i-SPiKE 2023

INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

"Optimizing Innovation in Knowledge, Education and Design"

EXTENDED ABSTRACT

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Assalamualaikum warahmatullahi wabarakatuh,

First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality . I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH

WELCOME MESSAGE (i-SPiKE 2023 CHAIR)

We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPiKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPiKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPiKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail
Chair
3rdInternational Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPiKE 2023)

FLOAT-FLEX

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ABSTRACT
In modern educational institutions, it has been standard practice for students to bring a sizable quantity of books and other materials to class with them, causing their backpacks to become overly heavy. Carrying large and heavy burdens every day to school in backpacks has been recognised as a risk factor for the onset of musculoskeletal problems in school students, but not limited to back pain, shoulder discomfort, and neck pain. It is critical for parents to get a greater understanding of this problem in order to stop the onset of comparable health difficulties in their children. Physical strain from improperly worn, fitted, or laden backpacks can produce a substantial forward tilt of the head and discomfort. The Float-Flex is a ground-breaking backpack system that combines ergonomic and suspension features to effectively alleviate the physical discomfort and strain that come with carrying heavy weights for students. This specialised backpack minimises back and shoulder strain by distributing weight evenly across the body, offering a special and useful feature for students of all levels. The Float-Flex is an innovative product that attempts to fundamentally alter how school students carry their stuff to schools without compromising their health.

Keywords: Ergonomic, float-flex, suspension system

INTRODUCTION

In the current educational environment, the large and heavy backpack appears to be an innocent buddy and accompanies students throughout the day, becoming a familiar and frequently undetected enemy. Backpacks are becoming disturbing due to their weight and potential health risks although they are handy for carrying needs. A variety of physical health problems may arise for students who carry heavy backpacks. According to a study by Negrini et al. (2020), heavy backpacks can contribute to musculoskeletal illnesses such back pain, neck pain, and postural abnormalities. Students who carry large backpacks may endure spinal compression and an elevated risk of spine injury (Whittfield et al., 2001). Moreover, heavy backpacks may also cause students to face psychological issues like stress, anxiety, and a decreased sense of wellness (Agarwal & Rai, 2015). In addition, the study by Klakk et al. (2020) on the students' cognitive function and the weight of their backpacks indicated that students carrying heavy loads may make it harder for them to concentrate and retain information.

Nowadays, most children carry loads that are too heavy for their developing bodies. These bags, which are overflowing with textbooks, notebooks, and other supplies, have come to symbolise how difficult it is for students these days to combine their academic success with their overall well-being. By examining its underlying causes and consequences, it is essential to increase public awareness on the issue of heavy backpacks among students and what potential solutions that could minimise the detrimental effects on kids' health, happiness, and academic success. The issue of heavy backpacks among students is one of the issues that educators, parents, and the government have recently started to pay more attention to because of the potential long-term impacts on children's intellectual and physical well-being.

The Float-Flex backpack was designed with the goal of serving as an educational adjunct and is suitable for usage by both primary and secondary students. A unique combination of features is used to simplify a heavy load. The backpack seems to include both an ergonomic and suspension system, which could assist spread the weight of the contents equally over the body and lessen stress on the shoulders and back. It serves the overall framework of the exercise and can be used by students of any age. Additionally, it includes a range of patterns that combine an ergonomic system and a suspension system, as well as an embedded system. The purpose is to demonstrate a unique ability that can help students lift and carry large and heavy bags. Overall, the Float-Flex is a specialised backpack with a number of features that could be helpful for students of any age.

The Float-Flex backpack is particularly suitable for primary school students due to the lack of availability of bag designs tailored to their specific needs and preferences. This is because primary school may have trouble with large or weighty backpacks, uncomfortable support, or an unfavorable design. Therefore, a suspension bag that is both practical and aesthetically pleasing is ideally suited for primary school students. Moreover, Float-Flex backpack may also gain popularity among outdoor enthusiasts and travelers.

