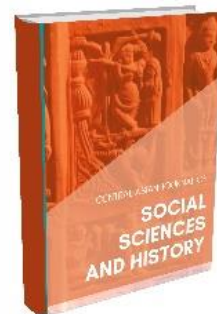




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### Embodied Learning and Its Implication for Effective Learning

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#### Abstract:

Embodied learning has gained considerable increase in this modern era due to its distinctive approach in assisting students. Embodied Learning is rooted in the relationship between body and mind in learning. It constitutes a contemporary pedagogical theory of learning, which emphasizes the use of the body in the educational practice. It is one of the most effective techniques that involves physical movements and interactivity. This emerging technique easily integrates human-computer interaction and learning sciences to provide a bit challenging experience but a great learning output. Simple movements are required during the technique in the teacher's lessons. It does not only improve students' interest in learning but engages them in the most pleasing way. Several researches related to various areas of expertise highlight the usefulness and the necessity of the body itself as a learning tool. However, it is difficult for teachers to incorporate the concept of embodied learning in classrooms. The combination of tangible intelligent objects, wearable, motion-tracking, sensor technology, and interactive video can give an ultimate outcome of this learning approach. Given the significance of Embodied Learning to new teaching methods and approaches, this paper presents the nature of embodied learning, its

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features/principles, strategies for its application in the classroom, need for applying it and its implication to learning. It was concluded that embodied learning approach provides a meaningful learning experience for students. It was suggested among others that teachers should be trained on how to apply embodied learning in teaching different subjects in the classroom.

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## Introduction

The increasing dependence on technological tools for effective learning has brought to light new dimensions in the research area of educational technology, gaining more attention in pedagogical implications of different emerging technologies. In contemporary educational discourse, renewed interest in Embodied Learning (EL) has emerged, in conjunction with the exploitation of technologies, which provide new teaching approaches and interactions. Learning is a comprehensive activity in which we come to know ourselves and the world around us. It is a paradoxical activity: it is doing and submitting at the same time. And its achievement ranges from merely being aware, to what may be called understanding and being able to explain (Oakeshott, 2017).

Theories of learning inspired by empirical psychology claim to have discovered the general principles that govern human learning or what is commonly described in psychological or epistemological terms like 'knowledge' or 'understanding' (Sani, et al., 2021). Learning is viewed as a process of interaction between students and teachers who design each activity that will be carried out to help students actively learn or master learning material (Gasong, 2018). The interaction process that changes in students is the result of planned learning. Careful planning in carrying out the learning process is the main requirement to minimize disruption in the learning process (Sani, et al, 2021). Embodied learning is a renewable learning model in learning. Embodied learning in contemporary discourse is used interchangeably with action learning, kinesthetic learning, and embodied cognition (Johnson-Glenberg, 2014). The characteristics of embodied learning provide answers to questions related to the way's knowledge is constructed by students while they view every- one's body as a tool for knowledge construction (Kalantzis & Cope, 2014). In particular, the term "body" in embodied practice includes the physical body, the senses, the mind, and the brain, that is the whole of the student's personality.

Facilitating students to learn human being provides a meaningful learning experience and is stored in their long-term memory (Marian et al, 2019). Learning to use physical activity is an activity of gaining knowledge and building a proper understanding of the brain (Ionescu & Glava, 2015). The psychological process in building these two things is the relationship between the performance of cognition, education, and the environment of students. Body involvement is also emphasized on the learning by doing approach, kinesthetic learning, and Montessori methods (Hyland, 2019).

Embodied Learning is rooted in the relationship between body and mind in learning (Yakhlef, 2010). Learning through doing and doing activities provides an opportunity for the child's soul and body to collaborate and understand the material provided, they cannot be separated, such as learning through verbal instruction alone, providing abstract images only, or through listening activities in the classroom (Montessori, 2013). According to Lindgren and Johnson-Glenberg (2013), the primary principles of the implementation of embodied learning are the following: the sensorimotor activity, the relevance of gestures to the theme that is to be reproduced, and the emotional involvement of participant in the whole process.

