

**First Bahamas Mixed-Methods Game-Based Learning Research  
Reveals Teachers Support Use Of Games In STEM Instruction**

**In Brief Preliminary Findings**

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## Abstract

Very few studies on game-based learning (GBL) have been conducted within the Caribbean/West Indies, particularly studies of a mixed-methods nature examining in-service K-12 STEM teachers' perspectives. This paper, which presents preliminary, in brief data results (full study findings forthcoming), addresses the aforementioned gap and explores the benefits of employing GBL as a teaching strategy in primary (elementary) and secondary schools within the Bahamas where no research has been conducted in the area of GBL. This study utilizes a mixed-methods approach and is made of a quantitative questionnaire for teachers and interviews with teachers. Thirty-nine teachers completed the quantitative questionnaire and 29 teachers participated in the interview session. Teachers were drawn from the Bahamas' first National Science, Technology, Engineering, the Arts, and Mathematics (STEAM) GBL Conference. Data findings from the teachers' completed questionnaire and interviews should begin to fill in the research gap as it relates to GBL in the Bahamas and the Caribbean.

***Key Words: Game-Based Learning (GBL), STEM based learning, Bahamas, Caribbean, Primary School, and Secondary School***

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Special thanks to the Lyford Cay International School for co-partnering with Dr. Pinder to host the Bahamas' 1<sup>st</sup> National STEM Game-Based Learning Conference, Feb. 3<sup>rd</sup>, 2018, from which has resulted this first preliminary mixed-methods research paper on GBL to come out of the Bahamas.

## Introduction and Brief Review of the Literature

The USA, China, Malaysia, Jordan, Turkey, and even some of the Bahamas' Caribbean neighbors are using game-based learning (GBL) as a platform to deliver interesting and innovative lessons in primary and secondary schools. The traditional "chalk and talk" is no longer considered the norm in the teaching-learning process; but rather, creative fun-filled game activities, which can be incorporated into lessons, are now considered the "way to go" in teaching.

Specifically, neighboring countries to the Bahamas such as the United States of America (USA) and Jamaica are wholeheartedly embracing GBL as a way to improve STEM (Science, Technology, Engineering, & Mathematics) based learning within Primary and Secondary Instruction. In a 2017 U.S. study, "*K12 Embraces Video Games*," it was revealed that GBL can serve several critical functions: "can engage students, lead them to better perform on tests, and can improve critical thinking skills (Whitmer, 2017)." According to an article published in the 2015 Jamaican Gleaner "*Education Ministry Turns to Game, Performing Arts-Based Learning*," it was revealed that the Jamaican Ministry of Education made a "move to improve the teaching of mathematics, science, and language through the use of Information Communication Technology (ICT) and GBL." Jamaica secured \$108 million from the United Nations and targeted 6000 teachers and administrators in order to move ahead with this initiative during the 2015/2016 fiscal year.

In an effort to make a case for GBL as a platform to improve teaching and students' achievement in STEM based disciplines in the Bahamas, **Dr. Patrice Juliet Pinder** recently conducted the Bahamas' 1<sup>st</sup> STEM GBL research study. The larger research, which is a mixed-methods (quantitative and qualitative) study is titled "*In-Service STEM Teachers' Perceptions of Using GBL in Primary and Secondary Instruction in the Bahamas*." The STEM based GBL study represents a first for the Bahamas and also represents one of a few studies of its kind within the Caribbean. Teachers who participated in this research study were drawn from 10 primary and secondary schools, 3 private and 7 public schools, and were all attendees at the Bahamas' 1<sup>st</sup> STEAM (Science, Technology, Engineering, Arts, and Mathematics) GBL conference, which was a conference Dr. Pinder created and co-partnered with the Lyford Cay International School to host in February, 2018. In all, the conference attracted 50 teachers and administrators; of which, 39 completed a survey/quantitative questionnaire, and 29 participated in an interview session in which they were given three interview questions. The survey and interview questions were designed to get teachers' overall view points on using games in instruction. As an important note, this research piece being presented to you is a preliminary, brief version of the larger Bahamian study "*In-Service STEM Teachers' Perceptions of Using GBL in Primary and Secondary Instruction in the Bahamas*." The full study is forthcoming.

