Visual Basic Coding in PowerPoint-Based Lessons for Grade 6 Mathematics

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Abstract
There is no doubt that education and the learning process has changed since the introduction of computers such as PowerPoint-Based Lessons. It includes pedagogical approaches like interactive learning, inquiry-based approach, discovery learning and contextualized-localized learning that promotes student-centered activities and lessons, teacher-assisted instructions and appreciation of the locale by-products, livelihood, academic-occupational relevance, and individuality. Mixed method was used in getting the impression and significance increase of the pre-test and post-test. There was a large effect and significant increase in the pre-test and post-test scores in the learners' conceptual understanding (d = 1.36 & 0.89), problem-solving skills (d = 0.56 & 0.39), and interest (d = 1.56 & 1.05) towards Mathematics in experimental and control group respectively. Unfortunately, there was only a small effect and no significant difference between the groups. However, it doesn't pose any conflicts in the use of technology in the classroom context rather it clearly showed the versatility of the pedagogical approaches in the reality of the educational system. Overall, the quality of the instructional material and the assimilation of technological progress in the classroom are crucial for the teaching and learning process. In relevance with the changes, educators should accept and wholeheartedly embrace technology-based tool in teaching as one of the proofs of the continual professional development, keeping abreast with needs and interests of the 21st century Millennial learners. The challenge is to incorporate technology in a more engaging (active) rather than entertaining (passive) manner.

Keywords: PowerPoint-based, pedagogical approaches, and student-centered

Introduction

According to the International Bureau of Education the design of primary education is to meet the basic learning needs of the learners such as literacy, oral expression, numeracy, and problem-solving which are intended to prepare pupils to benefit from secondary education. One possible solution to achieve this goal is the use of computers as it increases the conceptual understanding and problem-solving skills of the learners[1]. Nowadays, an increasing number of educators utilize technology-based materials in facilitating discussions and lectures. However, even technology is ubiquitous in teaching, many are still cannot maximize its uses. Effective use of ICT in teaching and learning process is needed to suffice the prerequisite aspects to have conducive learning in relation to the 21st-century learners[2]. And being familiar with these technology-based tools is not enough to achieve the goal because "teachers should be geared to the teaching of fundamental ideas in whatever subject is being taught – Bruner, 1960"[3]. Additionally, proficiency in teaching is related to effectiveness. Proficiency demands being flexible or being able to work effectively in a diverse kind of students in any situations or environment and across a range of mathematical content[4]. In general, the results of teachers' abilities to design lessons based upon robust instructional principles are vital in making effective technology-based teaching[5]. Consequently, the instructional principles integrated in the PowerPoint-based lessons were premise in the provision of Philippine Republic Act 10533, Enhanced Basic Education or K+12 Program, which states that curriculum shall "be contextualized and globalized, shall use pedagogical approaches that are constructivist, inquiry-based, reflective and collaborative and integrative, and shall be flexible enough and allow school to localize, indigenize, and enhance the same based on their respective educational and social context..,".

Methodology

The study used a developmental method to have a systematic process in designing, developing and evaluating the developed instructional materials. Also, it integrated mixed method with quasi-experimental design in which the gathered data in quantitative data were compared and analyzed the effects in the learners' conceptual understanding, problem-solving skills and interest, while qualitative data was used to validate and support the numerical claims. The first phase of this research was to think the applicable approaches to the chosen topics, then it followed by conceptualizing the lesson plans along with the development of the PowerPoint-based lessons. After these, the developed tools were assessed and evaluated by the experts,

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[1] Lazakidou, G & Retalis, S. (2010). Using computer supported collaborative learning strategies for helping students acquire self-regulated problem-solving skills in Mathematics. Computers & Education. Vol 54, Issue 1, January 2010, pages 3 – 13.

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[4] Kipatrick, J., Swafford, J., Findell, B. et al (2001). Adding + IT UP: Helping Children Learn Mathematics. p. 369. National Academy Press,WashingtonDC. Retrieved from: https://www.nap.edu/read/9822/chapter/12

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thus, all suggestions were applied before the conduct of the study. The locale of the study is at Travesia Elementary School, Travesia, Guinobatan, Albay, Philippines. There were four sections and out of those sections only two groups were analyzed to be comparable. After identifying the groups, the researcher tossed a coin to determine which group will be the control and experimental. The two sections have 40 students, and only 33 and 34 learners in control and experimental group respectively were accepted in the analyzation of data because others did not meet the required hours for the implementation.

Effects of the PowerPoint-based lessons.

The purpose of developing an intervention is to have effects on its recipient. For example, in education, many educators and researches developed instructional materials which deem to show positive results specifically in the performance of the learners. In this study, the researcher developed instructional material, PowerPoint-based lessons, which provides provide digital learning experiences with student-centered lessons and activities through guiding questions, learning-by-doing, and localization of examples and situations. Hence, statistical treament such as mean scores and standard deviation for pre-test and post-test, the p-value for a significance level, and Cohen's d for the effect size are shown in table 1.

