



Using Feuerstein's Mediated Learning Experience in Enhancing Cognitive Functioning of Remedial School Learners

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Abstract

The study investigated the effects of mediated learning experience (MLE) intervention on Remedial school learners' cognitive functioning as measured by the Ravens Coloured Progressive Matrices (RCPM). The sample comprised 67 participants (males = 35; females = 32; mean age = 11.8) from Grade 4 through to Grade 7. Participants were given the RCPM on two occasions, and in-between, a non-randomly constituted experimental group was exposed to MLE intervention. Pre-post test results revealed significant improvement within the experimental group on the RCPM, while non-significant pre-post test results were found within the control group. These findings provide support for further development and application of dynamic assessment and its MLE construct.

Keywords: dynamic assessment, mediated learning experience, cognitive functioning, traditional measures, remedial school learners

INTRODUCTION

There has been a growing concern internationally regarding dissatisfaction with traditional (static/normative) measures of cognitive ability (Foxcroft & Roodt, 2005; Kleinert, Kennedy & Kearns, 1999; Skuy, Seabi, Skuy & Fridjhon, 2003; Tzuriel, 2000a). These traditional measures have been criticized for bias and unfairness to cultural and socio-economic minorities in the Western countries (Tzuriel, 2000a), and majorities of disadvantaged communities in African countries (Seabi & Amod, 2009; Skuy, et al., 2003). They have been found to lack the ability to provide remedial strategies for enhancing cognitive functioning (Lidz, 2002). Research has shown that traditional intelligence test scores underestimate the abilities of children who come from low socio-economic levels and those who have learning difficulties (Resing, 1997). Given the socio-economic and educational disadvantages that majority of the South Africans were exposed to during the apartheid regime, and still do under the current regime (Seabi & Amod, 2009), there is a need for assessment approaches that focus on future potential rather than on current ability. Sternberg and Grigorenko (2001) report that traditional intelligence tests measure skills acquired in the home or at school. Therefore, it is hardly surprising that





“children from socially disadvantaged backgrounds and from ethnic minorities under-perform on such measures, since they struggle with items that are unfamiliar and unpracticed” (Elliott, 2003, p.16). Reliance on traditional methods of psychological and psycho-educational measures has been found to be unreliable within the South African context (Skuy & Skuy, 2005).

Given dissatisfaction with these traditional methods, dynamic assessment (DA) has been suggested as an alternative assessment approach to overcome many of the abovementioned difficulties. However, a review of literature demonstrates that dynamic assessment is infrequently used, particularly in South Africa and for those studies in which it has been implemented. It is mostly undertaken for selection purposes that is, for selection and placement of students in institutions of higher learning or the placement of employees into various occupations, and less so for remedial purposes (Murphy & Maree, 2006). Haywood and Tzuriel (2002) note that DA is not widely utilized and in actual fact, there is a dearth of research based on DA for several reasons. For instance, that DA is not widely taught in institutions of higher learning; the school personnel who receive psychologists’ reports typically do not yet know how to interpret the recommendation made from DA and that it is far more time-consuming than traditional static measures (Karpov & Tzuriel, 2009). It was therefore the intention of the current study to apply DA approach in a remedial school context.

Dynamic assessment is an “umbrella term used to describe a heterogeneous range of approaches that are linked by a common element, that is, instruction and feedback are built into the testing process and are differentiated on the basis of an individual’s performance” (Elliott, 2003, p.16). The most often cited definition of DA is that it commonly follows a sequence of a pre-test phase, followed by an intervention or mediation and concluding with a post-test phase (Campione & Brown, 1987). An important characteristic that distinguishes DA from traditional measures is the focus on how much change can be produced within a learner in a structured learning situation rather than comparing a child’s performance with his/her peers (Zaaiman, Van der Flier & Thijs, 2001). Karpov and Tzuriel (2009) report that unlike traditional measures, DA provides educators with data required to suggest specific strategies for effective instruction and intervention.

