

Ergonomics content in the physical education teacher's guide in Rwanda¹

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Abstract. An important aspect that affects the effectiveness of ergonomic programs is that inefficient mechanical functioning start at an early age and that back pain and posture problems are already evident in children. Children, from a very early age, as well as adults spend an ever increasing amount of their time in front of computer and television screens. The cumulative effect of this sedentary lifestyle leads to improper posture, as well as inefficient and harmful movement patterns and loss of basic physical skills. Physical Education course should deal not only with sports and physical activities, but also with broader aspects of life-skills and physical functionality. It should offer a solution to the modern technology-based society. Keeping this in perspective, Ergonomics content was introduced in Physical Education Teacher's Guide in Rwandan schools with an aim in preventing musculoskeletal disorder in children.

Keywords: Ergonomics, Schools, Physical Education, Prevention, Classroom

1. Introduction

Ergonomics plays an important role in the modern working society since it has been recognized that the prevention of work-related injuries improves productivity. (Heyman E and Dekel H, 2006) Proper ergonomic design is necessary to prevent repetitive strain injuries, which can develop over time and can lead to long-term disability.

Children and adolescents are increasingly engaged in activities that simulate work demands known to cause repetitive strain injuries in working adults. From the earliest years, children use computers at home and school. Nursery schools and commercial play spaces advertise computer classes, computer games are produced for every age and interest, and reference materials are sold on CD-ROM.

Children spend an ever-increasing amount of time at their school desk and in front of computer either at home or school. The appropriateness of school furniture has attracted wide interest during the last few years when research showed an increase in neck-shoulder pain (NSP) and low-back pain (LBP) among

teenagers. A possible factor behind the increase could be sitting for extended periods in stooped, static or otherwise awkward postures at school, particularly when combined with increased sitting at computers, and a sedentary lifestyle in general. (Woodcock, A. 2007)

The cumulative effect of this sedentary lifestyle leads to improper posture, as well as inefficient and harmful movement patterns and loss of basic physical skills. (Heyman, E. and Dekel, H., 2006).

Sitting posture as such, and stooped sitting posture in particular increases stress to spinal structures. The pressure on the lumbar intervertebral discs increases when the pelvis is rotated backwards and the lumbar spine and torso are flexed. Degeneration of the lower lumbar discs has been detected even among 15-year-old children, and children with disc degeneration or protrusion have LBP more frequently than those without. These results further emphasize the importance of good sitting postures at school. (Woodcock, A.2007)

¹ Ergonomics Content in the Physical Education Teacher's Guide in Rwanda

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1.1 Ergonomics in Schools

The literature on teacher or student awareness of ergonomics of computers is scarce. A study conducted by Lai in New Zealand of the awareness of health risks associated with computer use among administrators, principals and teachers in primary and secondary schools found that most of the respondents 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. (Dockrell, S et al. 2007)

Sotoyama et al. conducted a questionnaire survey of the use of computers in schools in Yokohama and Kawasaki cities. They reported that less than 10% of schools were 'actively' incorporating ergonomics information into the computer education of the pupils. It is hence a concern that children were using computers to an increasing extent, but may not have received any ergonomics information about their use. (Sotoyama, M et al. 2002)

1.2 ICT in Rwandan Schools

The Government of Rwanda (GoR) is committed to pursuing ICT led socio-economic development with the vision to modernise the Rwandan economy and society using ICT as an engine for; accelerated development and economic growth, national prosperity and global competitiveness. (<http://www.gesci.org/rwanda.html>) The Ministry of Education is active in promoting the use of ICT in schools and is co-ordinating the One Laptop Per Child project in the countrywide. Although there is a shortage of ICT skills and technical support at the present time, ICT in education is extending from tertiary institutions to all primary and secondary schools. (<http://www.mineduc.gov.rw/spip.php?article119>)

Most of the secondary schools in Rwanda presently have a lab based training for ICT education. But these Laboratories never were designed using Ergonomics into consideration. Even the teachers are not trained in this context. This will put enormous pres-

sure on the physical growth and musculoskeletal system of the children.

It is widely accepted by educators today that in order to cope with the rapid changes in the complex modern society, school curricula should be extended to accommodate relevant life-skills. In the context of Physical Education (PE) this implies that the discipline should be redefined in order to cope with the technology-based lifestyle, which is characterised by stasis and passivity. Indeed in recent years there is a growing trend to regard PE as an integrative discipline, encompassing both practice and theory of health education subjects. Thus, PE should deal not only with sports and physical activities, but also with broader aspects of life-skills and physical functionality. It should offer a solution to the modern technology-based society where children, from a very early age, as well as adults spend an ever-increasing amount of their time in front of computer and television screens. (Heyman, E. and Dekel, H., 2006)

With this in mind, the Department of Physiotherapy at Kigali Health Institute took the initiative to introduce Ergonomics content in the Physical Education Teacher's Guide and worked in collaboration with National Curriculum Development Cell under the Ministry of Education, Rwanda. The Ergonomics content was prepared keeping in mind the local perspective and the pictures take were of a local school going child, so that the children and teachers can relate to easily.

