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DEVELOPMENT OF FASHIONABLE WHEELCHAIRS FOR MOTORICALLY DISABLED PEOPLE

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Abstract

This research aims to develop fashionable wheelchairs so that they are qualified to be properly utilized by motorically disabled people for conventional use or during fashion shows or national and international fashion carnivals. A vast mobile ability in every aspect of life has become a dream for many people, especially those with special needs. Amidst the difficulties faced by the physically disabled, disabled college students desire to drive from their homes to campuses or anywhere else. This research is a developmental research. The model of development implemented is ADDIE (Analyze, Design, Development, Implementation, Evaluation). After the production stage, the early prototypes will then be validated by an expert in teaching-learning media. The data obtained in this research are from interviews and observations from the subjects, which are motorically disabled college students. The instruments for data collection are in the forms of interviews and observations. Based on the goal of the development of product design, this product reached the success rate of 100% with the qualification of feasible usage, while in terms of manual book it reached the success rate of 80%. Moreover, the success rate of tutorial videos reached 95% with the qualification of feasible usage. The success rate as of the publication of this article was as much as 80% because the results for stage 2 of product test was pending. The assessment given for this product received a success rate of 100% with the qualification of feasible usage due to the products developed in partnership with manufacturing experts and the production site where the products are made by adjusting the conditions and needs of students with motor disabilities. In this aspect of the assessment, the media expert gave advice to pay attention to the materials and the manufacturing process. Therefore, these fashionable wheelchairs can acquire the classification of feasible usage by the motorically disabled for conventional use or for fashion shows or national or international fashion carnivals.

Keywords: Development, fashionable wheelchairs, physical disabilities.

Abstrak

Penelitian ini bertujuan untuk mengembangkan kursi roda yang fashionable sehingga layak untuk digunakan oleh penyandang disabilitas motorik baik untuk penggunaan konvensional maupun pada saat peragaan busana atau karnaval busana tingkat nasional maupun internasional. Kemampuan mobilitas yang luas dalam segala aspek kehidupan menjadi dambaan banyak orang, khususnya mereka yang berkebutuhan khusus. Di tengah berbagai kesulitan yang dihadapi oleh para penyandang disabilitas fisik, mahasiswa disabilitas ingin memiliki kendaraan pribadi dari rumah menuju kampus atau tempat lainnya. Penelitian ini merupakan penelitian pengembangan. Model pengembangan yang diterapkan adalah ADDIE (Analyze, Design, Development, Implementation, Evaluation). Setelah melalui tahap produksi, prototipe awal kemudian akan divalidasi oleh ahli media pembelajaran. Data yang diperoleh dalam penelitian ini diperoleh dari hasil wawancara dan observasi terhadap subjek penelitian yang merupakan mahasiswa disabilitas motorik. Instrumen pengumpulan data berupa wawancara dan observasi. Berdasarkan tujuan pengembangan desain produk, produk ini mencapai tingkat keberhasilan 100% dengan kualifikasi layak pakai, sedangkan dari segi buku panduan mencapai tingkat keberhasilan 80%. Selain itu, tingkat keberhasilan video tutorial mencapai 95% dengan kualifikasi layak pakai. Tingkat keberhasilan hingga artikel ini diterbitkan mencapai 80% karena hasil uji produk tahap 2 masih menunggu hasil. Penilaian yang diberikan untuk produk ini memperoleh tingkat keberhasilan 100% dengan kualifikasi layak pakai karena produk dikembangkan melalui kerja sama dengan para ahli manufaktur dan tempat produksi tempat produk dibuat dengan menyesuaikan kondisi dan kebutuhan siswa penyandang disabilitas motorik. Dalam aspek penilaian ini, ahli media memberikan saran untuk memperhatikan bahan dan proses pembuatannya. Oleh karena itu, kursi roda modis ini dapat memperoleh klasifikasi layak pakai oleh penyandang disabilitas motorik untuk penggunaan konvensional atau untuk peragaan busana atau karnaval mode nasional atau internasional.