In recent years, the embodied learning approach has influenced educational technology, especially human-computer interaction and the environment, and technology objects for learning purposes. The initial approach has provided information that student interactions and experiences provide an interesting and useful way of learning. Research on education addresses the benefits of learning environments designed to use embodied interactions (Dourish, 2001) in children's learning processes. Meanwhile, new technology or development continues to be designed by scientists, the technology being designed must consider the characteristics and learning principles contained in it (Trninic and Abrahamson, 2013). The development of the times requires teachers and academics to continue to develop in providing learning for students, meaning that if times are developing then the teaching material must be following the conditions of the times. Technology is one of them, technology will help teachers achieve learning goals. Students can develop according to the times. Embodied learning provides both things in the classroom. This paper provides a practical view of embodied learning beginning from the concept of embodied learning, its features, theoretical framework need for embodied learning, implication for effective learning and its application in the classroom.

## Learning

Learning is a process of interaction between students and teachers who design each activity that will be carried out to help students actively learn or master learning material (Gasong, 2018). The interaction process that changes in students is the result of planned learning. Careful planning in carrying out the learning process is the main requirement to minimize disruption in the learning process. Embodied learning is a renewable learning model in learning. Embodied learning in contemporary discourse is used interchangeably with action learning, kinesthetic learning, and embodied cognition (Johnson-Glenberg, 2014).

According to Brockett (2014), learning is a personal act of individual to make full use of his potential. It is a process of self-actualization to its maximum level. According to Roger (2010), Learning is not memorizing of information, facts and ideas. Its sole purpose is not producing the stored information in the examination. No doubt, it is one of the elements that contribute for the success of the learning process but not a whole. According to him (Roger), it is an unfulfilled curiosity and urges that moves the learner to bring in everything he can see or hear or read about any type of machine or instrument in order to improve the efficiency and speed of it. It includes discovering, drawing in from the outside, and making that which is drawn in a real part of *ME*. It is something that has been done by the learner to understand the real world. It aims at information processing instead of information acquisition.

According to Driscoll (2000), learning is a process of continuous change in human performance or performance potential. It must come about as a result of the learner's experience and interaction with the world around him. Learning is a way of being. It is an ongoing set of attitudes/temperaments and actions by the individual and groups which they employ to keep abreast of the surprising, novel/new, ambiguous, obtrusive and recurring events (Vaill, 2011).

## Embodied Learning

Embodied learning is a pedagogical approach that focus on the non-mental factors involved in learning, and that signal the importance of the body and feeling. Embodied learning is a renewable learning model in learning. Embodied learning in contemporary discourse is used interchangeably with action learning, kinesthetic learning, and embodied cognition (Johnson-Glenberg, 2014).

Embodied learning appears as a multimodal and playful process that requires the involvement of the human body in the cognitive process (Foglia & Wilson, 2013; Wilson, 2002). Researchers of embodied learning claim that in this type of learning the body, next to the mind, constitutes a significant factor in the overall learning process, while it facilitates the meaning of learning through bodily experiences and interactions with the environment (Foglia & Wilson, 2013; McClelland, Pitt, & Stein, 2015). Specifically, the idea of embodied learning places the student in the center of the learning process giving opportunities for physical interaction with the learning material (Ayala, Mendivil, Salinas, & Rios, 2013; Chandler & Tricot, 2015) and providing hands-on activities in classroom-based environments. From this standpoint, different embodied technologies such as motion-based games (e.g., Kinect-based games, Wii, leap motion games, and exergames) are embodied learning technology which could be used in classroom settings for learning purposes (Kosmas, et al, 2018). Researchers and practitioners argue that games such as motion-based games require the learner’s interaction both with the technology and learning material, promoting the physical engagement of the learner in the learning process (Abrahamson, 2013).

Embodied Learning is rooted in the relationship between body and mind in learning (Yakhlef, 2010). Embodied education has been defined as the basic concept which includes embodied teaching and embodied learning (Lindgren & Johnson-Glenberg, 2013). Embodiment refers to how we explore our body or our abilities, rather than contemplating deficiencies or disabilities (Stolz, 2015). Based on the philosophy of "I hear and I forget, I see and I remember, I do and I understand" (Vaillancourt, 2009) provides an overview in the process of better understanding which involves all elements psychologically and the body. The body is complete unity between the soul and organs, they cannot be separated in receiving stimuli through the sensory available to the body. According to embodied approach, both body and mind are able to produce the knowledge significantly by integrating the physical interaction in learning. In that way, as Atkinson (2010) states, “we experience, understand, and act on the world through our bodies.”

