Development and Validation of Multi-Modality Instructional Model

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ABSTRACT: Development of models of teaching is the recent innovation in teaching. An important purpose of discussing models of teaching is to assist the teacher to have a wide range of approaches for creating a proper interactive environment for learning. An intelligent use of these approaches enables the teacher to adopt him to the learning needs of the students. A number of educationist and psychologists have proposed model approach to teaching. A model of teaching consists of guidelines for designing educational activities and environments. Model of teaching is a plan that can also be utilized to shape courses of studies, to design instructional material and to guide instruction. Joyce and Weil, (1972) [19] explained Teaching of model is a pattern or plan, which can be a curriculum or courses to select instructional materials and to guide a teachers actions. Educators and psychologist have design several types of teaching models which provides suitable guidelines to the teachers for modifying the behaviour of the learners. As a matter of facts some sorts of models of teaching have been existence since times immemorial. In simple language a models of teaching may be defined as a blueprint designed in advance for providing necessary structure and direction to the teacher for realizing the stipulated objectives. After the investigator completed the determination of the steps the model was presented to the panel of experts. The

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panel of experts scrutinized and validated the steps of the model and gave their opinion about the fitness of the model for application. They further commented to conduct a pilot study with the application of the model from the pilot try out of the model it was found to be effective for application in classroom teaching.

Key words: Development, Validation, Multi-Modality, Instructional Model

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Introduction

Kuhn and Schroeder (1971) studied on comparative effect of a multi-sensory approach and auditory method learning of spelling among sixth grade students. They have concluded that scored significantly higher than students taught through multisensory learning those have been taught through auditory method. **Kalivoda (1978)** studied and established that Multi-sensory learning techniques are helpful in the development of comprehension of a foreign language. **Thorton, Jones, and Toohey (1982)** implemented a multi-sensory teaching program- Multisensory Basic Fact Program (MBFP), into remedial classrooms for students of grades two through six. The program incorporates visual learning through pictures, as teachers provide oral prompts. Students are also involved kinaesthetically when learning new concepts by tapping or finger-tracing. **Brenda Martin (1999)** studied that the Multisensory Approaches and Learning Styles Theory in the Elementary School. Multisensory approaches and learning styles theories have been found to be effective in developing strategies to teach diverse learners in the elementary school setting. **Christie (2000)** has worked the understanding that the brain uses the five basic senses to obtain insight on the world; it is unsurprising that utilizing multiple senses increases the probability of knowledge absorption. In its simplest form, the theory behind multi-sensory education is to provide each child the advantage of lessons taught through multiple senses that would increase the likelihood of the child absorbing the material. In more complex terms, instruction targeting multiple senses stimulates more neural pathways within the brain. Therefore, educators who effectively target more than one of the senses in every lesson would likely to have a higher percentage of student comprehension than those educators who do not rely on the potential of the senses in teaching. **Dev & Doyle (2002)** observed the impact of a multi-sensory approach on teaching

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reading. They used the Orton-Gillingham technique (Institute for Multi-sensory education, 2000), which involves visual, auditory and kinaesthetic modalities, with first grade children at the special education level. **Valente (2002)** examined the impact of a multisensory approach to teaching of reading ability. This involves visual, auditory and kinesthetic modalities with first grade children. He has concluded that improved reading ability through multisensory approach.

Shaywitz et al. (2004) investigated the effects of a multisensory, phonologically-based reading program (experimental intervention) on the brain activation patterns of children with reading disability. They concluded that the provision of an 'intensive phonologically-based reading intervention, that used multisensory techniques, brought about brain activation patterns in children with reading disability that resembled those of typical readers. It is promising that fMRI results showed neurobiological changes in children who received the phonologically-based treatment one year after the treatment ended. In fact, similar findings of neural changes after phonological training in children as well as adults have been reported in the literature. **Kast, Meyer and Vogeli (2007)** found that use of Multi-sensory education in the classroom has produced some promising results. Their targeting multiple senses during a writing training program improved writing skills for students. **Renee Zabel (2007)** has worked about Improving Vocabulary Acquisition with Multisensory Instruction. The purpose of this research was to improve student vocabulary acquisition through a multisensory, direct instructional approach. **Kast et al., (2007)** studied that effect of multi-sensory education on letter recognition, phoneme identification, and pseudo-word decoding.