Kata kunci: Pengembangan, kursi roda modis, disabilitas fisik

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INTRODUCTION

As we know, there is a special disability law issued by the government to provide opportunities for people with disabilities to be creative. This obviously provides convenience for people with disabilities. Article 10 of Law No. 8 of 2016 states that persons with disabilities have the right to education services, which includes the right to have equality and opportunities to obtain quality education services in all types, channels and levels of education. People with disabilities are defined as having physical, mental, intellectual and sensory deficiencies or imperfections. (Catherine Marshall & Gretchen B. Rossman, 2014)defined them as people with a lack of work capacity or inability to work, people born with an illness, or people with other conditions that are usually age-related and can affect anyone. Mobility is an ability to move and navigate within an environment (Ini & Rahardja, n.d.)

The ability to have great mobility in all aspects of life is desired by everyone, including those with special needs. Those with disabilities will face difficulties, especially regarding moving from one place to another. Higher education, as a place of knowledge development, is a very appropriate place to develop innovations, both in technology and social fields. In line with this, UNIPAR Jember has a mission and goal to produce innovative scientific work through research activities that can provide solutions to problems faced by the community through community service. For that reason, the research team attempted to develop fashionable wheelchairs to help motorically disabled college students support mobility in the realm of fashion and throughout the campus.

The role of assistive technology is beneficial to support activities carried out by people with disabilities. According to (Komalasari et al., 2018), assistive technology can help people with physical disabilities be able to perform daily activities independently. One group that uses assistive technology is the physically disabled. The physically disabled (tunadaksa), according to (Sutjihati Somantri & T. Hajah, 2006) are people with a state of damage or disruption of bones, muscles, joints and innervation in normal function. (Bilqis, 2014) asserted that the physical development of children with disabilities is similar to that of children in general, except for the limbs that are damaged or impaired. Any disruption or damage to one of these limbs will be compensated for by the other limbs. For example, a person born without feet can

improve hand and arm functions as compensation (Firdaus & Fajar Pradipta, 2019)

Based on data obtained from the Special Education study program at UNIPAR Jember, there are several students with disabilities. The type of disability experienced is amputation with loss of legs or paralysis of the legs. Objective conditions in the field show that some of these students do not experience obstacles in cognitive, social or emotional aspects, yet they experience difficulties in mobility. (Ini & Rahardja, n.d.) explained that humans are able to move due to the joints, muscles, and nerves as components of motion tools. If one of these components malfunctions, the others will be affected, resulting in mobility barriers (Fajar Pradipta & Andajani, n.d.). The results of interviews with students with disabilities who are talented in fashion show that there are several difficulties; first, for student mobility from one room to another to support daily lecture activities, and secondly, to support their passion, namely mobility for fashion shows in cat walks or in local and international fashion carnivals. Students with disabilities actually need special assistive devices such as wheelchairs or canes, which are modified so as to be able to assist their mobility. For students with disabilities, the existence of mobility aids, one of which is in the form of a wheelchair, is a necessity used to support lecture activities, daily activities at home and also in the passion of those who have modeling talent. Specialized mobility devices serve as part of their "limbs" that are integral to their lives. But their use requires modifications to the wheelchair equipment to facilitate the accessibility of the disabled in their daily activities or in their careers. No one has had a creative idea to solve the problem, until there was a student with a disability at UNIPAR Jember in the Special Education study program who is an expert in designing carnival costumes to try to make an innovation in the form of a fashionable wheelchair.

On fashionable/modified wheel chairs, certain parts were added and modification is also done to the operating system suitable for consumers' needs. The modified form of the wheelchair can add to the shortcomings of the modified form of wheelchairs that have been commonly used by the sick and also the disabled. This research aims to help physically disabled students in overcoming struggles in mobility in everyday lives or for modelling purposes in fashion shows so that it will be able to describe benefits of fashionable wheelchairs.

METHOD

This research aims to develop fashionable wheelchairs for the qualification of highly feasible usage for the motorically disabled for conventional use or for fashion shows and national and international fashion carnivals. Themodel of development in this research is a model called ADDIE (I Made Tegeh et al., 2014)

The model of development called ADDIE was selected based on the consideration that it is comprehensible and easily utilized. (I Made Tegeh et al., 2014) revealed that a research implementing the ADDIE development model consists of five stages; analysis, design, development, implementation, and evaluation.