The body can be defined based on two parameters. There is the embodied/biological/ sensual way of being, but at the same time there is also the sociocultural and relational/interactive way in which skills are developed. The notion of body in Embodied Learning, does not merely include that body itself but it also includes the senses, the mind, and the brain, that is the whole of the student’s personality (Smyrniou, et al, 2020). The body functions as a natural source of meaning production, since it helps students to express themselves in a natural way. The body is defined as the human corporeal experience and the subsequent psychological consequences, while others state that the unconscious aspects of corporeal experience constitute the basis of cognitive activity and linguistic expression (Nñez, et al cited in Smyrniou, et al, 2020).

Embodied learning is closely related to constructivist models and to modern educational theories regarding the role of the teacher, of the student and of learning itself in the educational practice. Embodied Education has been defined as the basic concept which includes Embodied teaching and Embodied learning (Lindgren, et al, 2013). In fact, the terms Embodied Learning and Embodied Teaching are used interchangeably to refer to new scientific and educational practices (Wilcox, 2009). In accordance with the constructivist principles, the body is used both inside and outside classroom for experiential learning and is not treated as a place of learning. The principles of Embodied Learning provide answers to questions related to the ways knowledge is constructed by students as they leave behind them the academic model of perceiving knowledge and treat each student as a whole, while they view everyone’s body as a tool for knowledge construction and as a knowledge carrier (Kalantzis

& Cope, 2013). Language and full-body motion have been studied as an integral means through which students' express thoughts and meanings when they interact with a set of collaborative digital games designed by the researchers (Smyrniou & Kynigos, 2012) in creative and innovative teaching approaches (Riopel & Smyrniou, 2016). This way, each student is placed in the center of the educational process, while disinterestedness is transformed into active participation and emotional neutrality into cooperation.

### **Features of Embodied Learning**

Dixon and Senior (2011) identified the following as the primary features of embodied learning:

- a. Sensorimotor activity: Sensorimotor activity is the ability to perform target-oriented movements. This ability is for tasks in which information from the environment must be continuously processed and converted into manual movements. (Abrahamson, et al, 2012), asserts that in sensorimotor activity, the body movements are involved in the process of embodied learning and the perceived stimuli can be transformed into a more suitable memory and cognitive representations. As it has been mentioned relevance of gestures refers to the analog or structural correlation of symbols and their meanings (Segal, 2011). Based on the above-mentioned, it becomes apparent that embodied learning involves coordinated movements either of body parts or of the whole body in order for a learning goal to be achieved combined with the students' sensorimotor activity and their emotional involvement.
- b. Relevance of gestures to the theme that is to be reproduced
- c. Emotional involvement.

### **Theoretical Framework**

#### **Embodied Cognition Theory (Shapiro, 2014)**

According to Shapiro, embodied cognition theory is particularly important to consider for understanding the development of spatial cognition in children. Previous theories of human cognition have focused on abstract mental representations, in which sensory and motor systems serve the purpose of delivering input and output to and from the cognitive system (Wilson, 2002). In this approach to human cognition, the computer metaphor is often used: the human mind functions just like a computer, with input, output, and a set of computations in between. In contrast, in the embodied cognition approach, sensory and motor systems are seen as fundamentally integrated with cognitive processing. Embodied theory has brought in the light essential considerations for how we can design for the interactions between people, objects, body and space.

Using the body is essential in concept representation and communication while this is also confirmed by the emphasis other fields and cognitive objects place on the body as a learning tool, such as dance theatre, kinesiology, athletics even Mathematics and Physics (Smyrniou, et al, 2020). All these cognitive objects have student collaboration, movement and the process of cognitive development as a common denominator.