## **Particulars of the Bahamian Study (Pinder & Pinto, 2018):**

### **Research Questions**

Three research questions were used, which were:

1. What are your perceptions/views on the use of a game-based learning approach being employed in the traditional teaching of educational concepts, be it in science, math, or other subject?
2. In what ways might game-based learning impact your traditional teaching of educational concepts, be it in science, math, or other subject?
3. In reflecting on your students, in what ways might game-based learning affect those of your students with learning deficiencies or learning challenges?

### **Methods**

A mixed-methods approach was employed in this study, which consisted of: first, a quantitative questionnaire with 10 Likert-type questions where strongly agreed = 5, agreed = 4, neutral = 3, disagreed = 2, and strongly disagreed = 1 (Karadag, 2015), and second, three interview questions were used as a part of the qualitative section of the study (interview questions were adapted from Pinder, 2016, 2017).

**Sample Size and Curriculum Focuses of Teachers were as follows:** 50 K-12 educators attended the conference, 39 out of 50 teachers or 78% completed the survey, and 29 out of 50 teachers or 58% completed the interview questions. Additionally, the teachers represented either the Bahamas' National K-12 Curriculum in STEM, or the International Baccalaureate (IB) North American K-12 STEM Curriculum, or a combination of both curriculums.

**Reported Gender and Years of Teaching Service:** Of those teachers that reported their gender on the survey, 19 reported their gender as female, 4 reported their gender as male, and 16 individuals did not report their gender. With respect to reported years of teaching, 9 teachers indicated 0 to 10 years of teaching service, 5 teachers indicated 11 to 19 years of teaching service, 12 teachers reported 20 years or greater of teaching, and 13 teachers did not indicate their years of teaching service.

### **Procedures**

#### **First:**

Teachers were trained on the use of game-based learning techniques and tools. Specifically, as the teachers were being trained they were exposed to:

- theories behind game-based learning—cognitive and constructivist theories
- 4 non-digital games or paper based games and 7 digital/computer based games (teachers played these games)

## **Second:**

Teachers were grouped and were allowed to participate as a group/team in an engaging “teacher interactive session” where each of the groups were allowed to choose one of the following options, either to create their own: “Spin, Select a Number and Question Game,” or to create their own “Random Question Game,” or to create their own “Classroom Feud Game,” or to “think of and discuss a creative game they would like to design for their classroom,” or “to serve as game reviewers, thus critiquing others of their peers’ games and gaming designs.”

## **Third:**

After being exposed to various forms of digital and non-digital games and after participating in the “interactive session,” teachers were next given the quantitative questionnaire (survey) and three semi-structured interview questions to complete.

## **Data Analyses**

This research study consisted of: first, a teacher quantitative questionnaire where teachers’ views and perspectives of game-based learning were captured on a rating scale of 1 to 5, where 5=strongly agreed to 1 = strongly disagreed, and second, semi-structured interviews with teachers where teachers’ views were expressed in writing and later the primary researcher “**coded**” the written responses in order to generate the “**themes**” and “**categories**” that inform this study’s data results.

## **Key Preliminary Findings of Study (Pinder & Pinto, 2018):**

This study sought to examine Bahamas’ pre-primary, primary, and secondary school teachers’ views of employing game-based learning within primary to secondary instruction. The following preliminary findings represent teachers’ favorable or unfavorable responses toward GBL as expressed on their completed survey and on the responses they gave to the three interview questions posed to them.