Wohlfarth et al. (2008) studied the benefits of learner-centered classrooms do not end with academics. Students tend to view student-centered

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classrooms positively. In this study, graduate students were asked to evaluate their college classroom experiences for one course. Students agreed that the class was very learner-centered and noted that the classroom opportunities were extremely important in helping students to learn. **Salinas, Kane-Johnson & Vasil-Miller (2008)** observed that learner-centered classrooms are more effective than traditional classrooms – both in helping students achieve higher test scores as well as helping students emotionally and socially. Student-centered classrooms offer students the opportunity of choice. Students are able to follow their interests and highlight their personal skills in assignments that encourage demonstration of learning to be presented in unique ways. **Benninger (2010)** has studied on working memory training and intervention strategies that were designed for class room teachers to use with students that struggle with working memory deficits. **Bahman Gorjian (2011)** made an evaluation of the effects of art on vocabulary learning through multi-sensory modalities. This study investigates the effects of multi-sensory art modalities on vocabulary acquisition. The following art modalities were examined: (a) visuals and (tactile) (b) music (auditory) and kinetics. **Jay Feng (2012)** has studied the methods for Sight Word Recognition in Kindergarten: Traditional Flashcard Method vs. Multisensory Approach. **Taghvayi, D (2012)** conducted an experiment to study on the Effectiveness of Integrative Approach, Fernald Multi- Sensory Technique on Decrease Reading Disability. Purpose of Study is treatment approaches of reading disability vary from visual stimulation to special diets to enhance reading instruction. The research purpose is comparing the effectiveness of an Integration approach with Fernald multi-sensory method for decrease Reading disabilities in elementary male students. Research results showed that the Integration approach was more effective from Fernald method

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for reducing Reading disabilities in reading, understanding. Phonemics and correct reading areas.

Loghman Aghabeigi (2013) studied on the Design and production of education media to spelling model based on multi-sensory Fernald and reduces its impact on students' first grade spelling problems. **Obaid, Majeda Al Sayyed (2013)** investigated the effect of using the multi-sensory approach for teaching students with learning disabilities on the sixth grade students' achievement in mathematics at Jordanian public schools. To achieve the purpose of the study, a pre/post-test was constructed to measure students' achievement in mathematics. The experimental group was taught using multi-sensory approach while the control group was taught using the current approach. The findings of the study indicated that there were statistically significant differences in the post- test between the control and the experimental groups in favour of the experimental group. **Gouranga Saha (2015)** suggested a technology supported Multi-Sensory Approach to Science Teaching Model. He observed that the classroom teachers' fears of science and abhorrence of technology integration particularly limit their ability to foster scientific literacy for all students. This study aimed at enhancing the quality of science teachers' pedagogical content knowledge via a professional development (PD) intervention employing a technology-centered inquiry science teaching technique. Twelve science teachers from Mid Missouri participated in this study. Pre- and post-test and anecdotal data analyses indicate that participant teachers' attitude towards inquiry science and science knowledge increased significantly from this program. In addition, these experiences have had a long-term impact on these teachers' confidence and comfort levels to implement technology-infused inquiry science instruction in their classrooms that their students find interesting and meaningful.

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Multi- Modality Instruction Model

Multisensory learning as the name implies is the process of learning new subject matter through the use of two are more senses by Prasannakumar and Saminathan. (2016). If learning is to occur, educators must ensure that new information is processed in such a way that it can be retained in long-term memory in order to achieve this, elaboration and connection must occur between previously learned memory and new information. It has been established that the more deeply the information is processed and the more connections that can be made between new information and existing memory structures, the more information will be retained in long-term memory. Therefore, in order to make new material meaningful, instruction must be presented in such a way that students can easily access and connect previous learning and experiences with the new material. One of the most often cited references to levels of elaboration for instructional purposes is the Taxonomy of the

