# Meditation as Instructional Technology: A Literature Review

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## Abstract

*What instructional technology ultimately aims at is to help learners to be engaged to learning contents for their learning. Meditation can be conceived of as an instructional technology in that it is a tool that can help learners become more attentive to their learning of instructional content. In general, meditation involves conscious attempt to train one's attention. Large portion of empirical meditation studies support that meditation practice enhances people's attention. But it is not still conclusive. Negative results have been also reported. One mediating factor between meditation practice and its effects is anxiety. Also, there seems to be other confounding variables. This review paper aims at identifying those factors having influence on effects of meditation. Two groups of relevant factors were identified: treatment factors and subject factors. Understanding on effects of influential factors in meditation practice will provide information to refine a meditation program to*

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*be helpful for learning.*

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## I. Introduction

### A. Meditation as instructional technology

It can be safely said that the key point in instructional technology is to engage learners in learning events. For this purpose, hardware technology, such as audio-visual media, electronic devices and computer software, is being utilized in the educational field. This type of educational technology is called technology in education. In contrast to technology in education, Ellinton et al. (1993) explained the concept of technology of education. Technology of education is methodology to improve the overall efficiency of the teaching/learning process. Under the concept of technology of education, Heinrich (1982) introduced meditation as a new kind of instructional technology (1982, 333). Hanson and Gueulette (1988) also suggested a new direction of instructional technology by introducing various psychotechnology including meditation. Both of them view that meditation has potential to help the learning process. Since their discussion on meditation as educational technology, it is hard to find related studies in the field of educational technology. The current literature review aims to develop the previous discussion on the possibility of utilizing meditation as instructional technology. Among the various positive aspects of meditation, this paper views meditation as a potential technique to enhance learners' attention.

Attention is the foremost important psychological factor in information processing and learning. In order for a student to learn effectively, learning content needs to be attended to. According to cognitive learning theory,

unattended information is not perceived so that it cannot be delivered even to short-term memory (Gagne et al. 2005). Thus, Gagne et al. (2005) prescribed 'gaining attention' as the first step of instruction and explained how to organize instructional activities to arouse students' attention. The underlying assumption of this approach of instruction is that students' attentive ability is fixed. However, this paper is interested in the plasticity of attention and will introduce meditation as a potential technology to enhance learners' attention through related empirical studies on meditation.

## B. Definition of meditation

This paper follows the Walsh's definition of meditation: "the conscious training of attention aimed at modifying mental processes so as to elicit enhanced states of consciousness and well being" (1984, 28). Overall, there are two types of meditation: concentrative and mindfulness (or open-awareness) (Delmonte 1985). Meditation defined above includes both types.

## C. Review meditation and attention

The claim of meditation as instructional technology underlying this review is based on the influence of meditation on attention. Research reports that there is significant improvement in attention from meditation practice. In Moretti-Altuna (1987)'s study, she compared meditation with other treatments (drug therapy and standard therapy control) for ADHD children aged from 6-10. Her conclusion was that meditation has similarly positive effects with other treatments in terms of impulsivity, distractibility, and parent ratings of home behavior. Moreover, meditation practice group showed more improvement in classroom behavior than other treatments. Linden (1973) also showed a similar result with Moretti-Altuna (1985). In Linden's study, the experimental subjects who practiced meditation with the technique of focusing on one's breath showed significant improvement in attention measured by CEFT (Children's Embedded Figures Test). CEFT requires skills to fix attention on

relevant objects amid a distracting background. Meditation also trains this skill of fixing attention. During meditation, a practitioner focuses and refocuses one's attention to a referent object even in the environment with noise.

On the other hand, there also have been reports not supporting positive effects of meditation on attention. For example, Williams (1985) studied effects of an intensive meditation retreat on experienced meditators' attention. The results did not support the positive effects of meditation. Explanations on the controversial results can be found in the subject variable. One explanation can be the age difference between the subjects in the two studies. The experimental subjects of Williams (1985) were adults and experienced meditators, whereas the Moretti-Altuna (1987)'s subjects were children with no meditation experience. Another explanation can be associated with subjects' initial attention ability. If a subject's attention ability is at low level, he/she has much room to be improved. If the ability is high level, however, the improvement might not be large enough to be noticeable. Yuille and Sereda (1980) were also negative on effects of meditation. They strongly doubt that the short-term practice of such a simple technique could bring about profound psychological change.

