eight formal three-hour sessions with a further in-between session for personal development. The first four sessions consisted of planned exercises to familiarise the children with the hardware and software, and to provide them with stimulating activities to give them confidence in their image-making. The following four sessions were devoted to an image development exercise where the children selected the content and were required to cooperate with each other, working in pairs and, at times, on combined images.

The second half of the project was devoted to the theme of the school itself. The children were asked to select a part of the school and to gather visual information on its form and structure. They then had to develop their computer image and finally work out how to combine it with their partner’s image on one monitor to form a final design. The results were finally compiled as a calendar which was sold to raise funds for the school.

At all stages of the programme, comprehensive records and observations were made of the actions of students and the outcomes of their work. The children, teachers and authors provided feedback formally (in the form of questionnaires and direct questioning) and informally (through observed action and interaction). Teachers completed weekly schedules concentrating on different aspects of their children’s actions: some formally designed as time/frequency observations; others calling for an overview of behaviour patterns.

Observations

Teachers

Social interaction and the context of computer-based learning will have an effect upon preconceptions which centre upon teacher and institutional expectations of what constitutes an appropriate learning environment. Teachers typically do not regard themselves as free agents in the classroom as they experience constraints which influence their purposes and ambitions. As Leacock (1969) has observed:
... (teacher) behaviour often takes on characteristics beyond their immediate aims or intents. They must adapt their style, not only to the children but to the institution, to the principal’s requirements, to the other teachers’ attitudes, and to the standards according to which they will be evaluated (p202).

In our work with this particular primary school, we found a most supportive principal and cooperative teachers. However, as the children were organised in pairs initially to support each other in their learning and to encourage discussion, the ethos of the learning context was perhaps different from the usual classroom. As such, some teachers took time to adjust and see the value of this kind of classroom style.

Comments from the teachers initially about noise levels were quite insightful and centred more upon the connotations attached to “noise” emanating from classrooms in terms of teacher expertise rather than pedagogical preferences of individual teachers. This perceived constraint, partly perhaps because of the informally shared meaning of noise within the school, could influence the teachers interaction with their students and students interacting with their peers.

Also, as our six teachers were working alongside their group of four students in a team teaching situation, a new teaching context was created for them and one largely outside their previous experience. This aspect of the project gave teachers the opportunity to come together and share ideas rather than maintain the more common notions of separateness and “privacy” with their inherent assumptions of individual responsibility within a classroom context. A frequent comment made by the teachers was the insights they gained relating to pedagogy within the team teaching situation and how limiting the more familiar “closed door” policy was.

Within the learning context, therefore, there were aspects new to the teachers which they had to adjust to quickly and which exerted an influence on the computer-based art learning. To their credit, the teachers quickly began to understand the value of the learning environment we were attempting to create. In fact, these primary teachers began to comment that a major advantage of computer-based learning was the potential for enabling students to interact, encouraging a learning process of children helping children.

The learning culture for the children was intended as one in which the learning process was emphasized and the technology assumed the significance of a tool, neither more nor less, just as the paintbrush is a tool in a traditional art setting:

The educational value of computers cannot simply be measured by the content of the software. It is the process of teaching and learning that the software employs that largely determine its value. In other words, how children learn is as important as what they learn. (Hanor, 1991, p4)

Through our feedback time at the end of every teaching session, issues were discussed and suggestions made which were frequently incorporated into the programme. In this way, we tried to create a collaborative research undertaking which genuinely involved the teachers in partnership with both the authors and the students.

By acknowledging and emphasizing this collaborative dimension we also acknowledge that the creation of any learning milieu will be influenced strongly by the teacher, who will determine the impact of student-student and teacher-student discussion.

As with any learning situation, social dynamics and the social milieu of computer-based artwork appear to be significant. Where teachers and students are in a situation of enforced contact, working relationships and learning strategies are developed and from the very first encounter, identities emerge. These identities, relationships and learning strategies were monitored and recorded. The participating teachers and the authors were involved in the observation and recording of this aspect of the research.
By the third week of the project most of the children had sufficient confidence to tackle the image development task and use their own reference as back-up. The combining part was more problematic for the boys than the girls. Echoing the work of Nielsen and Roepstorf (1985, cited in Hoyles and Sutherland, 1989) it was clearly observed that the paired girls worked much more cooperatively than the paired boys. The boys were not keen to release their image as part of a greater picture and showed concern about “ownership”. Combined gender groups worked better than the double pairs of boy-only groups.

