PROGRESS REPORT

The Computer Science and Electronics Program

at the

Solomon Mahlangu Freedom College

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What follows is a brief report on the status of the Computer Science and Electronics Project at Somafco. We describe the experience gained during Gretchen Kalonji's visit to Lusaka and Mazimbu and outline the short-term and long-term decisions that need to be taken.

Original Goals

We set ourseleves a number of main goals at the beginning of the visit.

1) The first task was to have informational and planning discussions in Lusaka with members of the Department of Education.

2) The second goal was to meet with teachers and administrators at Somafco to discuss the aims and proposed methods of the project, and to gather information about how the project might be most effectively implemented in terms of the existing curriculum.

3) A concrete goal was to set up an interim Resource Center for teachers and staff, so that they could begin to familiarize themselves with the main technological tools of the project and plan for the ways they could use these tools when the program is in full swing.

4) Lastly, we hoped to have discussions concerning some specific decisions that need to be taken concerning the project, most immediately effecting the training strategy.

Progress

Overall, we are pleased with the progress we made during this first stage of implementation of the project. Though in some aspects we were only able to partially satisfy our original goals, we were able to make considerable headway in an area which was not originally specifically part of the agenda, i.e. to gain experience in using these broad-based technological tools with small groups of children. Below we describe in some detail the degree to which the various goals were met.

Discussions in Lusaka took place with individuals in the Department of Education most concerned with the project, including Comrades Tikly, Mabandla, Manghezi and Majombozi. In these discussions they were brought up-to-date on the status of the project and planning startegies were discussed. In addition, a broader meeting was held, in which Cde. Kalonji explained the goals and strategies of the project to representatives of a wide number of departments upon which the project may be expected to eventually have a significant impact. These departments included DPE, DEP, DAC, DIP, DMD and Projects. An informational meeting with Cde. Choabi also took place on our first day in Mazimbu. In total, these meetings ensured that there is now a broad base of understanding in the ANC concerning the work in which we are engaged.

In Mazimbu a number of discussions were held with the teachers. A basic informational meeting was held with all of the secondary school staff. This large meeting was followed by a number of smaller meetings with groups of teachers in particular disciplines, as well as informal meetings with individual teachers, in which they were familiarized with the computers and the existing software base. In a meeting with Cde. Masondo, we discussed long term planning for the secondary school. We also had a large meeting with all of the teachers in the Adult Education program in Mazimbu and some of those based in Dakawa. In this meeting potential applications of software tools in the adult education program were demonstrated and educational strategies were discussed.

Meetings with teachers in the primary school proved to be somewhat more haphazard. We were unsuccessful in arranging an overall informational meeting but were able to have one-on-one discussions with individual teachers as the days went on. Many teachers, in fact, ended up showing up at the Computer Room as a consequence of hearing from their students about the variety of activities going on there.

It is interesting to note that while we originally intended the interim Resource Center to be primarily a place for exploration by the teachers of the educational potential of the computers, the vast majority of the activity has been led by students. Students took off with many of these tools in a matter of days and then played a valuable role in demonstrating them and explaining them to the teachers as they wondered in. Some of the teachers, however, played an active role from the beginning, particularly those from math and science. As the program progressed more and more teachers became active. Our goal of having a core of teachers motivated to begin exploring uses in the curriculum of the various tools has largely been met, though it will be desirable in future to broaden the base of involvement. With the upcoming holidays, we expect a significantly enhanced participation of the teachers. The staff of the Computer Room, after a period of intensive hard work, are also now in a position to be able to help them get started in independent explorations. What is particularly exciting is that because of the unplanned social dynamics of our Center, teachers will almost always have students simultaneously working with them in the room. This will have the multiple effects of providing student-tutoring to get the teachers started, and of giving the teachers first-hand experience on the educational usefulness of the various techniques and an appreciation of the various styles of student-computer, student-student interaction.

