Redesigning Indonesian classroom furniture to ensure ease of transport by elementary school students

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Thesis Summary

The objective of this dissertation was to determine the proper weight, shape, and holding position of Indonesian elementary school chairs, for easy carrying, lifting, and turning by children aged 6–9, to encourage active learning. Three studies were conducted to examine 1) the effects of elementary school furniture weight and children’s age on the performance of three tasks—carrying a chair, carrying both a chair and a desk, and lifting a chair onto a desk; 2) methods of transporting and grasping a chair; and 3) the effectiveness of implementing chair modifications and different holding positions. The first study found that chair features, and especially chair weight, strongly influenced children’s performance in transporting furniture. Weight guidelines of furniture for elementary school children aged 6–9 were proposed. It was recommended that the weight of Indonesian elementary school furniture, which was too heavy for children aged 6–9 and especially children of younger ages, be decreased to encourage active learning. The second study identified preferred methods of carrying a chair and popular grasping patterns for carrying a chair, and lifting and turning a chair. These patterns should be considered during the redesign of heavy Indonesian elementary school furniture to ease transport, without having to decrease weight. The third study implemented two strategies based on findings of the second study about Indonesian elementary school chairs. The effectiveness of the strategies was then evaluated. The strategies were 1) modifying the shape of the chair to have a curved rectangle edge and be the proper size for a child’s grasp, and 2) carrying a chair in the lower holding position (LHP) or higher holding position (HHP). The chair modification and LHP significantly reduced task time, and significantly decreased activity of the deltoid middle fiber muscle. However, for lifting and turning a chair onto a desk, these strategies did not eliminate the influence of the excessive weight of the chair and discouraged easy task completion. In conclusion, Indonesian elementary school furniture is too heavy and large for young children to transport. Two effective strategies were provided that did not require decreasing the chair’s weight, and could improve the ease of carrying the chair. The findings of this dissertation may be useful to propose further research for redesigning Indonesian elementary school chairs to encourage active learning, which will lead to improvements in education quality in Indonesia as well as other developing countries.