Lidz (2002) notes that DA evaluates particular cognitive processes underlying successful performance and not necessarily the product. DA assesses not only what an individual has already been exposed to but also what one can do under appropriate guidance. Vygotsky (1978) thus coined the phrase zone of proximal development to refer to the “distance between a child’s actual developmental level as determined by independent problem solving and the higher level of potential development as determined through problem solving





under adult guidance or in collaboration with more capable peers” (p.86). This zone is believed to be an index of the learning potential of the child (Vygotsky, 1978). Elliott (2003) concurs that an evaluation of a child’s capacity to learn when provided with scaffold instruction that is tailored to offer a minimum assistance necessary for successful performance is more valid and meaningful for educational settings. Although there are several DA models, Feuerstein’s (1979) approach, in particular his notion of mediated learning experience (MLE) is the most influential and it is this approach that the current study is based upon.

Mediated learning experience (MLE) refers to those “human interactions that generate the capacity of individuals to change, to modify themselves in the direction of greater adaptability and toward the use of higher mental processes” (Feuerstein, 1979, p.110). During the MLE process, the mediator not only makes the stimuli meaningful but also elicits in the learner how the learning is applicable to other areas of life, thus enabling transfer. Childhood is probably one developmental stage when the advantages of MLE have the greatest impact on cognitive development. According to Feuerstein (1980, p.16) “the more and the earlier an organism is subjected to MLE, the greater will be his/her capacity to efficiently use and be affected by direct exposure to sources of stimuli”

During the interactive mediation, the mediator attempts to delineate the behaviors which could be hindering a child’s performance. The mediator observes if the child responds impulsively, if he or she is able to follow verbal instructions, and if he or she can make a plan to solve a problem. To identify the causal factor that impedes the child’s learning, the mediator observes the limitation of the child’s cognitive functions. Feuerstein, Rand and Hoffman (1979) developed the cognitive functions list that enlightens the mediator about the difficulty experienced by the “mediatee”.

Feuerstein conceptualized cognitive functions into three phases of cognitive processing; namely, the input (data gathering), elaboration (data processing) and output (data expression) phases. Failure to comprehend instructions and gather information at the input phase impacts negatively on the ability to process information at the elaboration phase. This also leads to production of incorrect responses (Skuy, Mentis & Mentis, 1996). It was therefore essential in the current study that the author noted any cognitive deficiencies displayed by the learners so that adequate and appropriate mediated intervention could be provided.

Feuerstein, Feuerstein, Falik and Rand (2002) maintain that cognitive development of individuals is often masked not necessarily by distal conditions (such as poverty, neurological impairment, emotional disturbance in the child, or low socio-economic status), but by proximal condition (inadequate exposure to MLE opportunities). Haywood and Lidz (2007) argue that although distal





conditions are commonly found in individuals with less than optimal cognitive development that does not necessarily mean they are causal factors of low intellectual functioning but rather correlation variables. It was therefore argued in the present study that if remedial school learners are exposed to sufficient MLE interventions their cognitive function can be enhanced.

Learners with learning difficulties are of concern because their learning problems appear difficult to “remedy” within a mainstream classroom using normal teaching methods (Yuen, Westwood & Wong, 2004). As a result, it is commonly accepted that these learners require intensive remedial intervention from a trained specialist educator if they are to make progress (Pikulski, 1994; Pinnell, 1997).

Application of Mediated Learning Experience: In support of Feuerstein’s notion of MLE, numerous studies (including Schur, Skuy, Zietsman & Fridjhon, 2002; Tzuriel & Kaufman, 1999) have been conducted, not necessarily with remedial school learners. Tzuriel and Kaufman (1999) explored the relation between MLE and cognitive modifiability among the children who had undergone cultural change. Before the mediation intervention, a group of Ethiopian children (n = 29) was compared with a group of Israeli-born children (n = 23) on the Coloured Progressive Matrices (CPM) and on two preschool dynamic assessment measures of learning potential, the Children’s Inferential Thinking Modifiability test (CITM) and the Children’s Analogical Cognitive Modifiability test (CATM). The results demonstrated initial significant differences ($p < 0.01$) on all the three measurements in favour of the Israeli-born children. After a short period of exposure to intensive mediation, the Ethiopian group had improved significantly and performed at the same level as their counterparts.

In another study, Schur et al. (2002) investigated the effectiveness of teaching experimental astronomy curriculum (EAC) to a group of low functioning high school learners in Israel based on a combination of MLE and a constructivist approach. This study included an experimental and a control group, each of which comprised 16 Grade nine learners. Although learners within both groups received instruction on the earth for three hours per week, the experimental group did so within the framework of the EAC, while the control group was exposed to a conventional approach to earth studies. The results revealed that the experimental group (receiving the curriculum through a combination of MLE and constructivism) improved their cognitive functions and learnt about the earth to a significantly greater degree than a comparable control group (receiving a conventional approach).

