

AN INVESTIGATION OF PRIMARY SCHOOL TEACHERS EDUCATION ON COMPUTER RELATED ERGONOMICS

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A national survey to investigate teacher education on computer related ergonomics was carried out by postal questionnaire. Questionnaires (n=1863) were returned from 416 of the 830 schools included in the study. Almost all schools (99.7%) had computers for children's use. The majority (89.6%) of teachers had received computer training but few (17.6%) had received ergonomic information. Respondents were not satisfied with their current knowledge of ergonomics. It is recommended that ergonomics is included in existing teacher education programmes.

INTRODUCTION

Schoolchildren in the Republic of Ireland have been introduced to computers through the IT 2000 Strategy. The strategy was formulated in order to meet the need "to integrate technology into teaching and learning right across the curriculum" (Dept of Education and Science, 1997). Pupils in every school around the country were given access to a computer, with many schools owning several computers. This initiative of the Irish Government is similar to that reported by others (Barrero and Hedge 2002; Straker et al 2002; Noro et al 1997; Sotoyama et al 2002; and Selwyn and Bullon 2000).

Teachers awareness of computer related ergonomics

With the growing increase in children's use of computers there is concern about how little consideration is given to the ergonomic factors associated with computer installation and use (Noro et al 1997; Bennett 2002).

The literature on teacher or student awareness of ergonomics of computers is scarce. Lai (2000) conducted a study of the awareness of health risks of computer use among administrators, principals, and teachers in primary and secondary schools in New Zealand. Most of the respondents (between 69% and 91%) were aware of possible health risks, but the study highlighted the lack of implementation of any preventive strategies to avoid the identified risks. The lack of continuing professional development related to health issues associated with computer use for school staff was also commented on. Sotoyama et al (2002) examined student education in computer ergonomics. Over 60% of both elementary and high schools and 30% of junior high schools did not give any ergonomic information to their students. Approximately 30% of elementary and high schools and 60% of junior high schools included limited ergonomic education. Overall less than 10% of schools were 'actively' incorporating ergonomic information into the computer education of the pupils.

Similar to Lia (2000) and Sotoyama et al (2002), the current authors were concerned that children are using computers to an increasing extent, but may not be receiving any ergonomic information about their use. In the Republic of Ireland the level of use of computers by children in school is unknown as is the level of education or knowledge of computer related ergonomics among schoolteachers and students. The current study investigated these issues in primary schools. It is acknowledged that it is the children who are the 'users' of the computers, but it was decided to survey the teachers, as it is they who teach the children about computers.

The specific aims of the study were:

- ❑ To investigate teacher education about ergonomic issues associated with computer use
- ❑ To investigate the sources and nature of the teacher education
- ❑ To investigate the level of satisfaction of teachers with regard to education about ergonomic issues associated with computer use.

METHOD

Study Design

Data was collected using a postal questionnaire sent to a random sample of 25% (n=830) of primary schools in the Republic of Ireland.

Materials. Data were collected by two questionnaires developed for use in the study. The school principal completed the first questionnaire. The teachers of each school completed the second questionnaire. Each questionnaire was printed on different coloured paper to differentiate between them. A definition of ergonomics was provided for the participants at the top of each questionnaire. Where possible closed questioning was used, however a number of open questions were included where it was considered information might be lost if closed questioning were used. A pilot study was carried out among 20 teachers

external to the study population. Design of the questionnaire was subsequently discussed with the respondents to ensure subjects' interpretations matched those of the investigators. Minor changes were made according to the feedback received.

Procedure. Data collection began in October 2001. A questionnaire package containing a letter of introduction, one copy of the principal's questionnaire, five copies of the teacher's questionnaires and a self-addressed envelope was sent to each school. If the school employed more than five teachers, the principal was advised to photocopy the teacher's questionnaire as required. A reminder was published in the Irish National Teacher's Organisation magazine in November 2001. A second mailing of the questionnaire in October 2002 followed up non-respondents. In the second mailing, the questionnaire package was exactly the same as the first mailing. The SPSS statistical package was used for data analysis.

RESULTS

Response rate

Questionnaires were returned from 416 of the 830 schools included in the study (response rate of 50.1%). A total of 389 questionnaires were received from school principals and 1474 questionnaires were received from schoolteachers. In the case of 27 schools, questionnaires were returned from the school's teachers but not from the principal.

Principal's Questionnaire

Demographical data. Schools from all 26 counties in Ireland with one exception (Co. Carlow) responded to the survey. The majority were based in rural areas (64.8%) with 20.5% situated in towns and 14.4% in cities. The majority of schools were mixed (87.7%), while 6.7% were girl-only schools and 5.7% were boy-only schools. The number of teachers employed by these schools ranged from 1-31.

Computer Equipment. All but one school reported having a computer available for use by the pupils. In the majority of cases (69.8%), these computers were used in the classroom with only 22.4% of schools reporting having a dedicated computer room and 7.7% of schools using their computers in other locations including for example in a hallway, office or general purpose room.

Teacher's Questionnaire

Demographical Data. The gender distribution of teachers responding to the survey was 82.8% female and 17.2% male. Teachers from all age categories were represented in the sample.