Additionally, we focused upon the quantity, quality and nature of talk between children working in a computer-based learning context. Several aspects of the analysis of the social dynamics and language analysis data illuminate central features of social interaction which are germane to this discussion. Of these, we have identified three areas which seem to be particularly significant as almost all of our children were observed over several sessions engaging in these behaviours. We have termed the behaviours: watching and absorbing, providing a running commentary and pointing.

Watching and Absorbing

As with any group of individuals, certain personalities emerge early on. Thus we could discern children who were leaders and rather dominant personalities within the original pairings we established. Sometimes this dominance resulted in frustration for the more passive individual in the pair. Frustrations arose with seven out of the ten pairs of students as the dominant child refused to share the manipulation of the mouse.

When this occurred, the child experiencing the frustration was given their own terminal and made very rapid progress in terms of both the manipulation of the technology and the creation of artwork.

A good illustrative example of this phenomenon was the pairing of two girls Dee and Hwee Peng. (These are pseudonyms to preserve the anonymity of the student participants). Hwee Peng was prevented by Dee from using the mouse and provided an audience for Dee. Initially, Hwee Peng was silent but watchful of everything Dee was doing. When given her own terminal it became evident that watching actions and internalising information are clearly important learning strategies for some children in the context of art-based computer learning.

After about an hour of the first session, Hwee Peng began to make encouraging comments to her partner and from that point onwards there was a great deal of discussion between the two children. In fact, it was Hwee Peng who was offering suggestions, encouragement and judgements about the work in progress which Dee largely took note of and incorporated into the drawing on the screen. In referring to a drawn line on the screen, for example, Hwee Peng made this comment: “That one there, (pointing at the screen) it’s got a twist in it which makes it good. You would do more”.

More than this, however, appeared to be happening as it was evident that Hwee Peng in this instance was doing more than making an artistic judgement as she went on to say: “That has a loop now like on basketball ground, twist again!” Although Hwee Peng has an obvious fascination for descriptive words, sometimes making up her own (for example “unround”) there were instances of her speech, of which this comment is but one illustration, where it seemed to us that the child was attempting to interpret or construct meaning for herself from aspects of her creative work.

Blackstock and Miller’s work (1992) is relevant here in their discussion of what they term the “symbol weaving” process whereby children construct meaning. This learning strategy is also referred to as synpraxis, or speech-cum-action, by Britton (1992). In our observations, we noted that the technology seemed to enhance this process for children and, although our programme did not include writing, lengthy oral responses and commentaries by the children emerged as a highly significant social phenomenon in our learning context.
Providing a Running Commentary

Although we had thought of the project initially as an opportunity to investigate pair and group work activities in relation to the process of computer-based art learning, in reality all of the children had their own terminals by the second session. Too many frustrations were emerging to maintain this arrangement as a feature of the research. However, the computer terminals were grouped in close proximity to each other so interaction was in fact still very much in evidence.

Interestingly, although children certainly did interact across the terminal screens, it was more common for individuals to provide for themselves what we have termed “running commentaries” on their work. These spontaneous monologues, quiet yet audible, were recorded from seventeen out of the twenty children. Sometimes these oral accompaniments were *aide memoires* for the computer tools and key commands which would be proceeded by, or in conjunction with, actions. As *aide memoires* they appeared to be effective, personal reinforcement to learning statements:

Press this (presses key combination) . . . no, not there . . . over the page . . . (presses ‘undo’ command on menu) . . . bring that down (brings down part of a drawing by highlighting and dragging the mouse) . . . turn it over . . . (presses wrong keys) no! . . . try again (presses different key combination) . . . better . . . I don’t want this (pointing at a section of the image on screen) . . . how to get off? (change) . . . where is eraser? (pause) how to rub out? . . . maybe up here (goes to menu bar and finds eraser tool) . . . get rid here (uses tool) . . . and here (uses tool again) . . .

(Hwee Peng)

This “running commentary” behaviour was also recorded, although not as frequently, when the children were working in their initial pairings. In this case the practice not only seemed to provide the child dominating the mouse with the reinforcement mechanism but also it gave the more watchful student an instructional demonstration which was extremely valuable once they were working separately.

