Effectiveness of Using *BizzApss* in Enhancing Students' Achievement with Different Learning Styles

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Abstract: Effective teaching and learning environment can be created if teachers are able to identify students' learning styles since learning styles can differ from one student to another. Learners are supposed to have authority to control their own learning, therefore it is important to ensure that they engage and be responsible for their learning. In order to ensure that students are fully engaged in their own learning, the differences between each learner must be taken into consideration in designing each teaching and learning session. For this purpose, the aim of this study was to design and develop a learning software named as BizzApss which integrated VAK (visual, auditory, kinesthetic) 1989 learning styles model. In addition the study also investigated the effects of BizzApss towards students' achievement. This software was developed according to the step by step process in ISD model by Hannafin and Peck (1988). Besides, BizzApss was developed based on an entrepreneurship subject and the software covers three subtopics which are target market, market shared and marketing strategy. The development of one subtopic was based on one learning style either visual, auditory or kinesthetic. The samples of this study were 30 students who enrolled in the entrepreneurship subject from MARA Professional College and they were selected randomly. During the learning process, students with different learning styles used the same software. After learning each subtopic using the software, students were given a set of test in order to investigate the effectiveness of BizzApss towards the students' achievement. The results were analyzed using Kruskal Wallis test after the normality test was run. The findings indicated that students' achievement improved after using BizzApss. Furthermore, a comparison between the students' achievement and their learning styles was also being analyzed. The result showed that there were differences in the mean rank for the BizApps developed between the three types of students. In conclusion, the students were dominant towards the design which matched their learning styles either visual, auditory or kinesthetic. For visual learners, the result revealed that students can understand easily when they saw pictures and explanations at the same time. This finding is aligned with the study conducted by [1] which found that the use of images and visual teaching aid helps students stored the knowledge in long term memory. [2] also noted that delivery of knowledge using pictures and diagrams gives a lot of advantages to students. Similarly, auditory students are dominant towards the BizzApss which was developed based on their learning style. [3] stated that auditory learners will focus and listen to teachers explaination at first and then will conduct activities based on their understanding. In addition the result on kinesthetic learners revealed that students were interested with the designed of BizzApss since they enjoyed the interaction provided in the software. It is because, the interaction in BizzApps provided the opportunity for them to be involved actively when they learned using the software. This statement was supported by [4[, since they highlighted that students with kinesthetic learning styles were inclined towards participating actively in the teaching and learning processes. As conclusion, this study has implications on developers of multimedia courseware, particularly instructional designers. [5] emphasized the importance of designing learning materials with different perspectives to match various learners' characteristics and preferences. Therefore, instructional designers must take the findings of this research into consideration when designing, developing and delivering multimedia in order to enrich students' achievement and motivation towards the subject matter through individualized instruction.

Keywords: Learning style; Visual; Auditory; Kinesthetic

1. INTRODUCTION

Teacher Education Division under the supervision of Malaysian Ministry of Education is responsible for managing the development of teacher education programs and therefore it is the task of the division to sustain the use of technology in education. National Education Philosophy emphasizes the need to produce qualified and competitive teachers who can be at par with the international system of teacher education. Teachers are required to teach using technology and to develop materials for teaching technology to students. Hence, teachers become an important factor in ensuring the successful use of technology in learning, especially the development of learning materials for students [6].

Although the use of technology in teaching and learning has been shown to improve students' achievement, there should also be studies which investigate its effectiveness against students who have different learning styles. This statement is clearly written in the Malaysian e-learning policy (2010), prepared by Asia e-University which states that learning materials should be developed according to students' learning styles. Aspects of learning should be emphasized in order to achieve the goal of developing knowledgeable human capital.

[7] indicated that teachers should identify students' learning styles and provide different types of assessment to improve students' academic achievement. The notion was clarified by [8], who stated that the development of learning materials according to students' learning styles is a very effective effort. Thus diversity of learning styles must be identified by teachers in order to make thorough preparation before starting the process of teaching and learning. Therefore, various models of learning styles such as Felder-Silverman and Kolb's Multiple Intelligence can be referred to by educators in order to identify the students' strengths and weaknesses. Subsequently, teachers can use the learning models to develop their learning materials according to the learning style of each student.