### **Need For Application of Embodied Learning for Effective Teaching and Learning**

In the last decades, embodied learning has influenced the educational technology field, especially the human-computer interaction and the design of technological environments and objects for learning purposes. Indeed, the embodied approach has informed interaction and user-experience design.

Recently, studies in education address the benefits of learning environments designed to incorporate embodied interaction (Dourish, 2001) in children's learning processes (Marshall, Price, & Rogers, 2003). While new technologies are constantly being designed, designers and learning scientists should take into account embodied learning characteristics and principles when designing mediated content (Trninic & Abrahamson, 2013). In the recent years, the development of different emerging technologies that require the human's physical interactions and bodily movements has brought to the light the use of embodied learning in various learning contexts. One example is the use of motion-based games, such as Kinect-based games, to facilitate the delivery of learning in educational environments. Currently, these motion-based games are specifically associated with physical engagement and interaction with learning material and for this reason have received the researchers' attention investigating their impact in many different contexts both in general and special education (Abrahamson, 2013; Kosmas, Ioannou, & Retalis, 2017; Kourakli et al., 2016).

It becomes evident that Embodied Learning is in accordance with new educational practices, as it uses personality as a whole, and promotes the way students learn and not the content of learning in the learning process. As the situations of the learning subject are explored during the process, the student gets the upper hand of multidimensional involvement. The basic idea is that existential learning can be stimulated with physical interaction. Research studies have pointed out how effectively movement can stimulate a person's mind and that signifies the role of movement in classrooms. As physical activities are highly correlated with intellectual growth, embodied learning is sure to reset the trajectory of traditional learning.

It seems almost trivial to say that we could not live any kind of experience, not even of intellectual nature, without the presence of the body. But indeed, the importance of the physical dimension has long been overshadowed by the cognitive sciences. The learning experience, conceived as a purely mental process, is implemented through exclusively mental processes: reading, listening, repeating. During the 21st century, pedagogical science has tried to introduce innovations in traditional education, with the aim of providing the most adequate preparation for an increasingly complex and changing reality.

With respect to the traditional dualistic conception of body and mind as separate entities, embodied learning aims to renew school practices by bringing the physical dimension to the center of the classroom. Therefore, the focus of embodied learning is the relationship between body and mind. From this, derive the key pedagogical principles of embodied learning, summarized as follows:

- a. Body and mind cooperate in the learning process.
- b. Action and thinking are intertwined.
- c. There is a connection between movements and concepts.

To sum up, the central tenet of this approach is that action and thinking are assumed as two simultaneous moments of the learning process.

### **Implication for Effective Learning**

The increasing dependence on technological tools for enhancing learning has brought to light new dimensions in the research area of educational technology, gaining more attention in pedagogical implications of different emerging technologies. The body through action and gesture, is a powerful tool to understand and to learn school subjects. However, embodiment deprived of its neuro-scientific base would have no chance in educational contexts. The brain in order to know that the human mind

does not work like a “computer” processing symbols. Neuroscience has unveiled (at least partially) brain patterns behind language and mathematical thinking and they are grounded in action and perception, in the body.

The idea to pursue is now to create learning contexts which allow brain-based instruction and embodied learning. These contexts can be natural, in interaction with a teacher but also, they can employ immersive technologies, in which embodiment is performed in virtual or augmented reality (mixed reality) (Lindgren and Johnson-Glenberg, 2013; Macedonia et al., 2014b). Considering that the future of employment is tied to excellent education, there is an urgent need to make instructional methods more effective by combining evidence based behavioral and neuro-scientific research with methodology through the use of embodied learning.

Embodied learning can benefit learners on different educational levels, but some learning activities seem to be more effective for certain age groups. Various learning activities can contribute in promoting research-pedagogy dialogues (Chong, 2020). This is important because pedagogical practices seem to respond slowly to developments in this research area (Macedonia, 2019; Macrine & Fugate, 2021), although embodied learning approaches might already be used in classroom practices, to affect this slow response the knowledge gained through advances in research area on embodied learning needs to be translated to classroom practices (Macrine & Fugate, 2021). Consequently, the argument about easy implementation of embodied learning in educational practice is very much relevant in this paper. Therefore, the knowledge presented in this paper is useful for research-based teacher education. Pre-service and in-service teacher education could act as catalysts in introducing and preparing teachers for implementing embodied learning in educational practices.

