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Facilitating E-Learning Using Collaborative and Social Methods in the 21st Century

Abstract

Facilitating learners at all levels of the education stratum to become effective twenty-first century knowledge creators, inventors and innovative workers is increasingly recognized today as a primary objective of education. Presently, the rapid expansion and availability of knowledge indicates the importance of curriculum and instructions that will empower learners to process knowledge using learner centered strategies rather than merely memorizing facts infused by teachers or lecturers. This means that graduates at every phase of the educational system be outfitted with the skills to interpret, analyse or manipulate information, critically think about information, ideas and opinions, and draw conclusions, inferences or generalizations, and communicate their ideas and provide constructive feedback to peers. The twenty-first century has cemented that e-learning is indeed a viable and competitive option for facilitating learning. E-learning via fully online or blended course environments therefore needs to ensure that its learners are equipped with twenty-first century skills and competencies. This paper will demonstrate how a collaborative and social facilitation model, 2T2C, can aid in transforming e-classroom environments and assist in improving learner's creative, inventive and innovative thinking, indicative of pedagogy and technologies to accomplish the dissemination of skills and competencies fitted for the twenty-first century. It also presents a delivery model with ODL training for facilitators which increases efficiency and effectiveness in preparing students for lifelong learning.

Keywords: 21st century skills, social learning, collaborative strategies, critical thinking, creative thinking, e-learning

The Need for 21st Century Skills and Competencies

Twenty-first century skills include teamwork, communication, innovation, and creativity and have as corollaries, creating, evaluating and analyzing, challenging the learner, promoting active participation, argumentation, problem solving, conducting investigations and tackling subject matter that is complex (ATCS, 2010). It involves a new learning culture that caters for learners being at the center of learning and being fully involved in social and collaborative learning.

Twenty-first century skills from The Framework for 21st Century Learning (Partnership for 21st Century Skills, 2009), consists of critical thinking and problem-solving, communication and collaboration, and information communication technology literacy and application. The solution to making 21st Century skills have an important effect on learners is to transmute them into e-learning applications connected to curriculum content and assessment (Jacobs, 2010). Regan (2008) corroborates that the infusion of 21st Century skills must be a primary element of teaching and learning and not placed as add-ons to the curriculum. Thus, e-learning facilitators must be trained to effectively infuse 21st Century skills and competencies in their online sessions.

It must be emphasized that these 21st Century skills have always been important for students, however, they are particularly and significantly crucial in our present information and knowledge-based economy

and society. To be able to hold information-age jobs, graduates need to think deeply about issues, solve problems creatively, work in teams, communicate clearly in many media, learn ever-changing technologies, and deal with a flood of information (Friedman, 2005). The rapid changes in our world require students to be flexible, to take the initiative and lead when necessary, and to produce something new and useful. Twenty-first century skills should therefore be pre-requisites to enter the job-market.

Friedman (2007) and Wagner (2008) states that employers in the twenty-first century stipulate that employees be critical thinkers, effective collaborators, innovators, and excellent communicators. Bellanca & Brandt (2010) also agrees that twenty-first century companies, organizations and countries are interested in finding the most qualified human capital to contribute to the advancement of knowledge creation. Hence, there is a challenge for educators to transform how they prepare learners for the inevitable and impending workforce. In other words, e-learning institutions have to approve and permit the empowering of their learners to obtain twenty-first century skills and knowledge to meet the demands of a knowledge-based economic workforce.

Theoretical Framework

Constructivist theories stand out clearly as the most suitable to examine the infusion of twenty-first century skills (Warner & Goolamally, 2016). This constructivist theory of learning attributes most of its foundational principles to the works of Piaget (1950) and later Vygotsky (1978). Teachers and learners will therefore be guided via active, collaborative and cooperative measures and strategies to accomplish high-order thinking, confidence, technology competencies, and communication skills, through real-world problem solving tasks, in the form projects, to attain the skills related to twenty-first century skills.