The actual mechanics of getting the tools up and running in the Computer Room went without a hitch. We worked with students spanning a large age spectrum, with most of them concentrated in two age groups; the 10-12 years old crowd, and the 15-17 year olds. The lynchpins of our program are Logo (with its extension Lego/LOGO), microcomputer-based labs, the basic productivity tools of word processing, database and spreadsheets, electronics kits and network science.

We gained extensive experience in using Logo with children in various age groups. All of us were thrilled to observe the alacrity with which the children appropriated this programming environment for projects of their own devising. Several other aspects were also striking to us, one of which was the cooperative learning environment that evolved among the children. Certainly some of the children quickly shot ahead of their peers in programming ability. Indeed the best of them quickly mastered rather advanced concepts in structured computer programming. Nevertheless, those most advanced students exhibited a charming willingness to spend large amounts of their time teaching the others. In fact, after approximately the first week of the program, it was unnecessary for us to explicitly introduce anyone to the basics of the language; our young honorary staff handled that all for us, and probably much more effectively than we could have done ourselves.

Children also made a lot of progress in exploring Logo's three-dimensional extension, Lego/LOGO. Both of our two main age groups made a great many devices (inluding cars, traffic light, mechanized turtles, timing devices and merry-go-rounds) and became quite adept at controlling them from the computer. The majority of their activities to date have been following prepared templates that are part of the accompanying curricular materials. However, they have now begun to explore their own designs. We are convinced that Lego/LOGO will be a very valuable part of our overall program and recommend continuing exploration of its use.

It is important to note at this point that none of the teachers have as yet gotten hands-on experience with Logo, though the Computer Room staff have been actively working with it. It will be important in the coming months to involve more teachers in this loop and to have them actively investigating the curricular options.

The microcomputer-based lab (MBL) activities formed another cornerstone of our initial efforts and were the object of great delight for children from ages 10 and up. The sound and motion probes were the biggest hits. Again, while teachers occasionally observed the activities of the children they did not get actively involved themselves. It will be important to rectify this situation soon, hopefully during the holidays, and to have them investigate their incorporation in the existing science curriculum. MBL is one of the few aspects of the program in which the limited density of computers need not be a crippling factor at this stage; it could be used now on a demonstration basis in the science laboratories.

Exploration of the basic productivity tools was more limited. Some of the teachers and students did begin to learn word processing, data base and spreadsheets, however. It is an area in which the staff will have to have more extensive planning meetings with the teachers on their own to make sure they can be incorporated seamlessly into all aspects of the school providing we are successful in eventually implementing our project in its full scope. Planning a limited number of example applications in the physical and social sciences, and exploring them with small groups of students would be highly desirable. One of the math teachers, Cde. Kibi, did make an admirable start at using spreadsheet and database to analyse student performance in the math subjects.

We were, of course, unable to get started on the network science part of our program; this will require successful launching of the low-altitude satellite. Planning and familiarization of the potential of this revolutionary approach in science education could begin now, though. We also made a very limited start in the electronics branch of our program. In this area we are hampered by our limited access to teaching kits as of yet. We do plan, however, to initiate an activity using the introductory electronics kits which are part of a first-year physics course at M.I.T. This activity will be performed on a trial basis with a small number of secondary students, led by the computer staff and Cde. Thembi Cele.

In addition to the above-mentioned activities, students spent a good deal of time on art, music and speech synthesis programs. Music composition software, in particular, was highly appreciated and its use should be actively encouraged in future.

The other main use of the computers by the children was in playing games. Some of the games no doubt have some educational value, particularly in enhancing basic literacy and numeracy skills. Their entertainment value may also be important in its own right. We feel strongly, on the other hand, that the time allowed for games should be minimized and the specific games used should be monitored. This game playing tends to be rather addictive, and takes time away for more valuable activities, if nothing else.