OBJECTIVE

The problem of large and heavy backpack particularly among the students lead to the creation of a premium bag with a suspension system, consistent ergonomic function, lightweight, compact design, and comfortable padding, as well as a spine protection system that help to

protect back and spine of the users. In addition, the suspension system at the back of the bag helps to lessen some of the strain brought on by the weight of the load that is carried by the bag. The cushioned channels of the bag provide sufficient support without putting strain on the shoulders of the user.

NOVELTY

A suspension system was used in order to eliminate shearing forces (Arghami et al., 2016). A spring system was used as a shearing force reduction device because walking causes a student carrying a backpack to be susceptible to shearing force. Float-Flex is specifically created to address a challenge experienced by Asian primary and secondary school students, namely their heavy and bulky backpacks. As a result, Float-Flex is built of lightweight materials and has a simple design that is simple to use. Children are particularly attracted with bright colours, enjoyable patterns, and distinctive designs. They are more inclined to use and adore a bag with a fun design as they are fashion-conscious and susceptible to peer pressure. Float-Flex would also be flexible to fit the children's bodies, making the bag more comfortable to wear since the bag could be modified to offer varied levels of support and cushioning. The bag may be adjusted to provide the right amount of back support and can be filled with air or water. It is possible to sell this functionality as a means to customise the bag to meet specific needs (Figure 1).

The Float-Flex is made from high-end, durable materials that can withstand normal use. It is constructed to last due to its reinforced stitching, strong hardware, and durable materials. The bag is also completely waterproof, offering the finest protection for its items, including computers, books, and documents, even in wet conditions. Ultimately, the Float-Flex offers students a dependable and long-lasting backpack option that always keeps their possessions dry and safe.

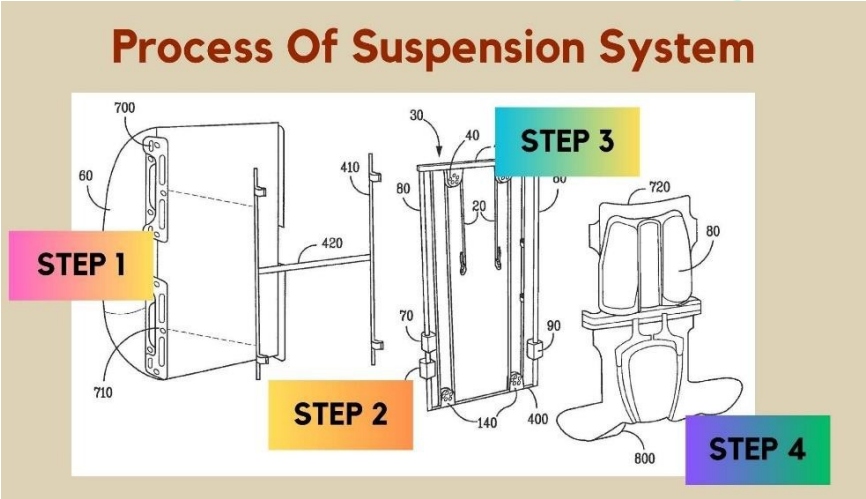

Figure 1. Float-Flex suspension system

PRACTICALITY & USEFULNESS

The user-friendly design of the Float-Flex backpack seamlessly integrates its cutting-edge technologies. The ergonomic straps are easily adjustable for the ideal fit, ensuring optimal weight distribution. The suspension system, which incorporates a spring mechanism, ingeniously absorbs shear forces as students walk, thereby reducing stress on their shoulders and backs. The padded channels offer comfort without compromising support. In addition, the backpack's adaptable design enables students to adjust the level of back support and the padding for their belongings to suit their individual needs. Furthermore, the Float-Flex backpack transforms the way in which students transport everything they own. By distributing weight uniformly across the body, the strain on the shoulders and back is reduced. Not only does the suspension system reduce the load's impact, but it also assures smoother movement, making it easier for students to walk without feeling the pressure. The roomy compartments keep textbooks, journals, laptops, and other essentials organised and easily accessible.