Self-directed learning is identified as one of the learning styles being practised by students. The findings by [9] showed there was a significant relationship between self-directed learning and students' achievement. This notion highlights that students have the ability to learn individually with a little encouragement from the teacher and if they are given freedom to learn. Therefore, based on the concept of self-directed learning, teachers at present should determine the different learning styles of students before developing teaching materials. Teachers may have the capability to develop teaching materials, but only a few able to develop interactive teaching materials which can attract students' attention. This happens when teachers fail to acknowledge students' learning styles. This notion was demonstrated in a study conducted by [10]. She found that teachers did not know the method to develop quality teaching materials which were suitable for all students. Thus, it is important for teachers to identify the learning styles of students before developing learning materials.

2. RESEARCH FRAMEWORK

The theoretical framework of this study was based on VAK Learning Model (1989) by Neil Flaming. VAK learning model states that there are three individual learning styles namely; visual, auditory and kinaesthetic. This model was used as a guide in developing learning materials. BizApps was developed as learning software for the topic of entrepreneurship. The software consisted of three sub-topics and it was developed based on different students' learning styles. The study investigated the impact of BizApps towards students' achievement.

This quantitative research used pre-experimental design since the researchers did not use a control group. Thirty students who had three styles of visual, auditory and kinaesthetic were randomly selected to test the effectiveness of the learning software.

3. BIZZAPPS DEVELOPMENT PROCESS

BizzApps software was designed and developed for Entrepreneurship. It has three different topics, namely Target market, Shared market and Marketing strategy. The topic of target market integrated visual learning style while market shared used auditory learning style. In addition, Marketing strategy adopted kinesthetic learning style [11]. Figure 1 shows the one of the interface in BizzApss Software.

Figure 1. Interface for "Target Market" subtopic

BizzApps software was developed based on Model of Instruction by Hannafin and Peck (1988). The model was chosen because it involved evaluation and repetition processes which could be done at every phase of the software

development process. Therefore, it was easier for the developers to make any corrections or improvements to the software before proceeded to another phase. The model states that the development process involves three phases namely; Need Assessment Phase, Design Phase and Develop and Implement Phase. Figure 2 below shows the Hannafin and Peck (1988) model.
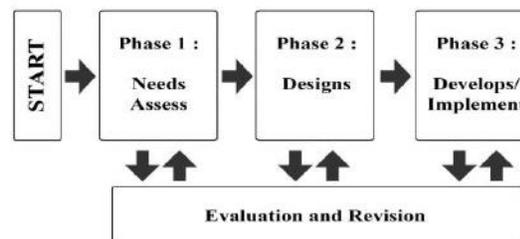

Figure 2. Model Hannafin dan Peck, 1988

3.1 Phase1 : Need Assessment Phase

Need assessment phase is the first phase in the model of Hannafin and Peck (1988). This phase requires several analytical processes to be considered such as user analysis and analysis of content and objectives of software development. In this study, the users were students who took the subject of entrepreneurship in a MARA Professional College in the southern state of Peninsular Malaysia. Therefore, every student who took the subject of entrepreneurship was taken into account by classifying them based on different learning styles of visual, auditory and kinesthetic. As mentioned before, the content analysis focused on the topic of target market, market shared, and marketing strategy. The content is based on the syllabus in the subject of entrepreneurship for Mara Professional College. Afetr analyzing the content of the subject, the researchers listed the objectives to be achieved by students at the end of the learning session. The learning objectives are:

a. clearly explain the concept of "target market".
b. lists the characteristics of the product.
c. describes the process of selecting a "target market" by region or consumer information.
d. explain the concept of "market size, market shared and sale forecast".
e. describe the types of "marketing strategy" with the ability to determine the price of the product and the correct choice of consumers.

3.2. Phase 2: Design Phase

Software design plays a very important role in the development of a software. Design involves overall plan or storyline of the software. The design phase of this study was divided into three namely, information design, interaction design and visual design.

Information design involved the efforts is to determine how the information will be passed on to consumers. Thus, the development of BizzApss differentiated three learning styles of visual, auditory and kinesthetic. As a result, one topic was based on one learning style. At the end of this phase, the developer produced a storyboard for each of the three learning styles. According to [12], a storyboard drawn by the software designer will take into account the development of the software on a computer screen.

Next, the interaction phase design involved the efforts to determine how the software would function and operate. The

researchers listed the types of interaction and operating system as well as the establishment of a control element for the BizzApps software. The control elements were important to the users so that they would always on the right track and were not lost while using BizzApps. Therefore, the icons, menus and control buttons were specified in the design phase. At the end of the phase, a flow chart of the production process was also made. According to [12] flowchart is a graphical representation of how the software works and usually the language used to describe the composition and functions of the software screen in the form which can be understood.