## **Brief Quantitative Survey Findings Were:**

**50–64%** of Teachers Surveyed **Strongly** Believed:

*GBL will make it easier for school students to excel in any subject (math, science, or other subject),*

*Use of GBL in school classrooms should be increased over time,*

*GBL can be highly effective in simplifying concepts for primary and secondary school students,*

*GBL can be used in any phase of the instructional process,*

*GBL is an effective strategy for assessing students’ skills,*

*And, GBL can make it easier for primary and secondary school students to learn any subject (math, science, or other subject).*

*(Survey questions taken from Karadag, 2015)*

**50–56%** of Teachers Expressed **Strong Disagreement** to these Survey Items:

*Developing games in instruction is difficult,  
Game-based learning is time consuming in primary and secondary instruction,  
Game-based learning will not contribute to the primary and secondary instructional processes,  
And, Game-based learning is not effective in primary and secondary instruction.*

*(Survey questions taken from Karadag, 2015)*

### **Brief Qualitative Findings From Teachers' Interview Data Were:**

**83%** of **teachers interviewed** held “*positive views*” about using games within their classrooms and saw them as “*useful/amazing tools,*” to enhance their teaching process.

Teachers also felt that using games in their instructional process could improve their students’ “*reviewing/recalling of new knowledge*” and “*development of deeper subject concept/content understanding.*”

Teachers also felt that use of games could benefit their students with “*different learning styles*” and “*learning challenges.*”

Only, **17%** of **teachers interviewed** held “*negative views*” on the use of GBL tools and strategies and they expressed sentiments such as:

*“GBL is very time consuming”*

*“May inhibit the learning process”*

*And, “GBL should not replace traditional teaching or assessments”*

### **Conclusion**

Both quantitative and qualitative data seem to suggest that GBL is a strategy that teachers in the Bahamas would want to employ or are employing successfully within their classrooms. As with Pinder (2016, 2017), teachers in this study believed that “*GBL positively impacts the teaching and learning process*” as Bahamian teachers interviewed saw games as “*useful tools,*” which could help students to better “*review and recall concepts.*” Additionally, games were seen as having an appeal to traditional as well as “*visual and special needs learners.*”

It is also very important to note that teachers’ gender and years of service within the profession did not appear to influence their views on using GBL, as early career teachers (0 to 10 years in service) and veteran teachers (20 years or greater in the service), as well as male and female teachers all seemed to favor the “*use of GBL tools and strategies within their classrooms.*”

## **Limitation of Study**

This research had a limitation with respect to the number of teachers who participated in the survey part of the study. The sample size was somewhat small and so this study's results may not be generalized to a larger population of teachers representing the entire Bahamas.

## **Future Research**

This research in brief and the larger forthcoming study "*In-service STEM Teachers' Perceptions of Using Game-Based Learning in Primary and Secondary Instruction in the Bahamas*" represent the first pieces of mixed-methods studies of a STEM focus centered around game-based learning to come out of the Bahamas. The studies also represents one of a few studies from the Caribbean/West Indies region on game-based learning. Thus, it is recommended that more studies on game-based learning be conducted in the Bahamas and the Caribbean; particularly, studies of a mixed-methods nature. The present research gap would be greatly filled if more researchers fulfilled the "call" of conducting more research on game-based learning in the Bahamas and the Caribbean

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## **About the Primary Researcher/Author of this Article:**

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**Dr. Patrice Juliet Pinder is a Bahamian born, noted international STEM (Science, Technology, Engineering, & Mathematics) Based Researcher who has produced more than 30 research and teaching scholarly products, such as: a STEM research book, book chapters, journal articles, conference papers, and grant proposals. She has served as a peer reviewer of Science/STEM based journal and conference papers and has reviewed research papers for such prestigious organizations as: Howard University's Tier 1 Journal, *The Journal of Negro Education*, *China*, *US Education Journal*, *NARST (National Association for Research in Science Teaching)*, *ASTE (The Association for Science Teacher Education)*, and *SAGE OPEN Access Journal—STEM Division*.**

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