Cognitive Domain developed by Bloom and his colleagues (Bloom and Krathwohl, 1956) and recently revised by Anderson and Krathwohl (2000). Bloom et al. (1965) proposed that educational objectives can be classified in six levels, each more complex than the previous. The first level is labeled knowing and simply requires a learner to repeat back what was heard or seen. This involves very little elaboration. The second level is labeled comprehension and requires some rudimentary levels of understanding that might involve having the student summarize or paraphrase some information. Again, this requires only modest levels of elaboration. Research has confirmed that the first four levels are indeed a hierarchy, while there seems to be a problem with the ordering of the two highest levels (Hummel and Huitt, 1994). Anderson and Krathwohl (2000) propose that the ordering is reversed, with evaluation being

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less difficult than synthesis, while Huitt (2000) proposes that they are both at the same level of difficulty though they incorporate different types of processing. There seems to be consensus that both synthesis and evaluation are based on analysis or the ability to compare and confirms that both are necessary for successful problem solving (Huitt, 1992). If a student creates an original satire at the end of the lesson, this development is successful. In order to facilitate those abilities, the class could discuss possible topics as a whole and why certain ideas would or would not be appropriate for satire. In order to bring along students who might still be having problems, starter sentences or paragraphs could be provided or the teacher could provide more examples of satires for the students to evaluate. At any rate, through this lesson, the students have moved through all levels of the Taxonomy of the Cognitive Domain (Bloom et al., 1956). And have begun to process information at the formal operational stage if they can make the abstract connections required to complete the activities of the lesson. The next two levels application and analysis, involved more elaboration and show a significant impact on long-term learning when they are used during the learning process. Application involves using the concepts or principles to solve a problem, while analysis involves understanding the relationship among the parts and how they are organized into a whole. The last two levels, synthesis and evaluation, are the most complex and require the highest levels of elaboration. Synthesis involves putting the parts or components together in an institutional situation.

Teacher expects optimum level of processing in mind of them students. The level of processing is mainly depends upon memory process by Prasannakumar (2016). Most of the students have retrieval difficulties on past learning. Memory difficulties directly related to sensory integration. In these circumstances the investigator made an attempt to construct Multi-Modality

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Instructional Model based on information processing approaches. This model contains three parts the first part such as Instructional part, processing part and outcome part. Instructional part includes seven steps. There are relating new information to prior knowledge, Focusing attention to the information, developing sensory connection, Organizing the information, Expanding sensory images, Structuring the information and Practicing recall. The processing part contains several instructional strategies based on stimulation, sensation, Attention, Perception, Imagery, conceptualization and memory. The learning outcome part has various action verbs, which are verbs that result in overt behavior or products that can be observed and measured.

Table 1: Multi-Modality Instruction Model (Prasannakumar & Saminathan. 2016)

Instructional Strategies	Multimodality Processes	Learning outcomes
• **Relating New Information** **Multimodality stimulation strategies**	Visual stimulation Auditory stimulation Tactile stimulation Olfactory stimulation Gustatory stimulation	Recognizing Identifying Recalling
• **Focusing attention to the information** **Multimodality Attention Strategies**	Visual attention Auditory attention Tactile attention Olfactory attention Gustatory attention	Focusing Selecting Distinguishing Discriminating
• **Developing sensory connection** **Multimodality sensory strategies**	Visual sensation Auditory sensation Tactile sensation Olfactory sensation Gustatory sensation	Representing Analyzing Segmenting Paraphrasing Organizing
• **Organizing the information** **Multimodality Perceptual Strategies**	Visual perception Auditory perception Tactile perception Olfactory perception Gustatory perception	Clarifying Classifying Illustrating Interpreting Structuring

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Instructional Strategies	Multimodality Processes	Learning outcomes
• **Expanding sensory images** **Multimodality Imagery Strategies**	Visual Imagery Auditory Imagery Tactile Imagery Olfactory Imagery Gustatory Imagery	Predicting Integrating Coordinating Outlining Constructing
• **Structuring the information** **Multimodality Concept formation Strategies**	Auditory concept Visual concept Tactile concept Olfactory concept Gustatory concept	Hypothesizing Generalizing Abstracting Designing
• **Practicing Recall** **Multimodality Memory Strategies**	Visual memory Auditory memory Tactile memory Olfactory memory Gustatory memory	Summarizing Rehearsing Reviewing Judging