### D. Meditation and absorption

Attentional absorption may also be influenced by meditation practice. According to Tellegen's interpretation, absorption is a disposition for "having episodes of 'total' attention that fully engage one's representational (i.e., perceptual, enactive, imaginative, and ideational) resources" (1974, 268). A person in the state of absorption to the relevant task is expected to be highly efficient in the performance. An issue is whether meditation can enhance the ability of absorption. Davidson, Goleman, and Schwartz (1984) showed that duration of meditation practice is correlated with absorption level. Since it was cross-sectional study, however, the study did not show the effects of meditation on absorption level directly. Moreover, an opposite result was shown in Spanos et al. (1979)'s study. In the study, four different groups of

trained meditators differing in the amount of meditation practice did not differ from one another in absorption measured by the intrusion of thoughts during meditation. Nonetheless, the average of trained meditators' absorption score was better than non-meditators. A longitudinal study is required to verify the effects of duration of meditation practice on people's absorption level.

However, direct positive effect of meditation on children's absorption was shown in Kim (2006)'s study. In her study, elementary 6 grade children who participated in 30 brain respiration meditation sessions showed significantly better concentration score than control group in both paper and pencil test and brain wave test.

## E. Meditation and anxiety

Meditation may also have an indirect influence on attention. One possible mediating factor in effects of meditation on attention is anxiety. According to processing efficiency theory, anxiety impairs cognitive processing efficiency (Eysenck and Calvo as cited in Eysenck, Derakshan, Santos and Calvo 2007). Attention control theory elaborates the processing efficiency theory by dealing with the effects of anxiety on central executive attention control functions of human working memory (Eysenck, Derakshan, Santos and Calvo 2007). Eysenck et al. (2007) explains that anxiety reduces the efficiency of three kinds of central executive cognitive processing of working memory: shifting, inhibiting, updating. Considering above theories, meditation may have an influence on attention if it truly reduces anxiety.

Delmonte (1985) analyzed the accumulated body of empirical studies on the effects of meditation on anxiety and tentatively concluded that meditation practice is associated with anxiety reduction. The concept of anxiety in his review included state, trait, cognitive, somatic anxiety, and neuroticism. Schwartz et al. (1978) distinguished cognitive anxiety from somatic anxiety and showed evidence that meditation was more effective in reducing cognitive anxiety than somatic anxiety compared to physical exercise. These findings, together with processing efficiency theory and attention control theory, imply

that meditation may have a positive influence on attention by reducing practitioners' anxiety.

On the other hand, Smith (1975) raised a doubt about the positive effects of meditation on anxiety reduction. In the literature review, he raised a question whether the positive effects of meditation was the result of meditation practice per se or expectation of relief. He conducted an experiment on effects of meditation with control of subjects' expectation about effects of treatments. The result was that there was no significant difference between the experimental treatment and comparison treatments after control of expectancy (Smith 1976). His single study may not negate the effects of meditation, but the study suggests the condition which should be met in a strong empirical meditation research.

Attention control theory just deals with the relationship between anxiety and attention control. There is no systematic explanation discussing the relationship between anxiety and absorption yet. Davidson et al. (1984) showed a possibility that they are independent and not correlated. But it is not still conclusive.

## F. Factors having influence on effects of meditation

As discussed above, meditation seems to have positive effects on attention in general, but it is still controversial. Considering the inconsistency of results of the studies, it is highly probable that there are confounding variables whose influence on effects of meditation is not ignorable. Two important categories of confounding factors are considered. One group is treatment factors and the other is subject factors.

## G. Treatment factors

The empirical meditation studies discussed above did not apply the same meditation treatments. The following table summarizes the differences of the treatment factors.

| | Type | Duration | Expectation control | Effects |
|---|---|---|---|---|
| Moretti-Altuna, 1987 | Concentration (Focusing on "one") | 4 weeks | No | Attention (Positive) |
| Linden, 1973 | Concentration (Focusing on breath) | 18 weeks | No | Attention (Positive) |
| Williams, 1985 | Concentration (Shamatha) | Intensive retreat | No | Attention (No difference) |
| Kim, 2006 | Concentration (Brain respiration) | 12 weeks | No | Absorption (Positive) |
| Davidson et al., 1984 | (Cross-sectional study) | N/A | No | Absorption (Positive) |
| Spanos et al., 1979 | (Cross-sectional study) | N/A | No | Absorption (No difference) |
| Schwartz et al., 1978 | Concentration (Transcendental meditation) | One month | No | Anxiety (Positive) |
| Smith, 1976 | Concentration (Transcendental meditation) | 20 days | Yes | Anxiety (No difference) |

Table. 1.