### **Application of Embodied Learning in the Classroom**

In Embodied Learning, new knowledge is affected by the conditions it is used and by the types of activities the student is expected to participate in. Smyrniou, et al (2020) identified the following parameters that should be taken into consideration when designing an activity using embodied learning:

- a. cognitive involvement to the topic, cognitive processes, representation of a scientific notion
- b. body movements
- c. expression of the student’s feelings
- d. clarity of instructions
- e. holistic design of activities
- f. student cooperation
- g. ability of students to apply acquired knowledge to new environments.

Kosmas, et al, (2018) revealed that Embodied learning can be applied in the classroom by using reliable technological tools such as educational games. Such professional tools can be adequate and applicable thus, allowing for examination of aspects of embodied learning in real classrooms. Recent studies (Kosmas et al., 2017, 2018; Kourakli et al., 2016) have shown that Kinems games can have a positive impact on children’s academic, cognitive, and motor performance. This suite of games includes several games which combine motor, academic, and cognitive goals with high adaptability regarding the curriculum.

Smyrniou, et al (2020) pointed that the procedure that is followed during Embodied Learning is gradually escalating. During the first stage, the student may not proceed to a movement related to the representation of concepts. However, students understand that they are going to be exposed to scientific concepts and they are concerned about the way of representing them. During the second stage, movements are produced sometimes unconsciously or even as the result of imitation while during the third stage the students are asked to think of ways of representing the suggested content.

During the final stage which is also the most important one, students apply the newly acquired knowledge to new environments, through dramatization (image/interactive theatre) or role play, where they represent the scientific concept not only verbally or by using body movements, but also by participating both mentally and emotionally to the extent of embodying this new Learning is a procedure during which the student employs mental processes expressed through coordinated body movements which are linked to the represented content, through his/her emotional involvement and verbal communication skills.

Sanako (2021) revealed that there are many physical activities that a teacher could envision to bring embodied learning in the classroom especially for the teaching of language. They identified and discussed as follows:

1. Games that include movement: Motion sensing technology is at the core of the Kinect-based games from Microsoft and from other tech-companies. Similarly, Augmented and Virtual Reality devices and games immerse the player/learner deep into movement and make them be in the scene rather than being just an outside observer. In 2021 there are games utilizing these technologies in the market that also are usable for language teaching and learning needs.
2. Role-playing and acting: Role-play is one of the all-time favorite language learning activities for many language teachers. This is an effective technique to get learners engaged, and make language learning a fun and more immersive experience. A simple example is to assign student groups to present a simple scene from a popular movie or a story in the target language.
3. Drawing comics: Drawing and arts combine thinking and movement in a very natural and enjoyable way. This is a language learning activity that triggers many senses and processes, including not only the hand movement but also attaching a picture and images to the right words and context.

The following strategies or methods or activities can also make embodied learning an integral part of a classroom.

**Lego building:** This is one of the best ways in stimulating vision and patience in students while fostering their creativity. For completing a structure, they will have to come across different mathematical skills as well as the out of the box strategies. A number of other factors needed for a developing student such as fine motor skills, puzzle solving, cooperative play and persistence have a significant role during the process. This activity can be used effectively to learn counting and measurements, patterns and symmetry, illustrating stories as well as visualizing different concepts.

**Kinect-based educational games:** Schools are now making use of advanced educational gaming systems using motion sensing to take learning to next level. The idea of learning subjects such as mathematics with just text book assignments is now getting replaced with such game-based learning. The advanced options such as, Microsoft's Kinect motion-sensor incorporates physical gestures with intelligent thinking in order to find solutions for puzzles. There are numerous options with interesting games such as pricking the right balloons, finding the right path for hedgehogs, magical baskets and



more to learn complex puzzle solving. The advanced learning strategies such as SMALLab Learning utilize motion capture technology.

