

Integrating English with total physical response for pre-schoolers' cognitive development

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This study explores the integration of English with Total Physical Response (TPR) for pre-schoolers' cognitive development. Research was built upon, review of cognitive developmental theorists, stakeholders, teachers' feedback and experience. Five TPR related lesson plans are specially created and vetted by experts in order to collect data related to young learners' cognitive development with the integration of English with TPR. This study employs a naturalistic observational methodology. The researchers conducted observation, attentive listening and tool field notes concurrently. A structured reflective note from the researchers is also used for analyses. The observation procedure seeks to record descriptive details about cognitive processes, ambience, and social activities among pre-schoolers. The findings indicate that there is improvement in language progressions, observable cognitive output with the ability to think, questioning skill, justifying thoughts and opinions and higher interest in learning through TPR. Therefore it is concluded that by integrating English with TPR, pre-school educators can maximize the output of their teaching.

Keywords: Cognitive development, Integrating English with Total Physical Response, Pre-schoolers, Thinkers

Introduction

Pre-schoolers these days are either watching television, playing with electronic gadgets and are becoming sedentary with very little physical activity or movement. Thus, it is crucial for pre-schoolers to be provided with learning activities that encompasses action learning or movement related learning involving, both hemispheres of the brain so that, pre-schoolers will learn effectively as they get to improve their cognitive development. This study provides observational and descriptive analyses of integrating English with Total Physical Response (TPR) in the process of cognitive development for pre-schoolers. This study gleans from the theoretical underpinnings of TPR, developed by James J. Asher in 1977. This research provides teachers with guidelines for action based teaching-learning, execution strategies and resource requirements.

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Problem statement

Decades of research have shown play as an important mediator in the physical, social, cognitive, and language development of young children (Bergen, 2002; Vygotsky, 1976).. The growing emphasis on written assessment and accountability, young children today are raised in sedentary environments in schools, has led to a reduction in active physical play in preschool teaching-learning process. Schools have eliminated play to make room for quieter, academic learning (Stipek, 2006). Public preschool settings have become particularly regimented and adult-directed, with teachers feeling compelled to increase literacy and numeracy instruction at the expense of play time (Golinkoff, Hirsh-Pasek, & Eyer, 2004). Passive television viewing and use of other medias like electronic games, i-pads and smart phones are also replacing active play, and have even been found to interrupt the play of young learners (Schmidt, Pempek, Kirkorian, Lund, & Anderson, 2008; Zimmerman, Christakis, & Meltzoff, 2007).

Not every child holds the same culture, learning styles, standard or background. Do we apply appropriate classroom strategies in an environment conducive for cognitive development of our pre-schoolers? No. This is because, through researcher's naturalistic observation, has been realized that there are three reasons to this, as follows: Firstly, during the early years (3-5 years of age), a child needs adequate whole-brain stimulation to help to forge neurological pathways which significantly stimulate the frontal lobe of the brain, laying the foundation for cognitive, emotional and physical development. This requires a conducive classroom with appropriate action based whole brain stimulating curriculum but, most preschool curriculum are conventional, obsolete, teacher directed rote-learning, without focus on pre-schoolers' cognitive development. Secondly, all teachers absorbed into preschool teaching-learning environment must be qualified, competent and compassionate with ability to reflect and understand learners' cognitive developmental needs and challenges but, not all teachers are qualified to teach and provide pre-schoolers' need for knowledge and mental processes. Besides, teachers are provided with standard lesson plans and no scope allowed for teacher creativity and incentives. Lastly, a preschool classroom need to be a conducive environment with a ratio of not more than 10 learners to a teacher and also must be spacious for activities and learning resources so that, learners will be able to move about comfortably during active-learning process but, classrooms are populated with over 20 learners and are cluttered with wooden tables and chairs while learners are kept sedentary and quiet, without communication-interaction exchange. Hence, preschool education requires appropriate learning curriculum, conducive environment and competent teachers, is crucial for pre-schoolers' emotional, physical and cognitive development.

Research objectives

- i. To justify the importance of integrating English with TPR for cognitive development amongst pre-schoolers.
- ii. To substantiate the importance for preschools, to provide an appropriate curriculum of action based lessons by integrating English with TPR, in a conducive environment and produce competent teachers for pre-schoolers' cognitive development.
- iii. To determine the potential benefits of TPR to pre-schoolers?

Research questions

- i. Why integrating English with TPR is important for cognitive development in preschool classroom?
- ii. How important is it for preschool establishments to provide an appropriate learning curriculum by integrating English with TPR for preschool classrooms, create an environment which is conducive and produce competent teachers to deliver action based lessons for pre-schoolers' cognitive development?
- iii. What are the potential benefits of TPR to pre-schoolers?