The last phase was the visual design and it was used to determine the design of the software. Hence, the researchers planned the layout of each multimedia element used and the layout of the display. The work done in this phase also involved selection of colors, types of multimedia and font used.

3.3. Phase 3: Development and Implementation Phase

Once the design phase was completed, the last phase involved development and implementation of software. BizApps software development process was in accordance with what was planned during the design phase. After completion of the development process, the implementation phase was conducted on the users in order to test the effectiveness of Biz Apps software to students who had different learning styles.

4. RESEARCH METHODOLOGY

BizzApps software was tested on 30 students consisting of 10 students from the visual, 9 auditory and 11 kinesthetic. During the treatment process, the students learned to use the three subtopics contained in BizApps. Then, a set of written achievement test was given to students after they had used the software. The achievement test consists of 15 questions divided into three sections, namely visual, auditory and kinesthetic section where 5 questions representing a different topic.

5. RESEARCH FINDINGS

To assess the effectiveness of the software on students' achievement, the achievement data was tested for its normality. As a result, normality test of Kolmogorov-Smirnov showed that students' achievement data was not normally distributed. Therefore, the significant impact of the software was then analyzed using a non-parametric test of Kruskal Wallis using SPSS software. Kruskal Wallis test was carried out separately for the three sub-topics in order to see the effects on the achievement of students with the three learning styles.

5.1. Achievement of students using visual learning BizzApps

Table 1 shows the value of p> 0.05 which is 0.135 and it proved that there was no significant differences in the effects of BizzApps on the achievement of students with various learning styles. However, students who possessed visual learning style had a "mean rank" of 19.00, auditory learners at 11.72 and kinesthetic learners at 15:41. Thus, based on the Kruskal Walliss test, it could be concluded that the learning materials developed based on the visual style gave an impact on students who had visual learning style. This notion was proven by the highest rank of mean value by visual learners as compared to other students with other learning styles.

Table 1. Results of Kruskal Wallis inferential statistics to test the use of visual software

	Learning Style	N	Mean Rank
Achievement	Visual	10	19.00
	Auditori	9	11.72
	Kinestatik	11	15.41
	Total	30	

	Achievement
Chi-Square	4.000
df	2
Asymp. Sig.	0.135

5.2. Achievement of students using auditory learning BizzApps

Table 2 shows the value of p> 0.05, which is 0.643. It can be concluded that there was no significant differences in the effect of auditory learning software towards the achievement of students with various learning styles. However, students who had visual learning style had a "mean rank" of 13.45, auditory learners at 16.78 and kinesthetic learners at 16.32. Thus, the Kruskal Walliss results proved that the learning materials developed based on auditory style affected the students who were the auditory learner type.

Table 2. Results of Kruskal Wallis inferential statistics to test the use of auditory software

	Learning Style	N	Mean Rank
Achievement	Visual	10	13.45
	Auditori	9	16.78
	Kinestatik	11	16.32
	Total	30	

	Achievement
Chi-Square	.883
df	2
Asymp. Sig.	.643

5.3. Achievement of students using kinesthetic learning BizzApps

The findings for the third sub-topic which was designed for kinesthetic students showed that p <0.05, with value 0.002. Therefore, the data indicated that there was a significant difference in the effect of kinesthetic learning software towards the achievement of students with various learning styles. The test results showed that students who had visual learning style had a "mean rank" of 11.25, auditory learners at 11.44 and kinesthetic learners at 22.68. The data proved that kinesthetic learning software affected the achievement of students with kinesthetic learning style as the highest rank of mean value was obtained by kinesthetic students as compared to students with other types of learning styles.

Table 3. Results of Kruskal Wallis inferential statistics to test the use of kinesthetic software

	Learning Style	N	Mean Rank
Achievement	visual	10	11.25
	Auditori	9	11.44
	Kinestatik	11	22.68
	Total	30	

	Achievement
Chi-Square	12.574
df	2
Asymp. Sig.	.002

6. DISCUSSION OF FINDINGS

The findings of students' achievement test were analyzed using Kruskal Wallis test. The analysis of test data showed that there was no significant difference between types of learning styles of students who used visual style BizzApps software. The results indicated that students regardless of learning style differences were capable of learning using the software developed according to BizzApps visual learning style. This finding is consistent with the findings of a study conducted by [13] in his study entitled "Adapting ESL learning styles: a case study of a student in SMEs". Her research discovered that learning through auditory and visual methods are very effective for students.[14], also conducted tests on the ability or inability to adapt to a new style of visual and auditory. The findings showed that all students showed positive reaction to visual learning aid such as by using painting, students were able to understand the notes easily.