Most of the studies used the concentration type of meditation, but their technique was not identical. Duration of meditation was also various. Furthermore, most importantly, expectation was not controlled in most studies. It is conceivable that different participation attitudes may produce different results even from the same treatment. Smith (1976) revealed the importance of expectation factor in his experiment by showing that there was no significant difference between the meditation and comparison groups when the expectation of treatment effects was controlled.

## H. Subject factors

Subject variables also need to be considered. One possible subject factor would be participants' initial attention ability. As discussed in the contrast between positive and negative report on the effects of meditation on attention, subjects who are already highly attentive would not have much room to be improved even with effective treatment. Moreover, attention ability may interact with meditation treatment. In other words, attentive ability may be not

only influenced by meditation practice but also have an influence on it. In a literature review, Davidson and Goleman (1984) also stated that "Subjects…who have some capacity to voluntarily self-regulate their attention are likely to experience subjectively positive effects from meditation" (1984, 602). They also concluded that attentional control is also associated with hypnotizability which is strongly related with absorption. Maupin (1965)'s study, however, drew a different conclusion that attention measures did not predict the response to meditation whereas regression and tolerance for unrealistic experience did.

Another important subject factor seems to be trait-anxiety. This factor also possibly interacts with meditation practice. Davidson and Goleman (1984) also claimed that predispositional differences in global anxiety had significant effects on subjects' ability to persist in the practice of meditation. A person who is not highly anxious would persist in the meditation practice and be likely to experience positive effects of meditation (Davidson and Goleman). However, this issue is not conclusive, either. In Beinman et al. (1984)'s study, trait-anxiety was not highly correlated with effects of meditation. But this result does not negate the correlation between trait-anxiety and effects of meditation. Since the dependent variable representing effects of meditation in Beinman et al. was not constructs measuring effects on attention, this issue needs to be further clarified.

Besides, locus of control was found as a salient factor influencing the effects of meditation. According to Rotter (1990), internal and external locus of control refers to "the degree to which persons expect that a reinforcement or an outcome of their behavior is contingent on their own behavior or personal characteristics versus the degree to which persons expect that the reinforcement or outcome is a function of chance, luck, or fate, is under the control" (1990, 489). A strong relation between locus of control and attention level during meditation was found (Di Nardo 1979). In Di Nardo's study, results showed that an internal locus of control was related to fewer intrusions of thought than an external locus control. This result is also moderately supported by Beinman et al. (1984).

### I. Conceptual model on effects of meditation

From the above discussion, the following model was drawn.

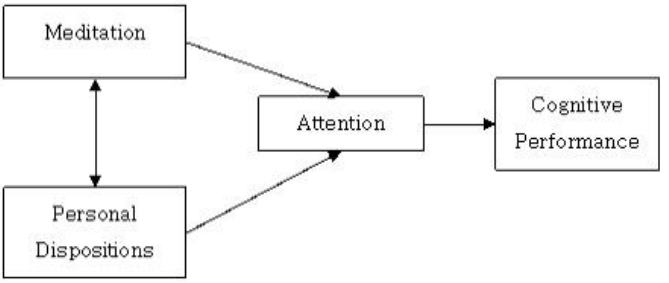


Fig. 1.

The above model shows the main effects of meditation and personal dispositions as well as interaction effects between them. The meditation treatments in the previous studies were not identical. And also it is also conceivable that individual differences contributed to different effects of meditation. Moreover, it is also probable that different types of subjects might have different influence from one type of meditation treatment than another. In other words, there might be interaction between meditation treatment and personal dispositions.

## II. Conclusion

Overall, meditation seems to have positive effects on practitioners' attention. However, some reports have raised doubtful questions on its effect. The current literature review tentatively concludes that the controversy on effects of meditation is caused by existence of confounding variables. Two groups of confounding variables were identified. One is treatment factors and the other is subject factors. Major treatment factors include, but would not be limited to, type of meditation, duration, and expectation. Moreover, initial

attention ability, trait-anxiety, and locus of control were discussed as major subject factors. The conceptual model suggested that meditation practice and personal dispositions would interact and have influence on practitioners' attention.

The current review shows the possibility of meditation as instructional technology. However, it also showed the limitation of the accumulated body of meditation study to provide supportive information on how to apply meditation in the educational field. In order for meditation to be effectively applied, the mechanism of effects of meditation needs to be further clarified. More elaborate studies on difference in meditation treatment, individual differences, and their influences on effects of meditation are necessary.

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