Use of Visual Auditory Simulation Tasks in Promoting On-Task Behaviour of Children with Special Needs

Abstract

Paying attention among learners involves sensory register. A lot of research shows that the inability for learners to perform well can be attributed to their inability to pay adequate attention while performing tasks. This research adopts the visual auditory simulation technique (VASTech) to systematically foster attention for special children (3–6 years mental) in a quasi-experimental setting by adopting a non-equivalent group control design. The results show that children who had undergone VASTech show a significant increase in on-task behaviour, with $t = -3.69$, $p < 0.05$. By using VASTech, this study aims at generating an intervention tool which can foster the attention of children with special needs.

Key words: visual auditory simulation tasks, on-task behaviour, children with special needs.

Introduction

Paying attention among learners involves the sensory register (Ormrod, 2006). Many researchers have found that the inability for learners to perform well can be attributed to their inability to pay attention while performing tasks. Children in the early childhood years are prone to hyperactivity and poor attention. In addition, young children with problems in focusing and attention will find difficulty in concentrating on a task, do not finish what they start, do not listen and frequently lose things (Lerner, 2003).
Children with special needs, especially those with Attention Deficit Disorders (ADD) or Attention Deficit Hyperactivity Disorder (ADHD) are particularly prone to lack of attention span. Consequently, they are often observed to be off-task most of the time during the process of learning. Other groups of learners who may show a marked lack of attention include children with autism, Down's syndrome, dyslexia and slow learners. Currently, children with ADHD and some healthy children who are active are prescribed drugs such as Ritalin and Dexadrine (Lerner, 2003). There is no doubt that these drugs can help in reducing restlessness, crying, distractibility, excitability, frustration and other hyperactive symptoms of the child, and have given positive measures on behavioral control, these drugs as mentioned earlier are accompanied by negative side effects such as insomnia and decreased appetite, and optimum dosage is difficult to determine (DuPaul, Barkley & McMurray, 1991).

Furthermore, to be dependent on stimulant medication is not effective in helping the child to function in society. It has been reported that children who face learning difficulties and dyslexia as well as slow learners exhibit hyperactivity, inattention and impulsivity (Lerner, 2003). The problem has constantly been a hindrance to children's learning. Hence, to ensure no one is left behind, an effective measure is urgently needed to train special educational needs (SEN) children to pay attention while staying on-task.

**Attention training through visual auditory simulation technique**

No learning can occur unless the learner is first able to focus on the relevant aspects of the task or concept and to focus on that long enough to process the information, giving it meaning and making it usable. Hence, it is particularly crucial that the attention focus and attention span of children with special needs should be fostered so that they are able to learn more effectively.

Conscious control of attention helps children understand that the level of attention required for a task varies depending on the task and that they can adjust the focus of their attention accordingly. This sense of personal control is related to the efficient performance of tasks, which requires focused attention while on-task.

Posner (2002) proposed testing the utility of the idea that implementing Attention Training (ATT) early in development may actually enhance attention and executive control networks. Neuropsychological studies suggest extensive development of attention and executive control functions between the ages of three and five, which correlates with developments in brain structure and function. Although the neurological basis of the effect of ATT is not yet understood, evoked potential
measures and functional Magnetic Resonance Imaging (fMRI) evidence suggest that ATT impacts on brain function (Mateer & Mapou, 1996; Olesen, Westerberg, & Klingberg, 2004). Implementing ATT with preschool-aged children may have a long-term impact on the functional development of attention and executive control networks. Furthermore, implementing ATT with children with special needs for the development of attention and behaviour problems may prevent or arrest impairment of attention. According to Berger, Jones, Rothbart, and Posner (2000), there is evidence suggesting that computerised game-like tasks can be adopted to assess and/or train attention in pre-school children.

Micheletti (1999) studied the treatment for children with attention hyperactivity disorder (ADHD) in four groups of children, where one group using stimulant medication, auditory and visual stimulation (AVS), auditory and visual stimulation (AVS) plus medication as well as the self-selected control group. The study found out that both the AVS and AVS/Stimulant medication group indicated significant statistical cognitive and behavioural changes at p< .05, p<.01, and p<.001 levels, as compared to the stimulant medication group. There was no cognitive or behavioural change in the self-selected control group.