Conceptual framework

In this study, knowledge is delivered by integrating English with TPR, providing natural language acquisition strategies, brain stimulating action based activities and comprehensible input for pre-schoolers' needs to enjoy learning. Lessons are linked between new information and prior knowledge, applying key concepts with defined language. Besides, vocabulary instructions modified to learners' levels, used cooperative-learning with constructive feedback, are relevant to the needs of pre-schoolers.

By integrating English with TPR, language and movements, can help learning to take place through mental processes along with sensory perception for pre-schoolers. This sharpens thinking skills like, creativity, analytical and problem-solving skill. The framework described through this concept of integrating English with TPR to teach vast subjects like, mathematics, science, yoga, music, movement, stories etc. for pre-schoolers' cognitive development, creates thinkers.

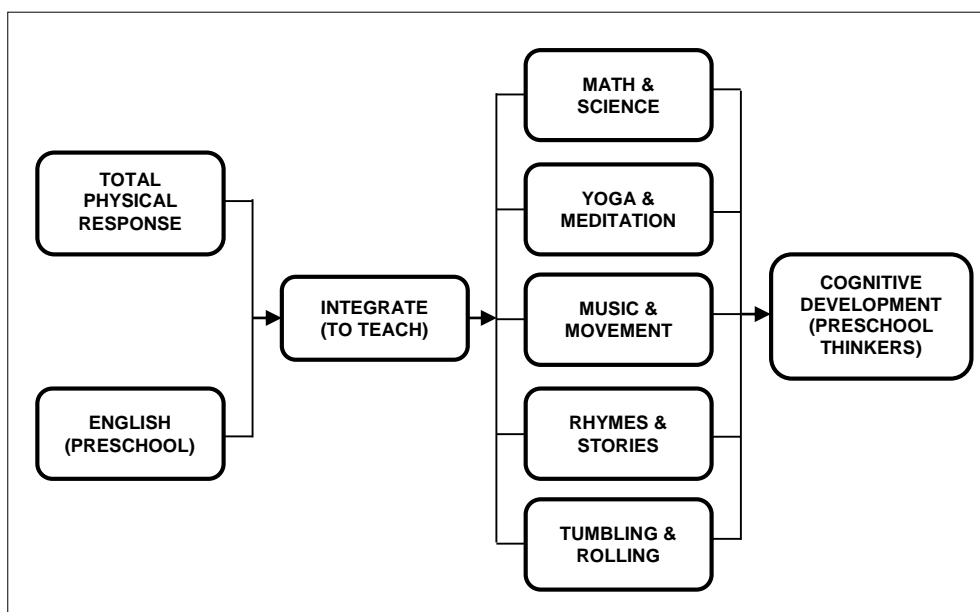


Figure 1. The conceptual framework of pre-schoolers' cognitive development

Significance of the research

With globalization and demand for quality intellectual human capital, the education system should study and adapt current cognitive developmental strategies from the western system so as to fit to our learners' needs, ability, challenges and culture.

According to Mahendran (2010), in Malaysia, children learn differently, due to, different back-grounds i.e. rural, semi- urban/ urban with different levels of understanding, different learning styles, influenced by their mother-tongue (L1) or first language interference as well as multi-cultural and religious diversity within which they are nurtured in. Therefore, lessons which are planned and structured should benefit each and every learner. Formal preschool education is crucial for the cognitive development of children especially for children who have both parents working and are unable to motivate and guide the child's perpetual learning process.

According to Suppiah (2012), children should be given the opportunity to participate in a range of activities that make use of different aspects of their intelligence, such as kinesthetic, visual-spatial and auditory intelligence. Giving learners the space to explore other alternative areas that may improve their cognitive development and skills serves to elevate students' confidence level and allows them to excel in an area they are intellectually and emotionally comfortable with.

Piaget (1972) said these cognitive development strategies, encompass language and literacy, social relations, storytelling, pretend play, math, science, music, songs, physical activities like yoga and dancing.

Pre-schoolers live socially and cognitively in a different world than the older children. The remarkable plasticity of the pre-schoolers' brain points to the importance of the learners' surrounding being safe, caring, social and emotionally conducive, coupled with interactive environment in promoting healthy neurological process enhancing cognitive development. The key is to employ language (ESL) with movement (TPR), using effective strategies so that, this can be instrumental in the cognitive development of the pre-schoolers ensuring that, learning is lots of fun with action and activity based learning. Learning for pre-schoolers need not be totally book based, just as how the child learns the mother tongue (L1), mainly listening, repeating and gradually constructing meaning of words (Armstrong, 2006).

Literature review

This study is meant to substantiate the co-relation between an appropriate preschool movement based learning curriculum by integrating English with TRP for pre-schoolers' cognitive development can create preschool thinkers.

