



MEE 2.0: ICLT2022
International Virtual Colloquium on Multi-Disciplinary Research Impact (3rd Series)
International Conference of Logistics and Transportation
Best Western i-City Shah Alam, Selangor, Malaysia, 05-06 Oct2022



Effects of Mismatch of Anthropometric Measurements on School Furniture among Primary School Children in Petaling Jaya, Selangor

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Abstract

The project is an improvement and innovation of newly redesigned school furniture for the primary school. It is now made to provide comfort and user-friendly activities for the user which is small children. It has an adjustable mechanism that helps to provide the height of the desk according to their preference. Aside from that, the desk is not redesigned to be more visually appealing to fit the narrative of a new modern design for the school. Concerning this, we seek to create furniture that takes into account these new trends and formats, emphasizing the characteristics of the educational equipment of public institutions: intensive use, difficulties in replacement and maintenance, etc. This resulted in an individual desk, which allows the possibility of varying the layout of the students in the classroom, robust and User-friendly.

Keywords - effects of mismatch, anthropometric measurements, school furniture, primary school

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DOI: <https://doi.org/10.21834/ebpj.v7iS19.4278>

1.0 Introduction

Primary school is a school comprised of kids between the ages of 7-12 years old. In Malaysia, the primary school is also divided into two levels, there is level 1 for children that are standard 1-3, and then there is level 2 for children that are heading to pre-teens which are standard 4-6. Primary schools are also divided into two language varieties (Chinese and Tamil). Preschool education may be followed by primary school education. Students in primary school, on the other hand, had to study for six years before sitting their first major examination, the UPSR. Aside from writing, learning, reading, and solving figures, religious education such as Islam and moral education are also being taught to these children.

During the school day, primary school children spend the majority of their time either sitting in chairs or performing activities at their desks. As we can be recognized, students are required to do all these activities in school with their desks. These desks are usually assigned to each student available and they will remain the same till the end of the year. Primary school students and their activities in school are a pose of how adults are at work. In their daily activities, these students need the utilization of desks and chairs that support their activities. In general, a product like furniture needs to be more ergonomic for it to be user-friendly and support comfort in a sensible. Furniture like desks and chairs, need to be associated with ergonomic feature that corresponds with the anthropometric aspects of the user (students). (Molenbroek, Ramaekers and Snijders, 2003)

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Ergonomics aims to create work and work settings that allow people to operate efficiently, productively, and safely. Instruments, things, furnishings, and alternative technologies that are adapted to the needs of the human body will improve people's comfort, physical health, well-being, and performance (Wahyuni Masyidah Md. Isa, 2014). Ensuring that the work locations and types of equipment used are suitable to the user's dimensions and biomechanics is one of the criteria for enhancing productivity. This problem also applies to high school settings, as pupils use chairs and tables throughout their instructional lessons and develop persistent sitting habits for a variety of reasons. As a result, children's mensuration measurements differ significantly between age groups and even within age groups. As a result, unsafe postures, contractor disorder (MSD), or psychological dissatisfaction will occur. The purpose of this study is to compare anthropometric data from children of various ages and genders (Wahyuni Masyidah Md. Isa, 2014). When compared to industrial and occupational contexts, we tend to lack ergonomic assessment in Malaysian schools. Classroom furniture, back form, and table height were all found to be strongly connected to the lifetime prevalence of MSD (33 percent) and neck discomfort (20.2%) in first-graders (norizzah nabi khan, 2016). As a result, public health concerns about the risks of dangerous posture must be taken into account. As a result, public health concerns about the repercussions of bad posture must be focused on classroom furniture planning; additionally, this study can verify the percentage of mismatch between children's measures and school furnishings.