In a South African context, Skuy, Gewer, Osrin, Khunou, Fridjhon and Rushton (2002) investigated the effects of Mediated Learning Experience on improving cognitive functioning of psychology students (n = 98) in a





predominantly white tertiary institution. The Raven's Standard Progressive Matrices (RSPM) served as a pre- and post-test measurement of cognitive ability. Mediation was only provided to the experimental group, which was divided into four subgroups (race), for purposes of the intervention. Although analysis of the pre-test scores yielded significant difference due to the effect of race, the post-test results yielded significant difference as an effect of the mediation and non-significant results as an effect of race.

Seabi and Amod (2009) conducted a pilot study in which the effects of a mediated intervention programme on a sample of grade five learners in a remedial school were explored. The purpose of the study was to compare the effects of one-to-one mediation in comparison to group mediation. It was proposed that participants within the Individual Mediation group (n=10) would perform significantly better than those within the Group Mediation group (n=10) given individualized intervention. Mediation tools/instruments (i.e. Set Variations B-8 to B-12 from Feuerstein's Learning Potential Assessment Device) served as a vehicle for mediating cognitive deficiencies. Results revealed a significant improvement in scores only within the Individual Mediation group. Despite the statistically significant improvement yielded within the Individual Mediation group, no statistically significant difference was found between the Individual Mediation and the Group Mediation sample.

It is argued in the current study that the above mentioned study (Seabi & Amod, 2009) may have underestimated the effects of mediation since the two groups which have been exposed to mediated learning intervention were compared without using a control group. The current study therefore investigated the effects of mediation in improving performance on nonverbal intelligence assessment, using Raven's Coloured Progressive Matrices. This Raven's test was chosen in order to follow up Seabi & Amod's (2009) study on remedial school learners. It was hypothesized that following the MLE intervention, the experimental group would perform significantly better than the control group on the Raven's Coloured Progressive Matrices (RCPM) scores. The research questions of the present study were twofold: Is there statistically significant difference between RCPM pre-test and post-test scores within the experimental and control groups? Is there statistically significant difference between the experimental and control groups on the RCPM post-test scores?

METHOD

Participants were drawn from Grade four to Grade seven classes in an urban Remedial School. This study was conducted in a multi-racial school in Johannesburg. There are no more than 15 learners in a class. Learners admitted to this school could not cope with mainstream learning for variety of reasons including issues related to learning, behavioural, and cognitive challenges. A





majority of these learners have been diagnosed with a “learning disability”, which is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical ability (Hammill, 1990).

Sixty-seven learners participated in this study with a mean age of 11.8 and age ranges from 9 to 14 years. There were 52 percent (n=35) males and 48 percent (n=32) females. In an effort not to disrupt the learning programme, 42 percent (n=28) of learners from Grade four and Grade five were assigned the experimental condition, whilst 58 percent (n=39) of learners from Grade six and Grade seven comprised the control group. Therefore, learners were not randomly assigned to different conditions.

Instruments used in the current study were derived from the Learning Potential Assessment Device (LPAD). Only the Raven’s Coloured Progressive Matrices (RCPM) and the Set Variations B-8 to B-12 were utilized.

The Ravens Progressive Matrices (RPM: (Raven, 1956)) are among the most researched and widely used of all culture-reduced tests (Raven, 2000). It is a nonverbal problem solving test in which each sets starts with an obvious problem and becomes progressively more difficult. The Raven’s Coloured Progressive Matrices (RCPM) items are presented on a coloured background in order to make the task visually stimulating, with the exception of the last few tasks which are presented on black and white. Rand and Kaniel (1987) reported reliability coefficients of .8 and .9. However, the RCPM was recently found to have good validity and reliability indices and is considered to be a suitable measure to assess nonverbal intelligence of young children (Kazem, Alzubiadi, Yousif, Aljamali, Al-Mashdany, et al., 2007). The RCPM test consists of three sets of problems: A, AB, and B. the possible scores on this test range from 0 to 36. Problems A and AB were utilized in this study as pre-post measurements, whereas set B was used for the mediation. As a result, the scores ranged from 0 to 24. Although the RCPM has been standardized only in the United Kingdom (1992), United States of America (1993) and Germany (1997), several studies conducted in South Africa confirmed the significance of the RCPM as a measure of intellectual functioning (Grieve & Viljoen, 2000; Seabi & Amod, 2009; Skuy et al., 2002).