Table 2: Expert's validation of the Multi-modality Instructional Model

Criteria	Mean±SD	Remark
Adequacy		
1. Relating New information	4.00±0.00	SA
2. Focusing attention to the information	4.00±0.00	SA
3. Developing sensory connection	4.00±0.00	SA
4 Organizing the information	3.25±0.25	A
5. Expanding sensory images 6 Structuring the information 7 Practicing Recall	4.00±0.00	SA
Weighted mean	3.85±0.05	SA
Coherence		
1. Relating New information	4.00±0.00	SA
2. Focusing attention to the information	3.50±0.29	SA

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Criteria	Mean±SD	Remark
3. Developing sensory connection	4.00±0.00	SA
4 Organizing the information	4.00±0.00	SA
5. Expanding sensory images 6 Structuring the information 7 Practicing Recall	4.00±0.00	SA
Weighted mean	3.90±0.06	SA
Appropriateness		
1. Relating New information	4.00±0.00	SA
2. Focusing attention to the information	4.00±0.00	SA
3. Developing sensory connection	3.75±0.25	SA
4 Organizing the information	4.00±0.00	SA
5.Expanding sensory images 6. Structuring the information 7. Practicing Recall	3.75±0.25	SA
Weighted mean	3.90±0.10	SA
Usefulness		
1. Relating New information	4.00±0.00	SA
2. Focusing attention to the information	4.00±0.00	SA
3. Developing sensory connection	3.75±0.25	SA
4 Organizing the information	4.00±0.00	SA
5. Expanding sensory images	4.00±0.00	SA
6 Structuring the information	3.85±0.05	SA
7. Practicing Recall	3.90±0.10	SA

Legend: Strongly agree (3.50–4.00); Agree (2.50–3.49); Disagree (1.50–2.49); Strongly disagree (1.00–1.49). SD: Standard deviation

Validity of the Model

Expert-validators were asked to validate the model. The criteria for evaluation include adequacy, coherence, appropriateness, and usefulness

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(Table 2). As shown from the table, the validators strongly agreed that the developed model showed adequacy (M = 3.85; Standard deviation [SD] = 0.05). Each of the indicators received a strongly agree remarks. In terms of coherence, the developed model got a very favourable rating (M = 3.90; SD = 0.06) which meant that the validators strongly agreed in all the indicators. Although the indicator on the provision of practical work had the lowest mean, still the developed workbook was coherent with the skills to be developed. This finding supports the study of Windschitl (2009) who clarified that coherence with existing knowledge does not mean tailoring instruction to what teachers already know but rather taking into account their deeply engrained theories about "good" teaching and learning.

Furthermore, the validators strongly agreed on the appropriateness (M = 3.90; SD = 0.10) and usefulness (M = 3.95; SD = 0.05) of the model. All indicators received strongly agree on remarks. It was suggested, however, that the developed model should contain logical, empirical and procedural validity. Content knowledge is very important and is related to student learning (Magnusson et al., 1992). Teachers with strong content knowledge are more likely to teach in ways that help students construct knowledge, pose appropriate questions, suggest alternative explanations, and propose additional inquiries (Alonzo, 2002; Gess-Newsome & Lederman, 1995; Roehrig & Luft, 2004).

Conclusion

The main purpose of this study was to develop and validate Multi-Modality Instructional Model based on the information processing approach and assess the impact of the developed model on students' knowledge acquisition. The data suggest that the developed model are acceptable and have a positive impact on students' performance. However, carefully conducted research should be done at different grade levels and in a variety of disciplines.

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Furthermore, a reproduced of this study which the sample is large enough and is conducted over a much longer period of time in between the pre-test and post-test could also reveal additional insight of the impact of the developed materials. The developed Multi-Modality Instructional Model has rated from ‘acceptable to ‘strongly acceptable’ by the experts in terms of the different criteria: Adequacy, Coherence, Appropriateness and Usefulness. There was no statistically significant difference in among the assessments of the students, peers, and experts on the acceptability of the developed model. It promoted students’ performance in content-knowledge acquisition.

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