Data collection is performed by observations and interviews with physically disabled college students, which assess such factors as physical condition, aspects of constraint, and mobility. The data validated by manufacturing experts will be analyzed using the formula below:

$$\text{Result} = \frac{\text{score achieved}}{\text{maximum score}} \times 100\%$$

Table 1. Categories of Feasibility of Cantic Technology Products

Success Rate	Qualification
76%-100%	Highly feasible (no revision)
56%-75%	Feasible (no revision)
40%-55%	Less feasible (revision)
0-39%	Not feasible (revision)

Analysis

The analysis stage is performed through observations and interviews. In this stage, the subjects are college students with physical disabilities.

Design

In the design stage, there are selection and organization of materials which will be given, design of product, and organizing evaluation tools (Bonk & Graham, 2006). The designing will be performed by making sketches of fashionable wheelchairs. The purpose is that the assistive technology created will satisfy the needs of customers, in this case physically disabled college students.

Development

In the development stage, assistive technology products in the form of fashionable wheelchairs are manufactured based on the design already made in the designing stage. The evaluation tool utilized in this research will be in the form of questionnaire to measure the validity of the technology of fashionable wheelchairs. At first, questionnaire is made and given to manufacturing experts to assess on the technology of fashionable wheelchairs.

Implementation

The fourth stage in the development model ADDIE is implementation. After the fashionable wheelchairs are considered feasible for use in this research, the testing stage takes place. Product testing aims to determine students' responses after using the aforementioned assistive technology product.

Evaluation

In the evaluation stage, the assessment of assistive technology products is carried out by the students. After the assessment of the products by the students, the resulting data are obtained and then analyzed qualitatively and quantitatively so that it is concluded whether assistive technology products in the form of fashionable wheelchairs are feasible for use.

RESULTS AND DISCUSSION

According to the results of early observations, several motorically disabled college students required assistive technology to accommodate their special needs so that they are able to complete tasks that they were previously unable to do. Thus, the fashionable wheelchair was created.

Fashionable wheelchairs were created by a student of the study program of Special Education at UNIPAR Jember Siti Farida in early November of 2023; she has experiences in designing costumes for international carnivals, and she has also won "Best Costume International Fashion Carnival" with the theme of Lion Fish.

Fashionable wheelchairs can be used by students for their studies and also for local and international fashion shows. According to interviews with motorically disabled students who have passion in modelling, fashionable wheelchairs are very helpful for students with motor disabilities in overcoming mobility problems for comfortable, accessible, and safe use for studies or for fashion shows and national and international fashion carnivals.

The details for fashionable/modified wheelchairs for the motorically disabled are as follows:

The fashionable wheelchair is modified having four carved wings, two in the front and two on the back to look more elegant, powerful, and fashionable. The ground clearance is made rather high to match the international carnival standards but still within safety limits to avoid wind pressure that can come suddenly during show time. Another purpose is for an ease for the disabled to aboard the wheelchair.

The width of the wheelchair as a whole is made not too wide up to 1.5 meters but it is still safe to turn, spin, go forward or backward. A system is added for backwards running so

that people with motor disabilities are easy to maneuver backwards with the overall machine length of the fashionable wheelchair adjusting to the body of the wheelchair in general. The steering control system is kept as it is, uncomplicated and adaptable to the conditions of the stage or the long, straight runway used by the models at the show.

Fashionable wheelchairs can be used alone or pushed as usual. When turning in the desired direction, people with motor disabilities do not need to worry, they only need to hold one wheel and push on the other wheel. If they want to go forward or backward, they just need to push or pull the two iron bars on the side of the tire together as usual. Thus, the body of the wheelchair, even though it has been modified in width and height according to international carnival standards, will remain firm, stable, and upright without slippage.

This fashionable wheelchair is easier for people with motor disabilities to ride independently and users can go directly to the designer for service.

The functions of a fashionable wheelchair are as follows:

- As a mobility support tool for students with motor disabilities in carrying out daily activities, lectures and in catwalks in fashion shows or fashion carnivals on a national or international scale
- As a means of carrying equipment or goods needed by students with disabilities, which is located under the wheelchair
- As a tool to socialize with the environment and society to show the existence and abilities and achievements of students with motor disabilities with paralyzed legs or leg amputation
- As a means to increase the ability to sensitize the need for accessible mobility in the fashion world for people with motor disabilities

The meaning of the elements of fashionable wheelchair is as follows:

- The fashionable wheelchair deliberately uses art carvings on the rear and front wings and on the body of the wheelchair
- to complement and beautify a modified wheelchair.
- The carving motifs facing each other symbolize harmony in brotherhood and friendship in the community. The back-to-back carving motifs symbolize a vigilant attitude or mutual protection between communities from all threats.
- The purple color used in some parts of the fashionable wheelchair relates to the Majapahit theme. In ancient times, this color was obtained from the extraction of

mollusks, which was so expensive that at that time only noble people wore purple clothes. Therefore, there is a strong association between purple and high social status and purple is often associated with luxury, elegance and nobility.