Learning Potential Assessment Device (LPAD) Variations B8 - B12 (Feuerstein, Haywood, Rand, Hoffman and Jensen, 1986). The LPAD materials include tools that involve higher cognitive processes and mental operations, such as the Verbal Analogies, The Organizer and LPAD Set Variations B-8 to B-12. The LPAD Variations B-8 to B-12 consists of sets of six variations on five Raven’s Coloured Progressive Matrices items. These Variations were selected for the current study because “they permit the examiner to access and modify abstract thinking, and also represent tasks that under normal circumstances are





rarely offered to the low-functioning individual” (Jensen & Feuerstein, 1987, p.396). Like the RCPM, it measures the same components such as an individual’s ability to form comparisons, to reason by analogy and to organize spatial perceptions into systematically related wholes (Tzurriel & Haywood, 1992).

The current study adopted a quantitative pre-post quasi-experimental design with an intervention in between. Participants underwent the pre-test and post-test phases by completing the RCPM measure according to standard administrations. The study focused on improving scores on the Raven’s matrices using the Set Variations II B8-B12 of the LPAD as the mediation task.

At the pre-test phase (day 1), all the participants were administered to the RCPM in a group setting. Participants within the experimental group were then exposed to one-to-one MLE intervention for approximately 30 to 45 minutes depending on the needs of the learner (day 8).

During the mediation, the author assumed the role of a mediator between the mediatees’ thinking processes and the cognitive strategies being taught. The mediation was geared towards correcting thinking patterns that impair learning, developing accurate perception, and insight and understanding of the participant’s thought processes. As cited in Seabi and Amod (2009, p.191), “the mediatees were encouraged to develop effective thinking strategies, refrain from impulsivity, be precise and systematic in gathering of data, clearly identify and define problems, devise a plan of action and avoid trial-and-error responses, look for logical evidence and reflect before responding”. The mediator intervened when it was necessary to assist the participants/mediatees as much as needed to complete the tasks. As already mentioned, aspects that were covered included:

- Regulation of behaviour, which implies inhibiting impulsivity or overcoming a blocking that may obstruct mediatee’s successful performance;
- Developing accurate perception through systematic approach of gathering and understanding of the problem, and being precise and clear;
- Production of reflective and analytic insight, whereby mediatees were assisted to think about the nature of tasks and their requirements and to be critical of their solutions; and
- Provision of appropriate verbal tools necessary to receive, store, process/elaborate and express information (Feuerstein et al., 1979; Skuy, Mentis & Mentis, 1996).

The approach was of a process-oriented nature rather than content focused. It is essential to note that during the mediation process, many of these learners were highly anxious and hesitant to respond. It appears that their





learning difficulty had resulted in emotional upset. It was essential for the mediator to address emotional issues first, so the learners could be able to focus on the tasks. The mediator acknowledged their feelings and assured them that inability to respond accurately to a question was part of the learning process, and they were not going to be punished for getting anything wrong. A rapport was established with the mediatees, and the mediator mediated behavioural and cognitive deficiencies displayed by the participants. A week after the intervention period, the RCPM was then re-administrated to all the participants.

Ethical considerations: The author obtained permission from the university's Ethics Committee to conduct the study and proceeded with the research only once this had been procured. Given that this sample is considered a vulnerable population, consent was obtained from parents or guardians, the principal of the school, educators, and the learners themselves. The participants were initially invited to participate in the research process and were informed they had the right to say no if they felt that way (voluntary). And if they participate and later feel that they did not want to continue with the study (tasks), they would not be hurt or laughed at (withdrawal). They were also told that no one would know what they have written as it was a secret (confidential) between them and the researcher, and that their names were not going to be written in the report.