Pointing

Evidence was collected from the observations that “pointing” was a frequent action of the children and that every child used their fingers at various times for this purpose. Pointing as a means of directing attention, sometimes for the “pointer” but also for an audience, is discussed in the literature by researchers such as Bates (1976) and Harris (1989). Two distinct types of pointing were observed, the first being the use of a finger to touch the computer screen physically and the second to describe shapes in space as a preliminary activity to working on a screen. Frequently too, these actions were accompanied by running commentaries and in some instances, provided another mode of reinforcement.

Describing shapes and images in space, not necessarily in close proximity to the screen, was less common than physically touching the screen. However, the authors recorded that twelve of the twenty children did use this action at regular intervals during the course of the programme and it seemed to be part of their learning repertoire of strategies in this context.

A good example of this phenomenon was in the initial pairing of Nazihah and Shanti. Nazihah was the dominant partner with Shanti frequently providing ideas and suggestions. In a very early session, Nazihah had a zigzag line on the screen with sharp points and angles. Shanti looked at the line and said: “. . . Straighten line more . . . to be like stairs” (at which point she rotated her chair to face Nazihah and described in space a typical staircase arrangement).

This kind of action was also observed with children physically touching the screen with a finger to convey their visual ideas to a partner, again accompanied by a running commentary. In some ways the action seems to have replaced a sketch book for the children which would typically be used, in many art classrooms, as a
means of developing ideas for preparation studies before a final piece of artwork is realised.

But pointing at the screen was also used in entirely different ways by the children. Many children (eighteen out of the twenty) used their fingers to touch a particular point on the screen to indicate an aspect of their work which they were going to make a value judgement about, the work areas which they were unhappy with artistically, or their problem-solving processes. Often, all three behaviours were contained within the same brief period of action as in the following case of a student.

Christina (a pseudonym) was recorded pointing vigorously at the screen with jabbing movements to her own verbal accompaniment:

... this pattern good (pointing to pattern filling a shape and making a judgement about art qualities) not too dark and different to that (pointing to a different section on the screen) ... but here (pointing to a figure) I try to draw legs longer but no good (meaning the legs still looked disproportionate to the body) ... I would do dress longer and no need for legs! (points to dress and draws in imaginary lines to extend dress length, a solution which seems deeply satisfying and gives the child enormous pleasure) ... use eraser ... or put dress over legs (running commentary on computer functions) ....

A final use of the pointing technique was also observed with the children attempting to stop the computer performing a function which she or he had keyed in. Kim Leong demonstrated this action when he attempted to stop the progress of a line on the screen by pushing at the screen with the fingers on one hand. The mouse had been abandoned and the action was accompanied by shouts of, “No! No! No! Go back! Go back!”

Humour and fantasy were also noted in the children’s recorded speech which accompanied their spontaneous running commentaries. For example, Hussein sometimes made noises which resembled rocket launching engines as he pressed keys and watched the imagery emerging on the screen. Kah Tong, in contrast, when using the eraser tool would use only one hand to manipulate the keys. His other hand would be folded into the shape of what looked like a firing weapon and he accompanied these manoeuvres with the words “Die already!” and the appropriate firing sound each time he used the eraser function on the screen.

Conclusion

It is evident to us that the social dimension to learning becomes particularly significant in the context of creating artwork which is computer-based. Interaction between children, computers and teachers and their surrounding environment seems to be of particular importance for learning using technology. The technology per se is only one element of a computer learning context, the focus needs to be on students and how they can be supported in using the computer most effectively in pursuing art plans and intentions. A technocratic approach which focuses on the effects the computer may have on learning fails to take account of the learning culture and the most important aspects of educational contexts: people and learning milieu.

Increasingly, emphasis is being placed on the teacher and the microcomputer as partners in constructing micro educational learning environments that complement one another and are adaptive to meeting the individual needs of students (Hanor, 1991, p5).

Creating a learning environment where students can use the computer as a tool to enhance their creative self-management skills, was central to our purpose as was encouraging students to become active and purposeful thinkers, learners and problem solvers.

Through our work on the SCAMP project, we became convinced of the enormous educational value in using technology as a focus for enhancing the teaching of thinking and learning strategies and the development of
metacognitive skills. It is also apparent to us that, as Ryba and Anderson (1990) state, these learning processes need to occur within the context of a planned learning environment which emphasizes the social dimension:

REFERENCES


One need only observe children interacting together with computers to see the potential that such technology has for improving learning strategies . . . (Ryba and Anderson, 1990, p1).