Learners of a constructivist e-classroom should therefore be given problems which they have not encountered before but of which they may believe they have the content and the technical ability to solve. Therefore, questions given by facilitators should be mostly non-algorithmic and can be given in the form of projects and assignments which will allow their learners to think and develop. This is essential today as the twenty-first century requires graduates to solve new and dynamic problems (Wagner, 2008). Learning therefore is not simply the positive acquisition of facts from one person to another, as a teacher presenting facts to students or a student simply reading and memorizing facts; as in rote learning.

The development of 2T2C took into consideration the need to prepare learners' for work and/or further studies. At the core of the 2T2C model are its four pillars, thinking, technology, communication and confidence. The 21st Century requires a different type of graduate who should possess skills to live, function and work in a highly technological and dynamic world. With this backdrop and the need to create learning environments that assist students to acquire 21st Century skills, 2T2C can be used by e-learning institutions to infuse 21st Century skills simultaneously within all subject disciplines.

Purpose of the Study

This study is a derivative of a larger study, and its main goal is to explore the perceptions of teachers' and students of the experiment group as the model 2T2C was being implemented.

The specific research questions are:

What are teachers' perceptions of the instructional model in the teaching and learning of mathematical concepts?

What are students' perceptions of the instructional model in the learning of mathematical concepts?

Methodology

A qualitative research designed was used in the study whereby the two teachers of the experiment group were trained for nine weeks to implement the 2T2C model. At the end of the study, which lasted for 12 weeks, interviews using the one-on-one and focus group approach were performed on both teachers and students. Specifically, chosen interviews, consisting of a list of open-ended questions, determined how teachers and students perceived the tenets of the instructional model in terms of acquiring 21st Century Skills and understanding mathematical concepts. Their perceptions were then analysed. The open-ended nature of the questions provided opportunity for the researcher and interviewees to discuss their experiences in greater detail. When the interviewees had difficulties in answering a question or hesitated, the researcher was able to probe further. Three types of probes were used, as stated by Barriball & White (1994), namely, the detailed-oriented probe, the elaboration probe and the clarification probe.

The sample was selected from a total of 50 teachers and 765 students from a secondary school in The Republic of Trinidad and Tobago. The sample was then chosen from a total of 8 mathematics teachers (from the Mathematics Department) and 117 Form Four students (ages between 14 and 16 years). The four teachers were chosen based on allocation policies and their eligibility to teach by the Ministry of Education. There were 4 distinct Form Four classes which met at the same time for the duration of the study. Two teachers were chosen for the control group and 2 for the experiment group.

Instructional Models

An instructional model is a well-developed way of teaching that not only has a strong rationale, but lines of research into their workings and into what is expected once it is used (Joyce, Calhoun & Hopkins, 1997). It is therefore imperative that instructional models be identified to assist e-learning facilitators to infuse 21st Century skills. Students have different learning preferences and learn at different rates. Joyce, Weil and Calhoun (2009) advocates that facilitators must not only be knowledgeable about the content they teach, but must also know and be committed to making decisions that involve the use of a variety of instructional models, their accompanying strategies and techniques, and approaches suited for particular purposes and appropriate to meet the diverse learning needs of students. Illustrating from major philosophical and psychological theories regarding how humans learn, Joyce, Weil, and Calhoun (2009) described four families of instructional models, namely: The Informational-Processing Family, The Personal Family, The Social Family, and the Behavioural Systems Family.

Educators' goals should thus be to have their learners organize, store, and retrieve knowledge and skills. By applying what we know about how the brain functions and remembers, educators can focus on the learning aspect of the teaching/learning process. All this can only happen if facilitators have the knowledge and experience and use the correct instructional models, strategies and techniques. Instructional strategies and techniques for e-learning facilitation must thus be provided to facilitators in order to ensure that they have these skills and competencies. Hence it is crucial that a facilitation model for the 21st Century be considered and constructed for e-learning which led to the development of 2T2C (Thinking, Technology, Communication and Confidence).