Domains	Statistical Treatment	Experimental Group		Control Group	
		Pre-test	Post-test	Pre-test	Post-test
Conceptual understanding	$\bar{x}$	6.18	9.21	7.35	9.38
	sd	2.65	2.75	2.63	3.04
	p-value	<0.0001*		<0.0001*	
	Cohen's d	1.36		0.89	
	Effect size	Huge		Very Large	
Problem-solving skills	$\bar{x}$	8.58	10.00	7.50	8.82
	sd	3.16	3.13	3.38	3.34
	p-value	0.001508*		0.0146*	
	Cohen's d	0.56		0.39	
	Effect size	Large		Moderate	
Interest	$\bar{x}$	3.81	4.24	3.86	4.28
	sd	0.26	0.20	0.36	0.22
	p-value	<0.0001*		<0.0001*	
	Cohen's d	1.56		1.05	
	Effect size	Huge		Very Large	

Table 1. Effects of the PowerPoint-based lessons in the domains of learning

Table 1 shows the differences between the used of instructional technology in teaching, PowerPoint-based lessons, from conventional teaching despite the significant increase in the mean scores from pre-tests to post-test in both groups. The effect sizes of d = 1.36, 0.56, & 1.56 of experimental group versus the effect sizes of d = 0.89, 0.39, 1.05 in the conceptual understanding, problem-solving skills and interest, respectively, explains that the integration of instructional technology in teaching is greater than the implementation of conventional teaching alone. Likewise, the significance level under the problem-solving skills is in favor of the experimental group, a p-value of 0.001508 is less than 0.0146, which is closer than to 0.00. The

first good point of using technology in the classroom is it saves time because even the only last five or ten seconds of giving instruction are critical moments in any discussions[6]. Also, well-defined applications of pedagogical approaches promote remarkable results, like the used of interactivity in the classroom as a premise in the Edgar Dale Cone of Experience, that the retainment of active learning is 70% to 90% unlike the passive learning that up to 50% only. Moreover, cognitive load theory which explains "the free exploration of a highly complex environment may generate heavy working in the memory load that is detrimental to learning"[7] was not observed since two features, enhanced discovery learning and inquiry-based learning, were properly integrated into with the discussion. Lastly, the used of contextualized problems help learners to enhance their problem-solving skills because they were familiar with the situation or context of the problems[8].

In the learners' focus group discussion, a question was asked "What can you say about the PowerPoint-based lessons?" then a pupil replied "*Maganda siya colorful, nakakaattract sa mga bata para makinig. At mas naiintidihan kasi step-by-step* – (It is beautiful and colorful; it attracts the learners to listen. Also, the lessons were very easy to understand because it provided a step-by-step process". Also, another pupil expressed his answer in the question, "What is the impact using this kind of material in teaching" - "*Mas nadedevelop and kaalaman ko magsolve ng math problems and naencouraged ako to participate na nagiging dahilan ng pagdevelop ng aking skills in solving* – (It really developed my knowledge and encouraged me to participate in the discussion which honed my skills to solve math problems". In addition, teachers observed notable behaviors during the implementation of the study, such as increasing number of active learners which made them recite during the lessons, solve problems on board, being attentive in the lectures, doing their individual activities, and above all most of the learners were present during the discussions.

Conclusion

The four pedagogical approaches, interactive learning, enhanced discovery learning, inquiry-based approach, and discovery learning, integrated in both PowerPoint-based lessons and conventional teaching promote student-centered lessons and activities, teacher-facilitated instructions, appreciation of locale-by products, livelihood, academic-occupational relevance, and individuality. Results showed that there were significant increase and remarkable effect size in the performance level and interest of the students for both groups. Statistically, there was no significant difference in the two groups, yet there is a very small effect size in using the instructional-technology in teaching which still deems to be positive and evident in the focus group discussions. It also implies that well-designed lessons and application of pedagogies either in the integration of technology or conventional showed versatility in the reality of the Philippine educational situations, where some schools in rural places do not have a power supply.

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[6] Scrivner, J. (2014). Classroom management techniques p. 128. Cambridge University Press (4th Print)
[7] Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive Load Theory and instructional design: Recent Developments, Educational Psychologist 38: 1 – 4.
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Recommendation

There have been immense advances in technology in most aspects of people's lives including in the field of education. And as computers are becoming a common tool for teaching, teachers should be more aware of the role as a guide in the acquisition of knowledge rather than transmitters of facts. They must be open-minded to the changes that are taking place, serve as problem solvers and innovate approaches or methodologies in the learning process; thus, allowing learners to discover facts for themselves. However, there are factors that are still holding the teachers to put these ideas into reality. But these are not enough to be excused in improving the way of teaching. Hence, the researcher's study contemplates how interactive learning varies in e-classroom-based learning and usual classroom setup. It showed that either of the two situations will make a significant effect on teaching. In addition, synchronization of other approaches like inquiry-based approach, discovery learning and contextualized can make an impact to acquire a meaningful way of learning, because its counterparts the weaknesses and strengthen the benefits of each other. Another factor that was considered is the capability of teachers in delivering the lessons with a distinct setup. Thus, the key to making real the ideal pedagogical approaches will depend on the teachers' skills and determination

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