2. Content

The Ergonomics content in the Physical Education Teacher's Guide starts with a brief introduction of Ergonomics and the importance of the same. The content on the whole is divided into 3 parts -

a) Ergonomic guidelines for computer use b) Ergonomics guidelines for classroom activities and c) Ergonomics guidelines in the school environment. Each of this part was subdivided into different subheadings to give more information on each one of them. The subheadings arranged are as shown in the Table 1.

Table 1
Sub-headings under the Ergonomics Content

| Major Heading | Sub-Headings |
|---|--|
| A. Ergonomic guidelines for computer use | <ul style="list-style-type: none"> i. Appropriate sitting position in front of a computer ii. Keyboard adjustment and typing iii. Mouse use iv. Monitor adjustment v. Laptop use vi. Lighting vii. Change position frequently viii. Workstation exercises –exercise breaks |
| B. Ergonomics guidelines for classroom activities | <ul style="list-style-type: none"> i. Writing ii. Reading |
| C. Ergonomics guidelines in the school environment | <ul style="list-style-type: none"> i. Carrying the school bag ii. Correct lifting techniques |

3. Examples for each of the Major Heading under Ergonomics Content.

The content under each subheadings as given in the Table 1 was then given with a correct and wrong position, with explanation given under each photograph. Tables 1, 2 and 3 show examples of the content that has been introduced under each of the main items of Ergonomic guidelines for computer use,

classroom activities and school environment. Table 2 shows the content given under the sub-heading of Mouse use under the guidelines for computer use. Table 3 shows the content given under the sub-heading of Carrying the school bag under the guidelines in the school environment. Table 4 shows the content given under the sub-heading of Writing under the guidelines for classroom activities.

Table 2
Example of content under Ergonomic guidelines for computer use





| CORRECT POSITION | WRONG POSITION |
|---|--|
|  |  |
| <p>WHEN USING A MOUSE:</p> <ul style="list-style-type: none"> ▶ Drop the arm and hand onto the mouse, with the upper arm hanging freely from the shoulder. ▶ Cover the whole hand over the mouse, with the palm on the center of the mouse and all the fingertips hanging over the front and sides (avoid the temptation to grip the mouse with the fingers). ▶ Make small circular motions with the mouse by making arm movements from the shoulder. ▶ Click the mouse button with the mid-section of the finger rather than the fingertip. ▶ Take the hand off the mouse when you are not using it, and rest the hand in your lap. ▶ Make sure you have enough space on the work surface to move the cursor with the mouse in one sweeping movement, rather than having to pick up and reposition the mouse. <p>▶ The wrists should be straight when using the mouse not bent up, down or to the side.</p> | |

Table 3
Example of content under Ergonomics guidelines in the school environment

| CORRECT POSITION | WRONG POSITION |
|--|---|
|  |  |
| <p>Experts say that one should carry a backpack weighing up to 15% of your body weight. (That means a child weighing 20Kgs should carry weight of around 3Kgs and not more than that.)</p> <p>Remember that the weight of OLPC laptop (X0) is around 1.5Kgs. Imagine with books also in the bag, it would add more weight putting more stress on the body.</p> <p>Use a backpack with wide, padded shoulder straps, and wear them on both shoulders. This will help distribute the load. Only carry the things that you need for that day in your pack.</p> <p>Evenly distribute the weight in your pack. Avoid using a pack that is too large, since this would</p> | <p>Wearing bag on one shoulder will make the body to bend to the opposite side to compensate the weight and not to let the child fall.</p> <p>This may lead to abnormal weight bearing, discomfort, pain and long term deformities (for example, postural scoliosis).</p> |

allow the load to shift inside the pack.

Table 4
Example of content under Ergonomics guidelines for classroom activities

| CORRECT POSITION | WRONG POSITION |
|--|--|
|  |  |
| <p>Ideal position for writing as :</p> <ul style="list-style-type: none"> - the back is properly supported - arms and wrists are correctly positioned - distance eye-paper is appropriate | <p>► Perching: Sitting on the front edge of your chair is inappropriate as it gives no back support if the back of the chair isn't touching you and put stress on the shoulder and arm. With this position the distance between eye-paper is reduced which may lead to various visual difficulties.</p> |

4. Conclusion

The content will be reviewed both after the training of teachers to use the guide and also after one year of implementation, with all the stake holders participating in the process. It is very important that Physical Education programs should deal not only with sports and physical activities, but also with broader aspects of life-skills and physical functionality. It should offer a solution to the modern technology-based society where children, from a very early age, as well as adults spend an ever-increasing amount of their time in front of computer and television screens. With the Ergonomics content developed for the Physical Education Teacher's Guide for Rwandan schools, hope is aroused that it will help in preventing musculoskeletal disorders among school children.

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