The Development of 2T2C

The 2T2C model firstly provide facilitators with the necessary and relevant training, to ensure that they have the confidence, belief, competencies and skills, as well as understanding of the need to infuse these skills, in their teaching and learning as practitioners. The training also equips facilitators with Open Educational Resources (OER) that are critical for them to perform their facilitation duties expertly. Support is also provided when and where necessary during the implementation of the model. The purpose of 2T2C is to facilitate the infusion of elements of 21st Century skills, simultaneously, while facilitating subject matter content. As students respond to e-learning instructional strategies and the intervention,

facilitators will implement 2T2C adeptly. Thus, at the end, both teacher and students, via 2T2C, will possess skills which are synonymous with 21st Century learning.

Implementation of 2T2C

Figure 1 depicts the 2T2C model. The model has both a conceptual and theoretical framework as its foundation. The training of facilitators and equipping them with the thinking skills and competencies are crucial. The four pillars of the model are some elements of 21st Century skills being used in this study, namely, Thinking, Technology, Communication and Confidence.
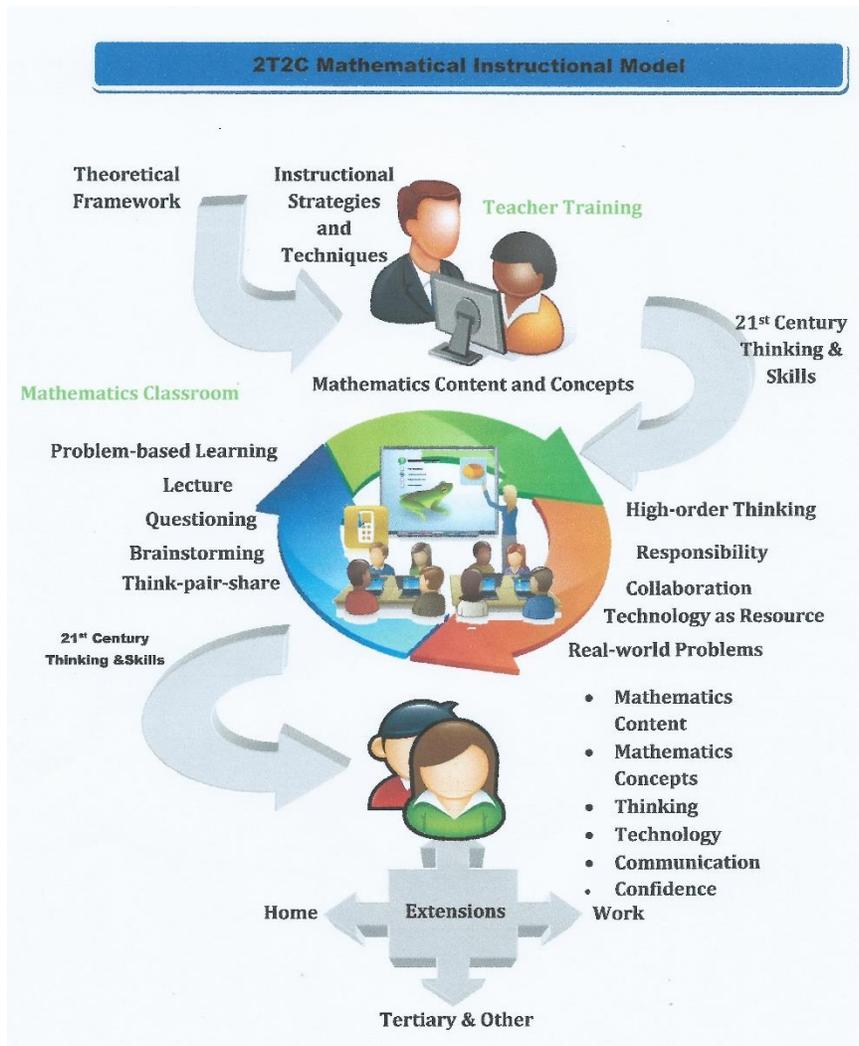
Figure 1: The 2T2C Model

Facilitators were trained in instructional approaches, as to how to get their learners to be confident; how to enhance students' communication skills such as collaborative, cooperative and social/communication skills. The difference between high and low order thinking were defined and discussed in detail; and their corollaries explained – critical and creative thinking.