Some of the groups of students at Mazimbu have been to date unfortunately under-represented in the exploratory activites in the Computer Room. Though we had good contact with the adult education program teachers, we saw none of the students. An active effort should be made to get them involved, perhaps setting up some special separate sessions for them initially. There was also a strong sex imbalance in the initial participation in our project. The majority of the students were boys, though the situation did tend to improve with time. The imbalance was even more marked, however, in the subset of students who were most actively and passionately involved. Experience with computers in education elsewhere indicates that, when the number of computers is very small and access highly limited, girls are reluctant to compete with boys for access. This disparity has often disappeared when adequate numbers of computers are available. However, we should be working now to encourage involvement by the girls and to work against the branding of computer science in the students' minds as an activity for boys.

In addition to our work with students and teachers at Mazimbu, we met with a variety of other offices to discuss their computational needs and to devise a strategy for meeting them. These offices included Radio Freedom, News and Views, the Library, the Furniture Workshop, and the Hospital. It will be the responsibility of Cde. Shepherd to follow up on these discussions, both to assist these departments in the decisions they need to make concerning eventual computerization and to make sure that their plans are well-coordinated with our overall educational program.

In Dakawa, we visited the VTC and the EOC and had extensive discussions with Cde. Njobe. We feel strongly that the needs of Dakawa should not be neglected in our long-term planning. In fact, because of the inherent flexibility of some of their programs, as compared to the more rigid schedule imposed on the secondary program by the exam schedules, Dakawa may provide even more fertile ground for imaginative uses of computers in education.

Short-term Needs

The short-term needs of our project are quite clear. We have to plan for the 6 weeks training program in the US. There are a number of talented and energetic individuals we have identified who have been actively involved here and who could be counted on to enthusiastically advance the project upon their return. It is clear that Cde. Shepherd will have primary responsibility for the project here, and must, therefore, be included in this group. For the other two members, we feel that one should concentrate on the needs of the secondary school and another on the primary school. Among the secondary teachers, the one who has been by far the most enthusiastically involved to date is Cde. Mzwandile Kibi. His background in mathematics would also be helpful, as an important aspect of the secondary program is to design an O-level subject in computer science which must be integrated thoughtfully with the mathematics curriculum. We were unable to identify a teacher currently working in the primary school with the interest and background to be part of the initial training group. We therefore recommend that Cde. Fezile Mphele be assigned to represent the needs of the primary school. Cde. Mphele has a background in computer science and has been very active in working with the small children. He has expressed an interest in developing the area of technology in education as his long-term professional goal. We would expect Cde. Mphele to then serve as overall coordinator of the computer science activities for primary students on his return from training and to work closely with the current primary teachers. All in all, we feel that this team of three could do an excellent job in representing the various branches of the school.

We hope now that our initial training program can take place starting in September, though the exact dates will have to be set after discussions with the people at Technical Education Research Centers (TERC) in Cambridge, Massachusetts, who have volunteered to host the program. We feel strongly, however, that agreement on the constitution of this group should be made as soon as possible, so that we can begin to arrange visas and travel.

The next step will be to arrange for some training to take place at Mazimbu, after the return of the initial group from the US. A number of members of the Technical Advisory Board of our project in Boston have expressed interest in coming here to give workshops to the teachers of 2 - 3 weeks duration on the areas of their expertise. We suggest that these workshops could start to take place in January, 1990.

The housing needs of our project also need to be discussed. We are very cramped in our current space. The situation will be even more aggravated when the next computer arrives. We understand that we will get access to the current Resource Room soon, which will be adequate for our short-term growth. It is important for the long-term, though, that the new Technical Wing be completed. We hope to work together with the Technical Department in designing appropriate furniture for the activities in this building.

Conclusion

The past few weeks have seen an intensive period of exploration which we feel has laid a sound basis for the eventual success of our project. Teachers and students are now in a position to continue building on this basis in the months to come. There are, of course, a great many challenges ahead. Our most crucial need is to generate the full material resources for our project. This will be the primary activity of Cde. Kalonji upon her return to Boston. Another major need is to encourage the active involvement of a wider spectrum of educationalists at Somafco, in order to insure that the full potential of our project be realized. The staff in the Computer Room will have responsibility for this aspect. We believe that the joint effort of the staff here and the crew of educationalists and engineers who have been assembled in Boston will enable us to make a significant contribution to many aspects of education at Somafco.