Use of Computers for Teaching. Of the teachers who reported having computer equipment available to them, 94.5% reported using it when teaching. The average length of time spent by the children using a computer every day at school varied considerable as can be seen in Table 1.

Duration spent at the computer	% Responses
1-10 minutes	35.0
11-15 minutes	20.9
16-20 minutes	14.1
21-30 minutes	15.8
>30 minutes	14.1

Table 1 Average duration of time spent at the computer by pupils

Teacher Training in the Use of Computers. The majority of teachers had received training in the use of computers (89.6%). Most of this training has taken place since 1999 (88.5%).

Respondents reported receiving training from a number of sources including the National Centre for Technology in Education (NCTE), external computer training companies and while at college (see Table 2).

Source of Training	% Responses
NCTE	61.0
External training company	14.2
Colleague	11.0
Other	21.5
At college	39.9
Teacher education centre	13.9
INTO	8.5
Summer course	7.1
Other	30.6

Table 2 Sources of computer training

The majority of teachers had received training that lasted for longer than one day (80.9%), while 10.6% received training of less than this duration and 8.5% reported other values.

Training in Ergonomic Issues. The majority of respondents (82.4%) stated that they had received no information on ergonomic issues during their computer training. Those who had received ergonomic training were asked to specify the average percentage of time given to ergonomic issues during their training. The majority (73.1%) responded that up to 10% of the course time was devoted to this topic.

The content of training of those who had received ergonomic information (17.6%) was further analysed. The percentage respondents who received information on specific ergonomic issues is shown in Table 3.

Ergonomic content in teacher training	% Responses
Sitting posture	71.9
Position of keyboard	75.1
Position of mouse/trackball	61.8
Position of wrist	53.3
Height of monitor	59.6
Effects of lighting	57.3
Frequency of breaks	54.2
Distance of monitor from eyes	53.3

Table 3 Ergonomic content included in teacher training

Respondents were also asked whether they gave information to their pupils on ergonomic issues related to computer use. 33.8% of respondents reported that they did provide such information. However, 68.8% of this group reported that they had not received training in ergonomic issues related to computer use.

The type of ergonomic information provided by teachers to their pupils included information on correct sitting posture (79.3%), the distance of the monitor relative to the head and neck (29.7%), duration of usage without a break (24.6%) and the position of the mouse relative to the user (22.4%).

Opinions on Ergonomic Issues Although almost two thirds of respondents reported having considered ergonomic issues prior to participating in this study (63.9%), the majority were not satisfied with their knowledge of ergonomics (81.5%) and 90.6% believed they needed more information in this area.

DISCUSSION

Demographics

Results from this survey were highly representative of primary schools throughout the Republic of Ireland. Schools from all counties, with one exception, responded to the survey. The demographics of respondent schools mirrored the pattern of rural versus urban and mixed versus single sex schools. Small and large schools were represented as determined by the number of teachers employed in the school. The gender and age profiles of the respondents were also representative of primary school teachers throughout the country.

Computer use

The majority of computers were used in the classroom (69.8%) compared to a computer room (22.4%) or in other locations (7.7%). Sotoyama et al (2002) reported that 64% of low elementary and 51% of high elementary schools have computers in or in the vicinity of the classroom.

Teacher Training in the Use of Computers

Most (89.6%) of the teachers had received training in computer use and most (88.5%) of the training had taken place recently, and lasted for longer than one day (80.9%). This is a positive finding as it demonstrates a good level of continuing professional development among the teachers. However, although most teachers had training in computer use the majority (82.4%) had received no ergonomic information during the computer training. The lack of ergonomic input is a cause for concern but could potentially be rectified. Most teachers are involved in continuing professional development, and the NCTE (a part of the Department of Education and Science) is the main source of the training (see Table 2). Therefore it seems reasonable that ergonomic information could be included in future training. A finding of particular concern in this study is that 68.8% of respondents who reported that they gave ergonomic information to the children have not received ergonomic information during their own training. It is possible that they received ergonomic information from a source other than their formalised training. This issue was not addressed in the survey.

Teachers Opinions on Ergonomic Education

81.5% of respondents stated that they were not satisfied with their current knowledge of computer related ergonomics. It is interesting that some of the respondents in the pilot study did not know what ergonomics was. To counteract this, the main study questionnaire included a definition of ergonomics and some examples relevant to this particular project. It is reassuring that 90.6% of respondents stated that they would like to receive information on computer related ergonomics.

Conclusion

This study found that computers are widely used in primary schools and that the children use the computers for relatively short periods of time. It was also found that most teachers have had recent computer related training. However ergonomic information is generally not included in the training. There is a need for inclusion of such information in teacher training because teachers should have the information to give to their students. Although the children are not spending long periods of time at the computers, it is likely that they will do so in the future. Habits or work practices that are learned at this early stage often continue into adulthood. If good work practices are established early, the likelihood of developing physical problems associated with computer use may be decreased. This study has identified that primary school teachers would like more ergonomic information. It is hoped that the findings of the study may influence policymaking and curriculum development of teacher training and the introduction of computer ergonomics in the educational system.

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