There were sessions for discussion, practice and reporting. The teachers presented a portfolio about their experiences during the training period. Teachers were asked during the course of the training to participate with each other how they expect their learners to interact and share. Thus, teachers gained from the training experience threefold. Firstly, they received the literature on the elements of 2T2C; secondly, the use of ICT tools were implemented and practiced; and finally, teachers were given the opportunity to integrate theory into practice with their colleagues. For example, in order to understand the usefulness of Wikis and Blogs (theory); teachers created their own Wikis and Blogs; and then interact with other teachers using their created Wikis and Blogs (practice). In this way, teachers will have the theory, practice and experience in using the resources they may then want their students to interact and have discussion with and use as a resource. Different learning management systems such as LAMS and MOODLE were introduced and discussed.

Teacher Training Components of 2T2C

Thinking Skills

Thinking is a cognitive process which can be described in many ways. In 2T2C, thinking skills is described using higher-order thinking skills schemata. The ability to reason at higher levels is accepted and considered as a major instructional goal of education and is regarded as a motivating force behind efforts to reform education over the past two decades (Costa, 2001). However, teaching using higher-order thinking (HOT) is complicated and difficult as some educators have determined especially when standardized testing makes teaching for HOT even more demanding and taxing (Ravitch, 2010). The query here is that this standardized test primarily focuses on low-order thinking (LOT) and in many instances focuses on preparing students for external assessments.

In general, it is difficult to give a precise definition of higher and lower order thinking, but as Resnick (1987) and Marzano et al. (1988) illustrated, LOT and HOT can be identified when each occurs in practice. It is therefore necessary to differentiate between LOT and HOT. LOT is often categorized as the remembering of information or the application of concepts or knowledge to well-known and familiar situations and concepts (Thompson, 2011). Schmalz (1973) remarked that LOT tasks requires a student "… to recall a fact, perform a simple operation, or solve a familiar type of problem; it does not require the student to work outside the familiar" (p. 619). Senk et al. (1997) characterized LOT as solving tasks where the solution requires applying a well-known algorithm, often with the student having no justification, explanation, or proof required, and where normally only a single correct answer may be meant to be possible.

Thus, HOT exists where tasks incur on students, when instructions which requires them to use complex, non-algorithmic thinking to perform a task in which there is not a predictable, well-rehearsed approach or pathway explicitly suggested previously. E-learning facilitation must therefore present to its learners HOT assignment that can be challenging to their learners and thus ensured that HOT skills are a part of the facilitation process.

Technology

Technology is an ever-progressing component of our global society and has become ubiquitous in one form or another in learning institutions. Studies on the effects of integrating technology in teaching and learning have begun to provide evidence on students' achievement. Simplico (2002) believes that this should gain the attention of educators to transform their instructional methodologies as it is a major ingredient in the lives of youths all over the world.

Since integrating technology can occur in many ways in various environments, successful curriculum development might provide facilitators with ideas on how to teach subject matter concepts in a mode that includes collaboration, exploration, inquiry, discovery, and construction. Technology provides students with the opportunity to simulate different complex scenarios, processes and phenomenon, to generate visualizations and explorations, and to connect dynamic notations, linked representations, and operations with symbols (Shaffer & Kaput, 1999). Therefore, integrating technology should not be simplistically perceived as using computers but a vital resource. Facilitators must be trained to use and implement OER's and other tools that are available to enhance teaching and learning in the 21st Century.

Communication

Interaction and dialogue are key components of learning according to the social learning theory (Bandura, 1971). Social constructivism emphasizes the conciliation of meaning and construction of shared understanding through dialogue (Jonassen, Howland, Marra & Crismond, 2008). Vygotsky's (1978) view on learning as a social process that occurs within the zone of proximal development (ZPD) also position's interaction as crucial to the development of thought and behaviour. Communication is so crucial in the 21st Century that both the cooperative and collaborative approaches to learning depicted by Bandura (1971) and Vygotsky (1978) need to be integrated into any teaching and learning methodology.

