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Pusat Asasi

Fun Vector Learning Kit

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ABSTRACT

As time goes by, the youth keep avoiding pure subjects, especially Physics. The complexity and highly meticulous working solutions involved causes it difficult to understand. This project's main focus is to enhance the understanding of vector concepts among students and pique their interest in studying physics. When getting ourselves used to the fundamental concepts of physics such as forces and motion, understanding the basic concept of vectors play an extremely important role. Being able to solve vector-related problems will assist them in scoring physics, since about half of the syllabus requires vector solving skills. Because of this, innovating a simple, low-cost but mind-training game will get students to be invested in learning physics. Fun Vector Learning Kit, consisting of vector board, rubber lines, question cards which is guaranteed to allow students to enjoy learning vectors. It is played among 3-4 members. This innovation is also believed to change the way students see physics as they would go through the learning process independently without guidance from educators. This is a good step to reel in more Science and Technology students, especially those who take physics subjects and ensure a good commercial success in the market as it is suitable for students from secondary school to pre-university and STPM students.

Keywords: Physics; vector; Fun Vector Learning Kit; students; innovation

INTRODUCTION

Physics is one of the vital parts of sciences that demands the learners to master the important theory, concept, and consumption of formulas in order to solve the problems related to daily life. As we know, the basic concept of physics such as force and motion needed the usage of vectors because there are two fundamental elements in vectors which are magnitude and direction. Although students may experience variety theory of vector, yet they still is having a hard time in imagining and applying vector concept in daily life. (Oh Hoon Kwon, 2011).

When students are able to completely understand vector, this can help them to determine the major problem in another case of physics as physics depends on magnitude and direction and this also results in the students to manage getting a good grade for their examination. Fun Vector Learning Kit is an interactive and jest board game that lets the players memorize physics with enjoyment. Besides, this board game is also vital in strengthening academic performance particularly in vector. Until this day, the tough learning system has become a challenge for students to adapt. For instance, long-written textbooks with combinations of many types of formulae are making students feel tension, as well as uninterested and waste of time as they learn nothing from it.

Therefore, creating an exciting yet challenging educational game to be played with friends or relatives can provide the students with a better environment for learning processes. This innovation may also lead the player to have a positive perspective toward physics. Moreover, the idea of board games is proven to bring many advantages. The benefits are the players can enhance their brain functionality and creativity due to this game's inventive way of solving a problem. It also reduces stress and builds self-confidence when students start to get the big picture of physics concepts. Since this is an interactive game, the players may boost their friendship as well as communication skills. Looking toward the academic aspects, this innovation helps the students to understand more about coordination and calculation in mathematics. Other than that, games and simulations have been proven to show mixed effects for many sectors such as student performance, engagement, and studying motivation. (Dimitrios Vlachopoulos, Agoritsa Makri, 2017).

Hence, the main objectives of this innovation are:

- To increase the understanding of vector in students.
- To give an exciting and effective method for students to learn vector.
- To become an educational material for educators to teach easily.
- To change perceptions of students to learn physics even during leisure time.

INNOVATION DEVELOPMENT

This vector learning kit innovation is complete with fun compartments to ease the process of learning vectors in a more appealing way. First of all, the vector board has constant grids of boxes. This is to ensure the rubber bands representing vectors with varieties of colours match the coordinates, length and unit. It is also to make sure the rubber band used as the vectors look tidier and does not collide with another vector. As we all know, vectors are two continuous lines in terms of x and y, and the resultant vector is the line connecting them, which is the line from the beginning of the first line to the end of the second line. Take an example, let say the first line, x is blue and the second line, y is orange, the resultant vector is a mixture of blue and orange rubber bands. As a result, the players that use this vector kit can imagine the vector effectively and to tell the vectors' parts apart.

Besides that, this vector kit has a set of cards to be used for the minigame of the kit. The cards come in three colours, which are green, yellow and red. The colours represent the difficulty of the questions given for the students to solve. The higher the difficulty of the question, the higher the marks given to the students. Running a game with questions at different difficulty help students to practice their minds to get used to answer mind-boggling questions similar with examination. The cards also h ave two features namely 'CHANCE' and 'FATE'. Some question cards are randomly labeled with 'CHANCE' with an envelope image or 'FATE' with a bird image. It is up to the players to pick one of these cards and answer the questions afterward.

Figure 1: Innovation Prototype

Figure 2: Chance and Fate Card

COMMERCIAL POTENTIAL

This Fun Vector Learning Kit is as enjoyable as it is educational, especially to the target audience that are school students and pre-university of matriculation students as they can be exposed to problems involving physics. The benefits that students can reap from this learning kit include problem-solving abilities that will make the students to quicken their thinking pace to complete the question answering tasks involving calculation. The questions are composed of three difficulty tiers, namely easy, medium and hard. Our target audience are precisely students that pursue science courses that include Physics, as it is a highly compulsory subject to pass. It will be a great honour for us had the Physics Department to purchase this innovation and utilise it as a form of educating to attract more students to be inclined in bettering their understanding the basic concept of vectors. For other potential markets, we also have Petroscience as our next-level target market, considering it is a discovery centre that harbors a lot of science workshops. This vector learning kit is suitable for people aged 16 and above.

Due to the fact that most students find physics to be too difficult and find it difficult to understand the lecturer's or teacher's lessons, students are frequently bored during class. As a result, they may give up since they are unable to grasp the lecturer's or teacher's main points. As a result, they will suffer if they lose interest in studying. In order for the students to pay attention and maintain their focus on the material, they need to play something enjoyable but

tough with their peers. Experts have also found evidence to support their claims that the game helps pupils maintain their attention long enough to learn more effectively and get higher results (Lepper and Cordova, 1992). There is only one game board, and the questions on the game cards vary in difficulty. Based on the board's quality, the quantity of nails used, the type of wood used, the rubber band used, and the type of paper used, the total cost of the game is RM45. Four players can play on one board. It relies on the proportion of the discount to determine whether the promotion can be made during the Science Carnival. Some individuals may be eligible for special discounts, such as Physics lecturers and employees who use this game as a learning tool and who will utilise it in class. Facebook, Instagram, Twitter, Shopee, and Lazada are just a few of the sites we may use to advertise our goods.Because most of the audience is made up of students who are studying science subjects and specific lecturers who teach physics, bookstores, universities, and secondary schools are the best places to conduct marketing campaigns.

Budgets and Costings

Material	RM per unit	Quantity	Cost (RM)
Box nails	0.10	72	7.20
Art rubber bands	0.028	875	24.50
Wooden board	6.80	1	6.80
Papers	0.05	30	1.50
Total			40

Profit Margin

Sale price = RM 60
Cost price = RM 54
Profit percentage = $\frac{45-40}{40} \times 100\ \%$
$= 12.5\%$

CONCLUSION

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In conclusion, this fun vector learning kit aided the players to understand vector with joy and excitement. The use of vector learning kit as a board game is able to yearn the attention of not only students, but also educators due to its effectiveness and innovative idea. This learning kit can be used as a teaching material to give student a clear image of direction and magnitude which are the crucial elements in vector. The players may also spend their free time wisely by playing this board in a fun way to enhance their understanding. The improvement that can be

made for future development is we can try to develop an application so that this game can be played digitally via smartphones and laptop. We also wish this learning kit can be commercialized as a main academic tool to educate students about vector easily.

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