- The unique philosophy behind the charm of the gold Majapahit carving on the wheelchair body is adopted from the sun which symbolizes achievement, success, luxury, prosperity, warmth and purity.
- Accessories in the form of pearls were added throughout the wheelchair, as pearls symbolize purity, beauty, wisdom and luxury.

As an inclusive institution that already has students with special needs, some of whom have motor disabilities, the institution should be able to create educational facilities and infrastructure that can optimally support lecture activities.

Motor disability according to (Kirk & Gallagher, 1986)is a physical health condition that is impaired so that the child's ability to carry out daily activities is hampered. (Almira Khoiriyah & Fajar Pradipta, 2017). A child with a physical disability is someone who has a certain abnormality or disability in the bones, muscles, or joints either brought from birth or acquired afterwards (due to disease or accident) resulting in disruption of normal body function (Ardiyansyah & Efendi, 2019)

To be able to overcome the mobility obstacles experienced by people with motor disabilities, a lecture facility and infrastructure that is accessible for people with motor disabilities is required.

Therefore, a special infrastructure was created that can support the mobility of lectures for students with motor disabilities, namely modified wheelchairs. The production of a modified wheelchair involves the addition of certain parts and the modifications are also specially designed to suit each user. In this case, the form of wheelchair modification applied is a wheelchair that is modified in such a way that it is tailored to the needs and characteristics of people with motor disabilities.

The four requirements for accessibility and fashion standardization according to the Ministry of Public Works and Housing Regulation Number 30/PRT/M/2006 are as follows.

- Convenience
- Everyone can reach all places independently.
- Usefulness
- Everyone can utilize all the space.

- Safety
- Every building and environment must consider safety for everyone.
- Self-reliance
- Everyone should be able to enter and use the premises without the assistance of others. (Chasanah & Fajar Pradipta, 2019)

Tabel 2 Accessibility of fashionable wheelchairs

No	Criteria of Accessibility	Std. A	Std. B	Expert
1	Convenience	Yes	Yes	Yes
2	Usefulness	Yes	Yes	Yes
3	Safety	Yes	Yes	Yes
4	Self-reliance	Yes	Yes	Yes
5	Standardization	Yes	Yes	Yes

If the research subjects, three students with motor disabilities, answered "yes", then the fashionable wheelchair was considered accessible. However, if the answer was "no", then it was considered inaccessible.

Regarding the criterion of "convenience" of accessibility in a modified wheelchair, all subjects answered "Yes", meaning that all felt that the modified wheelchair was easy enough to be used alone or pushed as wheelchairs in general. Subjects revealed that modified wheelchairs can be used on straight or winding roads with stable conditions so that it is very helpful for users.

Regarding the criterion of "usefulness" of accessibility in modified wheelchairs, all subjects answered "Yes". From the results of the interview they explained that the modified wheelchair can be driven on all terrains and road contours so that users feel comfortable in using the wheelchair. This is because there are tire modifications that are more fashionable.

Regarding the criterion of "safety" of accessibility on modified wheelchairs, all subjects answered "Yes". From the results of their interviews, they explained that they felt safe when using a wheelchair whose body as a whole remained in an upright position even when used when turning, which is one of the advantages of this modified wheelchair. In addition, the forward and backward movement with an easy operating system on the modified wheelchair really helps them to drive the wheelchair independently.

Regarding the criterion of "self-reliance" of accessibility in modified wheelchairs, three subjects answered "Yes" and one subject answered "No". Of the three subjects who answered

"Yes", they thought that with several advantages of the overall modified wheelchair they became independent in mobilizing from one place to another without being assisted by others. All three subjects revealed that they became more confident to mobility in public places independently while using this modified wheelchair. Meanwhile, one subject who answered "no" explained that he felt it took longer to adapt to the modified wheelchair because he felt it took time for him to get used to using the wheelchair independently.