Cooperative learning as defined by Slavin (1982) is an instructional method whereby students in small groups of two or more individuals, carried out as a team, specific common learning goals and objectives. All of the members of a group are expected to be actively committed to working mutually to achieve the established objectives in order for the activities to be called cooperative learning. Similarly, Johnson and Johnson (1991, 1999) defined cooperative learning as the instructive use of small groups for students to work together and maximize their own learning and that of the others members of the group.

Collaborative learning refers to learning whereby assistance is provided by an individual or group of individuals to another individual or group of people to attain the desired learning goals (Mastropieri, Scruggs, Spencer, & Fontana, 2003). Social interaction is a central theme in Vygotskian theory. They suggested that it is not possible to appreciate an individual's cognition in isolation from the social constructs in which they are situated.

Confidence

Without confidence/self-efficacy in one's ability, students cannot perform to their potential or at their highest standard. It is even possible that learners with lesser abilities, but with confidence, can outperform higher ability students because belief in oneself can be a powerful influence. Bandura (1986), refers to situation-specific 'self-confidence as self-efficacy, which is the strength of an individual's belief that they can successfully perform a given activity or task. The concept of confidence has often been used interchangeably with the concept of self-efficacy and self-confidence.

The task will be to engender in students that confidence so that when they do attempt challenging problems, they will not give up easily. When inefficacious individuals fail, they attribute the unsuccessful result to a lack of ability and tend to lose faith in their capabilities. When they succeed, they are more likely to attribute their success to external factors (Bandura, 1997, 1986; Schibeci & Riley, 1986). If students master a challenging task with limited assistance, their levels of self-efficacy or confidence rises (Bandura, 1986). 2T2C provides the skills to facilitators to assist in inculcating confidence via creative and technological means.

Teacher Training

The researcher provided training and support to the teachers of the experiment group in terms of the uses of Web 2.0 tools (technology); enhancing student self-efficacy (confidence); understanding and implementing higher-order thinking skills (thinking); differentiating between high and low order questioning and test items; the correct approaches to having a classroom environment with cooperative and collaborative approaches (communication); and maintaining and sustaining a student-centered classroom environment.

A blended training style was implemented and covered collaborative and cooperative teaching skills; the importance of self-efficacy in problem-solving; how to engender in students their high-order thinking capabilities; the importance of communicating in terms of acquisition of knowledge and as a social skills; and ICT competencies in the twenty-first century. There were discussions and any challenges and concerns of the teachers were entertained.

Conclusion

This 2T2C Model as conceptualized, when implemented, will deliberately and systematically empower teachers and students to effectively become lifelong learners while creating a vibrant, active and efficient classroom environment to attain 21st Century skills. The findings revealed, from the teachers' perceptions, that they require continuous training, re-training and professional development sessions in order to keep them abreast with innovative and creative methods to assist them with their facilitation. Thus being introduce to 2T2C was seen as very progressive and useful. They also emphasized that collaboration with peers was vital to the success of the model, as the teachers uncovered that teamwork has tremendous benefits. The teachers realized their need of teaching methods and strategies in order to combat the many learning styles of students. They also welcomed the training and in particular the use of wikis and blogs. Generally, teachers saw how using e-learning strategies were essential in their teaching and learning experience today.

The findings revealed from the students' perceptions of using the 2T2C Model that 21st Century skills can be infused simultaneous while mathematical content was taught. It was further revealed that the tenets of 2T2C, Thinking, Technology, Collaboration and Confidence, can be achieved in a student-centered, active and interactive classroom. It was very clear that students although initially having problems with the implementation of 2T2C, responded well and that gains were made in students having 21st Century skills. They fully enjoyed the use of technology as a resource and the e-learning inclusion in some sessions.

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