Data Analysis: An independent t-test was utilised to compare pre-test scores of the experimental and control groups on the RCPM scores. This analysis was done to determine the groups' initial level of performance. A paired t-test was also conducted to determine if significant improvement in the RCPM scores from pre-test phase to the post-test phase could be demonstrated within the control and experimental groups. It was expected that the experimental group would demonstrate significant improvement as a result of the mediation intervention, while no improvement was expected within the control group. An Analysis of Covariance (ANCOVA) was performed to test whether there was significant difference between the experimental and control groups on the RCPM post-test scores. The pre-test scores of the RCPM served as the covariates. By controlling the effects of the differences that the experimental and control groups would bring, effectiveness of the intervention was investigated without confounding variables. Given the composition of the control and experimental groups, (control group was composed of participants in higher grades; Grade 6 and Grade 7, while those in the experimental group were in Grade 4 and Grade 5) it was expected that the gap between the groups would narrow due to the mediation intervention.



RESULTS

The pre- and post-test means and standard deviations of the RCPM scores are presented in Table 1 for both the experimental and control groups. A statistically significant difference ($t [1, 66] = -5.48, p < .01$) was found between the pre-test RCPM scores, in favour of the control group. As shown in Table 1, a statistically significant ($t [1, 27] = -6.14, p < .01$) improvement of scores from the pre- to the post-test phase was only found within the experimental group.

Table 1: Pre-test and post-test Mean RCPM Scores within the Groups

| Variable | n. | Pre | | Post | | t. |
|--------------|----|-------|-----|-------|-----|---------|
| | | Mean | SD | Mean | SD | |
| Experimental | 28 | 16.75 | 4.9 | 19.67 | 3.5 | -6.14** |
| Control | 39 | 20.05 | 4.1 | 20.23 | 3.5 | -1.42 |

** $p < 0.01$

To determine whether there was a significant difference between the control group and experimental group on the post-test RCPM scores, an ANCOVA was conducted. The results revealed no statistical significant difference ($F [1, 66] = 0.39, p > .05$) between the experimental and control groups on the RCPM scores.

As illustrated in Figure 1, it can be seen that the gap between the experimental and control groups on the RCPM mean scores narrowed from pre-test to post-test teaching phase, in favour of the experimental group.

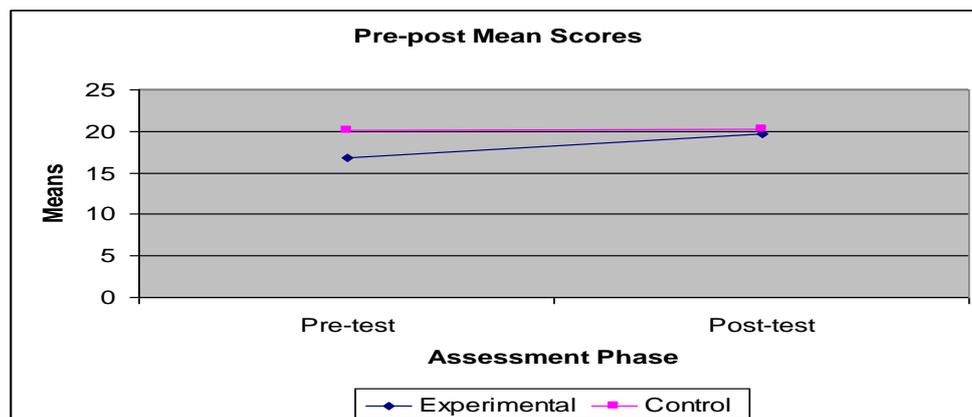


Figure 1: Pre-posttest mean Raven's scores within the experimental and control groups

DISCUSSION AND CONCLUSION

The major objective of the study was to investigate whether Feuerstein's mediated learning experience could be used as a vehicle for enhancing



internal validity. It was not possible to randomly constitute the groups, as it was the school principal's request that the learning programme should not be significantly disrupted, since the intervention was carried out during school hours. The mediated learning experience intervention was of a short duration. A long-term intervention programme where cognitive modifiability could be more permanent and pervasive is suggested.

The results of the present study suggest that the deficiencies that impede performance on cognitive tasks for remedial school learners are amenable to mediation. The fundamental rationale for assessing cognitive potential in this way is that if modifiability can be observed through such a short period of intervention, cognitive structural change may be possible through a long-term investment. According to Feuerstein (1979, p.71), mediated learning experience is a "prerequisite to effective, independent and autonomous use of environmental stimuli by the child". Impoverishment of this meaningful experience tends to conceal cognitive potential and as a result, traditional intelligence tests may be insensitive, as they largely assess environmentally learned abilities (Feuerstein & Feuerstein, 1991). Consequently, low educator expectations and placement to special schooling may limit learners' cognitive development.