In an attempt to evaluate the task performance in the context of an assembly simulation in a virtual environment, Zhang, Fernando, Xiao, and Travis (2006) found out that although introduction of auditory and/or visual feedback into the virtual environment did improve the task performance of the participants, integrated feedback (auditory plus visual) offered better assembly task performance than either feedback used in isolation.

In the current research, the researchers adopted the visual, auditory and simulation technique (VASTech), coupled with the systematic incremental approach (module to module) as a holistic way in fostering children’s attention in an economic yet effective way of promoting educational and instructional support which can facilitate children’s being on-task. This system blends the multiple intelligences theory with the multisensory approach in the games to form a holistic intervention tool.

The system has various distinctive visual features, so that it incorporates multimedia flash, animation, colourful icons and background in each game. The auditory features include enchanting background music, sound and motivational feedback. The simulation context allows children to immerse themselves in as natural an environment as possible to allow for active participation in the games. It has meant to be less academic but task-oriented by taking into account the cognitive load of children with special needs and the mainstream children. The systematic incremental approach allows for paced and long-lasting attention to
be inculcated among these children. In addition to the above-mentioned main features, other features such as fun, excitement, creativity and adventure were incorporated throughout the games.

**Objective**

The current research seeks to develop courseware using VASTech that incorporates multimedia flash to systematically foster the attention of special children (3–6 years of mental age) so as to promote on-task behaviour for effective learning.

**Method**

**Research Design**

This research adopts the pre-post non-equivalent control group design in a quasi-experimental setting by using VASTech in promoting the on-task behaviour of children with special needs. “On-task behaviour” is shown when a child is engaged in or working on a specific task or activity prepared by the researcher. The frequency of on-task behaviour before and after the intervention was recorded. The difference in the score of the task given before and after the intervention determines the effectiveness of the courseware.

**Sample**

A total of 54 children with special needs, in which 24 children from the experimental group and 30 children from the control group, aged 3–6 (mental age) was involved in this study. These children, with various types of special needs, including autism, Down’s syndrome, dyslexia and hyperactivity, were randomly selected from three centres for children with special needs in Malaysia.

**The System**

The content of the system is colourful, attractive, animated and in simulated contexts like in the garden, by the pond, on the beach, in the sea and in the cave. The system comprises three modules, namely, beginner, intermediate and advanced. Each level consists of five games, hence the three modules have a total of 15 games. Each game differs in terms of the time frame needed to complete the game and its nature of complexity. The duration for each game is set on an incremental basis, which means in Module 1 that game 1 will last for one minute, game 2 will last for two minutes, game 3 will last for three minutes, etc.. Each subsequent game lasts one minute longer than the previous game. The purpose of setting the short timeframe on an incremental basis with speeded tasks is to allow gradual and systematic training of enhancing learners’ attention when the tasks were given.
Researchers in the area of attention have relied quite heavily on speeded tasks (Balota & Marsh, 2004).

**Instrument**

The activity worksheets are used to determine the effectiveness of VASTech by administering a pretest before the experiment and a posttest. The worksheets comprise tasks designed based on the cognitive function relating to the attention ability and the applications underlying the task at hand to engage the children within time frames. This aimed at seeking to channel the dynamism of the child on the task that the child was required to perform, and to investigate how far the on-task behaviour of the child was promoted.

The tests consisted of pretest and posttest, adapted from one of Feuerstein's Instrumental Enrichment assessments (Feuerstein, Feuerstein, Falik, & Rand, 2003), which is free of specific subject matter used to develop children's ability to apply their cognitive functions to any problem and thinking situation. Below is an example for pre-test.

**Figure 1.** An example of a set of tasks in pre-test

![Diagram](image)

Based on Figure 1, the child is supposed to copy the pattern found in (A) to (B). Each effort to join a line from dot to dot is considered one task completed. Each diagram will carry 6 points for six joinings required in each diagram.