**Act out worksheet tasks:** Rather than simply doing the text book assignments with papers and pen, students should be encouraged to come out and just make an act of the worksheet tasks. When working out chemical reactions, students can form groups and pretend as electrons or neutrons or as different elements to combine reactions. Such activity would be fun and eliminates boredom from classroom. At the same time, as students interact very closely with the problems, they would get a very clear understanding. While learning biology, they can imitate different animals and their species. Such acts in fact stimulate effective conversion of potential energy into kinetic energy within a classroom.

**Hop scotch mathematics:** Learning mathematics is one of the hurdles of students of diverse class levels. Hop scotch math is an interesting gaming concept by which students can have an interactive math learning experience. With just a basic knowledge of arithmetic, students can learn higher level concepts only with chalks and stones. This game can be modified in different forms depending on the learning concept handled. The hopscotch area that resembles a calculator can be drawn in the classroom.

Make the boxes close so that students will not find it difficult for jumping into boxes.

When the stone keys '1', the student has to hop through equation that gives result as '1'.

For example, 4, 3, -, = or 1, \*, 1, = and so on.

Student gets out while committing any mistake and the last person that completes the entire round becomes the winner.

**Hands on practical:** Hands on learning is the key to embodied learning as students study the subjects by doing the stuff. Students can be given open ended projects in which they can come up with creativity. History can be taught with interesting ways such as folk art. Virtual science labs are the best option to learn science subjects by nearly experiencing it. If the projects are open ended, students will not need to stick on with the guide lines and go for out of the box ideas to explore the subject in an engaging way. Drawing out the topics and storytelling methods are other interactive methods of approaching a difficult subject.

**History mimes:** History is a vast subject and it is a night mare for many students to remember the many phases and periods. The rulers, the traditions and the way of life was very different in diverse phases. The history mime's strategy has proved really effective as the students work closely with the subject. An outline of different history periods and the traditions are discussed first. The students would voluntarily come up with mimes on different traditions or rulers by showcasing the way they dressed or the materials they used. The other audience students have to identify the history period after the mime show.

**Map art:** This is an awesome way of learning social studies through embodied learning. Map art involves adventurous exercises that help you learn more about the subject with hands on experience. In this technique, art and history is combined in its most effective way that gives you a layered understanding. In normal methods, many ways are devised to learn the map from the already printed materials. This strategy demands students to prepare the maps themselves that helps them to be closer

with the elements of the map. This form of learning stimulates their creativity and teachers are advised to give only minimal guidance to do the job.

**Field trips:** Taking a break from the four walls of a classroom can be a real boost to the students. Engage them with field trips once in a while when they get a chance to interact with the environment along with subject areas. When they experience the lessons of their subject, it is very easy for them to understand and memorize it for long without the additional effort of ‘typical learning’. As we all know a picture is worth a thousand words. So you can imagine how effective it would be to really see the chemical reactions, motor functions or the transformation or growth of a plant.

**Energy breaks:** In addition to all these activities that make the subjects closer to the student, getting some energy breaks can add great value to improving their alertness. Handling a set of drowsy students can be really challenging for the teachers and the learning session would be less productive. Warm up exercise between the sessions can act as icebreakers and relieve boredom while improving the blood pumping. Jump shot movements, swimming mimics, crossovers, weight training movements or simple arm rotations can do the trick. Including music and simple dance moves with all the students in the class can be real fun and they would easily get refreshed.

These are just ways of applying embodied learning in classroom. The use of both context and body in learning lays a foundation for abstract thinking.

## Conclusion

The embodied learning approach provides a meaningful learning experience for students. Integrate cognitive, motor-sensory, perception, and environmental abilities and the learning process to build knowledge and long-lasting understanding for students. Providing opportunities for students to learn as a whole and interact and adapt to the environment is the main goal of this approach. The implementation of embodied learning in the classroom can use media that has high technology capacity and simple media.

## Suggestions

1. The teachers should be trained on how to apply embodied learning in teaching different subjects in the classroom.
2. Teacher Training institutions should organize workshops to train the teachers to use the reinforcement technique appropriately for improving effective teaching learning process in the classroom.
3. Policy makers at national levels should take steps for the provision of basic needs to the students for bringing success to the teaching learning process in the classroom.

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