Due to their smaller stature and specific requirements, the Float-Flex backpack is particularly well-suited for primary students. The Float-Flex offers a lightweight and manageable alternative to conventional carriers, which can overwhelm young children. The backpack appeals to children due to its vibrant colours, enjoyable patterns, and customizable features, which fosters a positive association with its use. Promoting healthy habits from a young age, the backpack's ergonomic design allows for optimal support and comfort to be adjusted as the child grows. Furthermore, carrying hefty loads is a challenge that many students face, which may lead to health issues. With its innovative features, the Float-Flex backpack addresses this issue. The suspension system reduces the strain caused by weighty books and supplies, thereby preventing excessive stress on the shoulders and spine. The ergonomic design promotes correct posture, thereby decreasing the risk of musculoskeletal disorders. This makes the Float-Flex a practical option for students carrying a substantial quantity of school materials without compromising their physical health.

COMMERCIALISATION POTENTIAL

Every new technology that enters the market must be able to thrive and grow in a competitive environment that is unpredictable and ever-changing (Bandarian, 2007). Due to its distinct characteristics and intended market, the Float-Flex has a large commercialization potential. The primary target market of Float-Flex is the education sector, which constitutes a sizable and expanding market globally. The primary schools are mainly attended by millions of students globally. The Float-Flex has special features that set it apart from the other backpacks that are available on the market. Hence, the bag would be the solution for parents who are concerned about their children's health as the suspension system, ergonomic design, and spine protection system solve the issues of weight distribution, strain, and back support.

Educators and parents that place a high value on students' overall development and welfare will find the Float-Flex to be even more intriguing because it also aims to function as an educational accessory. Due to the bag's specialised function, it can assist students in carrying heavy loads, potentially reducing their fatigue and discomfort in class. Through integration and collaboration with NGOs, merchants, and educational institutions, The Float-Flex has the capacity to broaden its reach and distribution networks. Collaborations may also provide intelligent advice, support, and suggestions that aid in the product's commercial success.

Additionally, to appeal to the interests of young children, the Float-Flex has distinct shapes, vibrant colours, and fascinating patterns. Kids may be more interested in using and owning the rucksack because of its appealing design, which attracts their attention. The Float-Flex is made of high-quality material, which guarantees its endurance and resistance to normal wear and tear. Being waterproof not only expands the product's use but also guards expensive items from damage like computers, books, and important documents.

CONCLUSION

The issue of students' health, happiness, and academic success being impacted by the burden of large backpacks presents a formidable challenge that necessitates the implementation of creative remedies. The Float-Flex backpack is an innovative solution that aims to tackle the complex challenges associated with conventional bulky backpacks. This innovative backpack encompasses a combination of ergonomic design, sophisticated suspension technology, and versatile features, collectively offering the potential to transform the manner in which students transport their academic responsibilities.

The Float-Flex backpack appears as a potential solution, acknowledging the indisputable correlation between heavy backpacks and musculoskeletal issues, stress, and reduced cognitive capabilities. The suspension mechanism of the product is designed based on an analysis of shearing forces and the specific requirements of Asian students. This innovative design effectively mitigates the impact of heavy loads and facilitates effortless mobility. By achieving an equal distribution of weight across the body, this innovation serves to not only alleviate physical strain but also empower students to navigate their academic endeavours with more comfort and elegance.

The Float-Flex backpack is designed to provide customised support specifically for primary school students, so answering a previously unmet demand in the market and catering to the distinct requirements of these students. The incorporation of bright patterns and adjustable features establishes a favourable association between students and their backpacks, so promoting the development of healthy habits from a young age. The waterproof and durable design of this item enhances its practicality and durability, while guaranteeing the preservation of students' things and the value of their investment.

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