2.0 Problem statement

As an industry, Authorities should consider more in terms of comfort and safety furniture. Students in primary and secondary school spend the majority of their time at school, which is more than 6 hours per day, in a sitting position, with all heavy loads on an occupied seat. Students may experience discomfort as a result of school seats that lack ergonomic elements. As a result, students' feelings of discomfort are more likely to impact their concentration in academic sessions, as the discomfort can make them feel weary and unproductive. There are a lot of problem identifications that we can conclude based-on research and observations. Moreover, for school desks and chairs that do not match or mismatch, it can lead the problems of having a negative effect if it does not match for an exceedingly long time. Students will have negative effects such as muscle tension, muscle pains, lower back discomfort, and joint pain in various sections of the body as a result of this (Wahyuni Masyidah Md. Isa, 2014). In this research, the researcher would like to explore the possibility of creating new and improved school furniture for the young generation of leaders. The old classic design may be too 'boring' for all these children to appreciate. However, it's time for a new change for the coming new year as the researcher would like to be more understanding in terms of ergonomics and anthropometry measurements of the users to create 2 comfortable yet user-friendly school furniture. The researcher would want to give a better learning environment for the young generations for years to come.

The observation of the mismatch of anthropometric measures on classroom furniture among primary school students has piqued a few people's interest. With this research, it is hopeful that the people of the hierarchy take this measure into account in hopes of creating better school furniture for the younger generations. Furthermore, from these 3 research, the researcher can finally acknowledge the thoughts of users (school children) towards their school furniture, especially their behavior and how they feel about sitting for 6-7 hours straight. Besides that, from this research, the researcher would like to conclude the gaps that are made in this research, one of which would be in understanding the different sizes and measurements of school children. This would be very vital in designing new school furniture. Secondly, is applying mechanisms such as adjustability, towards the school furniture. This also would help school children in getting their preferred positions during school activities.

The study has a limitation and the researcher has planned to observe a proper interview and pictures of children who do their activities in the classroom. However, the researcher is left with the hard decision of having to do the observation online as an alternative. This is due to the pandemic that was still spreading throughout Malaysia. In this pandemic, conducting face-to-face interviews with respondents such as school pupils is prohibited since everyone must maintain a safe distance from others to avoid the Covid-19 virus. Besides that, it is also difficult to do an observation of school children's behavior in class as schools are mostly closed because of the increased cases of Covid-19 every single day. So, the researcher has done his research by collecting data from websites, articles, observations based on existing products (furniture), and also questionnaire through online forms.

From the research, this study focuses on the youth especially first-grade students of primary school in Petaling Jaya, Selangor. This involves a survey for those who fit the criteria of school children. The selection of respondents is only limited since it is unsafe to arrange a face-to-face interview. The researcher chose this issue because of wanting the best for the next generation of world leaders in Malaysia especially. To create a better learning environment in the classroom, surely, it's better to create new and 4 improved school furniture for users to be more comfortable in doing their activities. The existing school furniture that has been observed by the researcher has been either too old or too mainstream as it's been used for years of generation. For this reason, the researcher would like to create something that will inspire users (children). The researcher also wants to add some multifunctional and user-friendly designs for making the user more at ease when using the furniture.

Children have been known to spend over 30% of their time at school. Most classroom activities involve sitting for long periods, with little or no breaks. Every effort should be made to ensure that young children do not experience back pain and other musculoskeletal disorders due to prolonged sitting on improperly designed classroom furniture. This paper proposes a methodology and guidelines for the design of ergonomic-oriented classroom furniture for first graders in school. Adjustability was incorporated into the design to recommend the appropriate dimensions for the design of the classroom furniture. This anthropometric analysis could be used to design ergonomic-oriented classroom furniture which would not only incorporate adjustability but also improve the level of comfort for the intended users.

3.0 Research Methodology

The method by which data was gathered is referred to as the research technique. This method entails analyzing and studying the research's issue and problem, as well as how a researcher meticulously organizes an analysis to ensure accurate and consistent findings that define the research's goals and objectives. To put it another way, the methodology chapter should demonstrate that the procedures and strategies chosen are the best fit for the research aims and objectives and will provide actual and accurate results. Based on the research, the researcher has been using the method of qualitative. The researcher employed qualitative research in this study, which entails obtaining data from a variety of sources such as interviews, observations, and others without using any measurement or units to better understand the participants' experiences, opinions, and perceptions.