Then, the results of the above studies are also supported by a study conducted by [15] who found that visual learning helped students to understand the teaching and learning presented by the teacher easily. In addition, based on the interview data , [15] also concluded that there was no difference in the performance of active and less active students after they were exposed to visual learning materials. These findings highlight the notion that visual learning can be used by anyone with different learning styles.

However, the researchers also made a comparison of the achievements of these three types of students based on visual BizzApps software. Hence, analysis of the data showed that there were differences between the mean rank of visual learners, auditory learners and kinesthetic learners based on BizzApps software developed through visual learning style. This finding showed that students who had visual learning style was very dominant towards BizzApps software developed according to their learning styles. In contrast, students who had auditory learning style showed the lowest level of achievement which indicated that auditory learners were not capble of learning using BizzApps with visual learning style.

Therefore BizzApps software developed based on the visual style can be used by students with all types of learning styles. However, due to its nature, BizzAppsis more suitable for students with visual learning style. The findings prove that students can easily understand what is taught when they see pictures and less writing. This notion is also evident from a study conducted by [1] who found that the use of pictorial materials in teaching can assist students' understanding .In addition, [2] also noted the delivery of learning through the use of pictures and diagrams gave a lot of advantages to students. In addition, they also reiterated that visual learning style could provide many advantages to the students in terms of verbal processing.

The analysis for BizzApps auditory style software showed that there was no significant difference between the three types of learning styles. However, the analysis found the highest mean rank belonged to the group of students with auditory learning style. It shows that auditory learners performed better as compared to the other groups of students when using learning materials based on their learning styles. [3] stated that auditory learners completely gave their focus to teachers during any learning processes and they did not do any activities. This type of learning process usually involves teacher-centered learning. The results of achievement tests showed that students who with auditory learning style performed better on the questions which were designed based on BizzApps auditory style. However, only small differences in terms of tests achievement were shown by students with visual and kinesthetic styles. Therefore, students with visual and kinesthetic learning style had no problem in using BizzApps with auditory learning style.

In contrast to the software developed by BizzApps kinesthetic learning styles, the analysis showed that there were significant differences between the achievement of students with different learning styles after using the software developed based on BizzApps kinesthetic learning style. The results of the mean rank also showed that students with kinesthetic learning styles were more dominant towards kinesthetic learning materials. This shows that students who have kinesthetic learning style cannot learn effectively using teacher-centred approach but they are more likely to learn if the lesson involves movement. Figure 3 shows one of the interface in Marketing Strategy topic which need students to type the answer in the space given in the software.

Figure 3. One of the activity for students in "Marketing Strategy" subtopic

Moreover, according to [4], students' academic achievement can be improved if the students practise what is learned in the classroom. According to them, students can learn better in active learning situations. The significant difference was also observed from the test results achieved by visual and auditory learners. Students with visual and auditory learning styles were also able to learn using the software developed based on kinesthetic learning style. [16] highlighted that the strategy to teach students with auditory learning should include active classroom activities. Thus, the teachers' preparation before class sessions and the chosen learning strategy are important to provide opportunities for auditory students to get involved in the classroom.

In conclusion, the analysis proved that the software developed greatly affected students with different learning styles. In addition, the analysis also showed that the visual type of learners were very dominant using BizzApps software developed by visual style, auditory learners were also dominant using BizzApps software developed by auditory learning style and simultaneously kinesthetic learners were very dominant using BizzApps software developed by kinesthetic style. However, there were students who could master the topics of entrepreneurship well using BizzApps which was not according to their learning styles. Clearly, a student does not necessarily have only one type of learning style. Teachers should be more creative in order to diversify teaching methods and take into account the different types of learning styles among

students.

7. CONCLUSION

The development and reserach on BizzApps software showed that students' achievement can be improved if students' learning styles are taken into consideration by teachers in designing their lessons. Thus, it is important to determine students' learning styles before giving assignments or starting any process of learning to students. This is because students learning styles vary from each other [17]. In addition, the software development process which integrates VAK learning style model (1989) is seen as capable of helping educators to understand the characteristics of each learning style. This is because, in the process of teaching and learning, teachers play a very important role in ensuring students readiness to receive knowledge and skills. Consequently, teachers need to diversify their teaching methods in order to attract students to continue to learn. Each teacher must plan activities which fit the students' learning styles. In short, teaching and learning process which is carried out according to students' learning styles will assist students to understand the lesson content and help boost their performance.

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