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Telafi Eğitimi Veren Okullardaki Öğrenenlerin Bilişsel İşlevlerini Geliştirmede Feuerstein'in Aracılı Öğrenme Deneyimi Teorisinin Kullanımı

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Problem Durumu: Bilişsel yeteneği ölçmede kullanılan geleneksel yöntemler önyargıyla ve adaletsiz bir şekilde Batılı ülkelerdeki kültürel ve sosyo-ekonomik azınlıklara ve Afrika ülkelerinde dezavantajlı konumda bulunanlarca eleştirilmektedir. Bu toplulukların bilişsel işlevlerini artırma ve geliştirme konusunda iyileştirici ya da çözüm üretici stratejiler geliştirme yeteneğinden yoksun oldukları tespit edilmiştir. Güney Afrikalıların çoğunun ırk ayrımı sırasında maruz kaldıkları sosyo-ekonomik ve eğitimsel dezavantajlar ve mevcut rejimde de devam eden aynı dezavantajlı dönem göz önüne alındığında mevcut yeteneklerden ziyade gelecekteki potansiyele odaklanan değerlendirme yaklaşımlarına ihtiyaç olduğu aşikârdır.

Yöntem: Bu çalışmada Aracılı Öğrenme Deneyiminin (AÖD) öğrenenlerin bilişsel işlevleri üzerindeki etkisi Ravens Standart Progresif Matrisler Testi (RCPM) ile ölçülmektedir. Araştırmanın örneklemini deney grubunda yer alan 4. ve 5. ile kontrol grubunda yer alan 6. ve 7. sınıftan toplam 67 öğrenci (35 erkek, 32 bayan, ortalama yaş: 11.8) oluşturmaktadır. Katılımcılara 2 ayrı zamanda Ravens Standart Progresif Matrisler Testi (RCPM) uygulanmış ve 2 uygulama arasında da deney grubuna Aracılı Öğrenme Deneyimi müdahalesi yapılmıştır.

Bulgular: RCPM'nin ön test puanları arasında kontrol grubu lehine yaş değişkeni dikkate alınarak anlamlı farklılıklar bulunmuştur ($t [1, 66] = -5.48, p < .01$). Ancak, RCPM'nin son test puanlarında deney grubu ve kontrol grubu arasında anlamlı bir fark bulunmamıştır ($F [1, 66] = 0.39, p > .05$). Ön test ve son test sonuçları RCPM ile deney grubunun anlamlı bir gelişme gösterdiği sonucuna ulaşılırken ön test ve son test sonuçları arasında kontrol grubunda anlamlı bir farklılık bulunmadığı ortaya çıkmıştır.

Tartışma ve Öneriler: RCPM'nin son test ortalamalarında deney grubu ve kontrol grubu arasındaki fark aracılık etkisi ile deney grubu lehine daralmıştır. Bu bulgu, öğrenenlerin bir aracı ile etkileşime girerek yarar sağlayabileceklerini ve böylelikle bir aracı yardımı olmaksızın ulaşabilmeleri mümkün olmayan bir bilişsel aşamaya ulaşmalarında güçlükler olabileceği şeklinde bir öneri sunması bakımından oldukça önemlidir. Bu bulgular, dinamik bir değerlendirme ve Aracılı Öğrenme Deneyimi (AÖD) uygulamalarını desteklemektedir. Araştırma





bulgularına göre telafi eğitimi veren okullardaki öğrenenlerin bilişsel görevlerindeki performansı engelleyen eksikliklerin giderilmesi aracılık ile mümkündür. Bu yolla; bilişsel bir potansiyel uzun dönem çalışmalarla değerlendirilerek, çok kısa zaman aralıklarıyla gerçekleştirilen değişkenlik tespitleriyle (değerlendirme), bilişsel bir değişim sağlanabilir.

Anahtar Kelimeler: Dinamik değerlendirme, Aracılı öğrenme Deneyimi, Bilişsel işlev, Geleneksel ölçümler