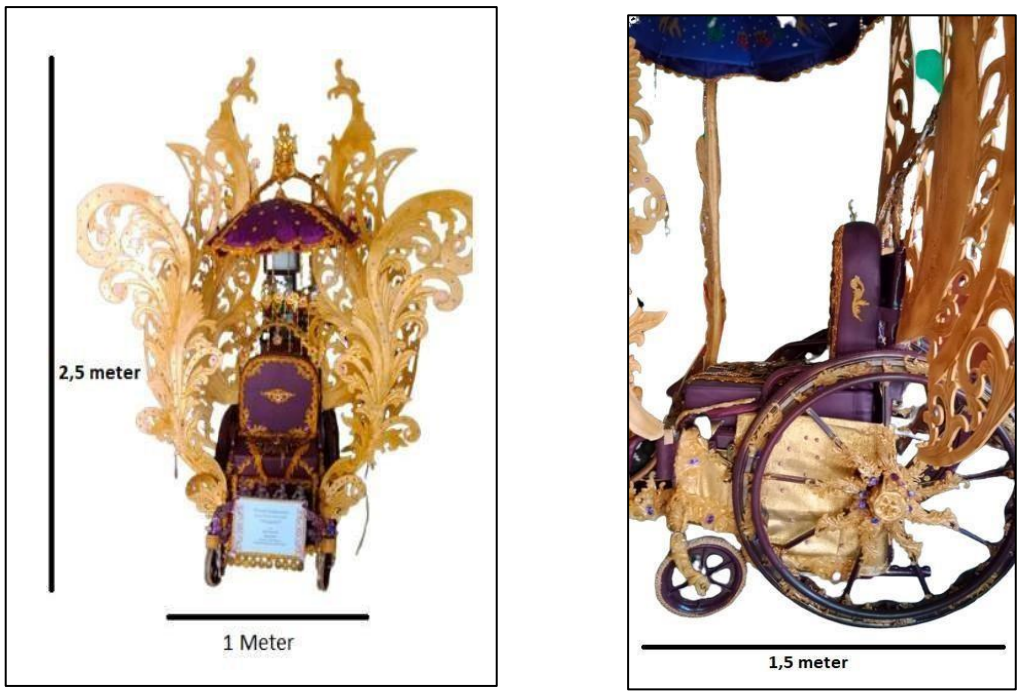

Figure1. Fashionable wheelchair for the motorically disabled

The stages of preparation for the use of geoboard media in the learning of students with mild disabilities are: a) Teachers must analyze the characteristics of their special children, which include, among others, their initial knowledge, skills and attitudes; b) After knowing the character, the next step is to formulate the learning objectives to be achieved; c) Knowing the curriculum of the field of study; d) Relating to the media, designing, modifying and developing appropriate materials and methods; e) Finally, conducting experiments before using the media.

The given stage of implementation or presentation is a process that can lead to the stage of using media at the beginning of learning. In the process of providing learning materials, it is necessary to consider and ensure that the media and equipment are ready for use, provide an explanation of the objectives to be achieved, and try to make the learning environment

conducive so that children's attention does not switch and focus only on the teacher as a teacher.

Based on the development of Geoboard learning media for children with mild deformities, which are delivered to introduce various kinds of flat shapes such as triangles, squares, rectangles, kites, circles and so on, and the material taught is adjusted based on the child's ability. Media development is developed in terms of appearance, images, coloring and uniqueness in using it and can attract children's attention to the subject matter so that children become more motivated to learn. Apart from the appearance of the development of the expansion of learning materials, in this case the development is given to children who are able to follow the material provided. The development carried out on children by providing material in the form of aspects of recognizing flat shapes as a whole using concrete media in which there are sub-aspects of mentioning the names of flat shapes seen visually, showing flat shapes by hearing instructed by the teacher, distinguishing flat shapes, grouping flat shapes and forming flat shapes directly using rubber bands on geoboard media. With the use of geoboard media that can form flat shapes in real life, mildly deaf children can practice forming flat shapes and directly understand the material of flat shapes.

CONCLUSION

The results of the research and discussion show that a modified wheelchair/fashionable wheelchair intended for students with motor disabilities can help overcome obstacles in mobility on campus and can also help mobility in the fashion world, whether it is on the catwalk or on the runway.

Fashionable wheelchairs should be produced more so that they can be used by students with motor disabilities not only in the Special Education study program on campus, but also by people with motor disabilities at other events including international fashion carnivals.

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