Each pretest and posttest comprises two different sets of exercises, namely Exercise 1 (four sets of tasks) & Exercise 2 (four sets of tasks). For each category of the child, the ability may vary. Some children may not be able to accomplish
tasks up to Exercise 2. Therefore, Exercise 2 is more on the extension from Exercise 1 if a child has no difficulty in completing Exercise 1. The scoring for each pretest and posttest will be the average points scored for each test. In pretest, the total points scored will be divided by the number of tasks a child accomplished. If the child has completed only four tasks, the total points scored will be divided by 4. If the child has completed 8 tasks, then the total points scored will be divided by 8 tasks. For that reason, a child who sits for the tests will get the maximum point score of 6. An average point for each test will be used to compare pre/post tests to determine effectiveness of VASTech.

Data Analysis

The data, in the form of mean performance for pre – and post – tests for both the experimental and control groups were analysed by using Paired Sample T-test from the Statistical Package for Social Sciences (SPSS) ver. 18.0, to find out if there is any significant change from pre-test to post-test in both the groups respectively.

Results

Table 1 highlights the mean performance of both the experimental and control groups. The results show that there is a significant change in the performance from the pre – to post-test for the experimental group, with t=-3.69, p<0.05; but not in the control group. This suggests that SEN children who had undergone VASTech training were found to be more on-task as compared to those who had not undergone the training.

Table 1. Task Performance of Children with Special Needs

<table>
<thead>
<tr>
<th>Task Performance</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Pre</td>
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<td>15.13</td>
<td>13.85</td>
<td>-3.69</td>
<td>0.001</td>
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<tr>
<td>Mean Post</td>
<td>24</td>
<td>25.42</td>
<td>20.78</td>
<td></td>
<td></td>
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<tr>
<td>Control:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mean Pre</td>
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<td>5.17</td>
<td>8.59</td>
<td>1.09</td>
<td>0.284</td>
</tr>
<tr>
<td>Mean Post</td>
<td>30</td>
<td>4.50</td>
<td>9.17</td>
<td></td>
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</tbody>
</table>
**Discussion**

The development of attention skill requires the learner’s systematic effort to maintain his or her ability to concentrate. In this sense, ample time is needed in training the mind to focus. There is no doubt that training children, particularly children with special needs, will take up a lot of family or school learning time, the effect achieved through VASTech training is hoped to be long-lasting.

Deficiencies and inefficiencies in attention create problems in learning and everyday functioning for many learners with disabilities. Krupski (1980) asserted that the ability to attend or the quality of that attention is affected by the interaction of three variables: the child, the setting and the task. Therefore, attention training seems to depend largely on the setting and task while recognizing the disabilities that remain a constant important factor. In this study, VASTech took this into consideration by allowing fewer non-target stimuli so that learners can engage on targeted stimuli as soon as he/she could. The duration of each game in VASTech depended on the concentration span of young children (author et al., 2009).

Barkley (2006) concluded that lack of sustained attention or lack of vigilance of effort is a central attribute of students with ADHD. Richard, Samuels, Turnure, and Ysseldyke (1990) investigated attention capabilities of students with ADHD and observed that students with ADHD seemed to have more difficulty with sustained attention, while those with learning disabilities were more likely to exhibit problems in selective attention. Hence, VASTech serves to enhance sustained attention by reducing the misbehaviour of these children.

**Conclusion**

As past studies showed, the importance of paying attention by SEN children remains crucial. It is especially important to explore other alternatives of behaviour intervention besides medication and other forms of behavioural training which were used in the past among the affected children. It is also rare for computer courseware to be used for intervention purposes, especially to foster attention among children. In view of the inadequacies of courseware to foster attention for teaching and learning in preschools and special education centres in Malaysia, this research suggests the need for designing new courseware, its implementation as an intervention tool and broader scale experimentation to measure long-term effect of VASTech treatment.
Bibliography