To begin, the researcher conducted observation to see the difference mismatch it is from the ages of school children and school furniture. Furthermore, the researcher chose to conduct secondary research, which entails investigating the literature for further information on school furniture, including its sizes and dimensions, as well as any other relevant data. This is due to the researcher's desire to observe and identify keywords that may be useful in narrowing down the issues raised in the publications. In the next research method, the researcher has begun constructing a survey to get more details in terms of the mismatch of the school furniture. This is to identify the behavior and activities that would affect their body and comfortability. The survey is distributed between 7-9 years old as they are the most likely to be affected by the mismatch of school furniture. From this survey that was distributed, the researcher has now gained more knowledge in terms of finding the problems or effects that are caused by the school furniture. Besides that, it is also important to analyze the existing school furniture in terms of functionality, mechanism, cost, and material. This method I called existing product analysis and it is important for this research as the researcher can understand more of the character and styles that are suitable to redesign the school furniture using the analyzed data.

3.1 Observation

The researcher has done an observation about the mismatch of school furniture especially trying to differentiate how big of a difference it is between 7-9 years old and 10-12 years old. The researcher only did an observation through the pictures and studied existing articles, which may be a complete representation of the users and the existing furniture. According to the researcher, user(primary school students) uses the table for activities like studying, learning, writing, etc. The researcher has also identified the user's body posture during the utilization of the existing school furniture, whether it is a mismatch of sizes that can make them feel uncomfortable when using it. School furniture should be an inspiring and ergonomic learning environment for users of different sizes. In addition, the design has to be timeless, the structures are durable and of high quality, and the furniture is highly usable and easy to maintain, resulting in a functional learning environment with a long useful life. A piece of improved furniture would motivate users to be more collaborative, promotes creativity, and works with technology to encourage critical thinking. Today's furniture necessitates a lot more than just a wood and steel frame. It necessitates a blend of advanced designs and utility, as well as a dependable and creative manufacturing technique. Based on an article, the researcher has observed the articles based on the research and findings made from the article itself. The article has done research based on the existing school furniture that has been overused for generations.



Figure 1. The existing school furniture in Malaysia



Figure 2. Two different types of school chairs in Malaysia



Figure 3. Classroom environment



Figure 4: The problems caused by the mismatch of school furniture



Figure 5: The existing school chair with two different sizes and ages of students

3.1.1 Findings on Observation

The researcher observed the mismatch of the existing school furniture among the school children. It shows how big of a difference the sizes of the school furniture as it could've caused uncomforted for them throughout 6 hours of school. But sometimes, school children between 7-9 years old have bad posture which can make them uncomfortable during activities in classrooms and so on. The mismatch between children's anthropometrics and furniture occurs in almost all of the 15 parameters for Year 1, with a 100 percent high mismatch reported for seat height, seat depth, and desk height. The goal of this research is to determine the attitudes of primary school kids toward the use of chairs and desks. This is intended to serve as a reference in terms of chair and workstation safety and comfort to avoid ergonomic injuries.

4.0 Conclusion

The researcher can identify the mismatch in the school furniture through an observation made by other researchers. This paper has given an account of the reasons for new and improved school furniture for the next coming years in Malaysia to be represented across states. The purpose of this current study was to identify the problems that are being caused by the existing furniture. Especially after identifying the different sizes of these children of all ages and comparing them with each other, we can tell how much of a difference it is from the current existing school furniture. This research is significant because it may result in future design standards that are more ergonomic and practical for students to use. Furthermore, the researcher can identify most of the problems through a questionnaire which helps identify

what kind of musculoskeletal pain school children feels. Finally, the absence of correlation could be due to the extraordinarily high occurrence of ergonomic mismatch, as well as potential student adjustments. Even though practically every student's desk and chair were found to be out of alignment, ergonomic misalignment had only a minor impact on physical discomfort. From this survey also we can understand that the respondents find the current existing furniture to be a bit old school or out of generation. Therefore, this is where proposing better and improved school furniture would solve the issue of having an outdated school furniture design. Lastly, the results of this study indicate the use of mechanisms like adjustable or modular would solve the existing issues of the existing school furniture, which are two important factors that will influence and adapt in every school in Selangor. The researcher has identified and compared all of the existing school furniture and adapts what needs to be in the design of new school furniture. - Moreover, the researcher would like to propose redesigning school furniture that is adjustable for children in any way that could help them be more comfortable when in the classroom. These conclusions, however, cannot be applied to different furniture designs or situations.

Acknowledgments

Special thanks to the authorities of the Malaysian Timber Industry Board (MTIB) for providing valuable information regarding Malaysian school furniture and Universiti Teknologi MARA Malaysia.

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