Cognitive development

Cognitive development as part of Psychology involved a child's thinking and understanding the internal processes of the mind (McLeod, 2007). Cognitive psychology provides insights on how learners learn, and the mental processes for learners to comprehend, make meaning and remember, (Trumbull & Pacheco, 2005). Suppiah *et al.* (2007) stated that, cognitive development is related to the process of changes with the mental and physical maturity as well as prior experience from early childhood. As children mature, they develop the ability to think on higher levels, processing information more skilfully to gain meaning and knowledge and making connections to other experience and information more easily (Suppiah, 2014). In an environment where both nature and nurture are present, pre-schoolers have the tendency to

actively learn by making meaning of what is seen and experienced by physically participating and doing thus, enhancing cognitive development. Watching children for signs of their cognitive development is important for daily planning of lessons. In order to present a challenging, yet developmentally appropriate curriculum for the learners, it is necessary to observe not only the pre-schoolers' interests, but also their learning and reasoning abilities. It is important to know that, all children develop at their own rate, and any concerns about a child's cognitive development should be discussed with the parents or care givers (Bietz, 2012).

Theory of cognitive development

Cognitive theory is concerned with the development of a learner's thought processes and how these influence learners understanding and interaction with the world. Cognitive development is defined within the fields of psychology and linguistics as being aware of current intellectuality such as knowing and thinking. Much of the theories involving cognitive development are attributed to Piaget, Vigotsky and Brunner.

Piaget theorized on how children used their minds for learning and acquiring new skills. Piaget's theory of cognitive development suggests that children move through four different stages of mental development with focuses not only on understanding how children acquire knowledge, but also on understanding the nature of intelligence.

Vygotsky's theory emphasizes the importance of society and culture for promoting cognitive development in children. An important concept in Vigotsky's theory is that the potential for cognitive development is limited to a certain time span which is called as 'zone of proximal development' (Kearsley, 1994).

Bruner's, theory states that the outcome of cognitive development is thinking and views symbolic representation as crucial for cognitive development since, language is the primary means of symbolizing the world. Bruner stated that, the purpose of education is not to impart knowledge, but to facilitate a child's thinking and problem solving skills which, then be transferred to a range of situations students as active learners, construct their own knowledge. Bruner's research on the cognitive development of children, proposed three modes of representation and they are, enactive representation (action-based), iconic representation (image-based) and symbolic representation (language-based), attaches great importance to language in determining cognitive development (Bruner, 1978).

According to the theory of left-brain or right-brain dominance, the thought processes require integration of the two sides of the brain, each side of the brain controls different types of thinking (Sperry, 1962). Carl Zimmer (2009) explained that no matter how lateralized the brain can get, the two sides still can work together.

Krashen (2003) states, language is acquired in only one way, when exposed to input (spoken language) that is comprehensible. Krashen claims that cognitive development, including the acquisition of concepts and facts, is more likely to occur through problem-solving, working on real problems, than through deliberate study. Information and experience synthesized knowledge gained from various sources and presents these in a structured way as problem-solving activity that is significant to cognitive development (Krashen, 2003).

Total physical response (TPR)

Total physical response is an approach to teaching second language that was developed in the 1970s by James Asher, professor of Psychology at the San Jose State University in California. Asher observed that traditional second language programs had a dropout rate of almost 95%. He thought this could be due to flawed and ineffective methods used in the programs. So he

decided to create a method of teaching second language that mimics the process children use when picking up their first language. Asher developed TPR as a result of his experiences observing young children learning their first language. He noticed that interactions between parents and children often took the form of speech from the parent followed by a physical response from the child. Asher made three hypotheses based on his observations: first, that language is learned primarily by listening; second, that language learning must engage the right hemisphere of the brain; and third, that learning language should not involve any stress (Robb et al., 2008).

Total physical response is often used alongside other methods and techniques. It is popular with beginners and with young learners, although it can be used with students of all levels and all age groups. The child would look to the parents for instructions, and then perform the movements required. The child didn't need to be able to say the words, only to listen and understand. Comprehension was the first step to language acquisition, not word production (Krashen, 2003).

Methodology

This is a qualitative naturalistic observational research. Special lesson plans were designed and validated and used as instruments to collect relevant data. For the purpose of this qualitative naturalistic observational study, researcher applied appropriate lesson-plans, as research instrument to generate data, to elicit participant's cognitive capabilities. The lesson plans were specially created and validated by experts in order to elicit the required data for the research. The outcomes of the action based TPR lessons employed and the response of participants, were recorded in observation checklist, field notes and researcher's reflective notes. This study employed naturalistic observational methodology as researcher observed and listened attentively, took field notes concurrently and soon after lesson, structured the reflective notes as analysis of the findings, pertinent to research questions. This is a common research method in behavioural sciences such as sociology and psychology. The observation procedure sought to record descriptive details about its cognitive essence, ambience, activity and social scene occurred pertinent to the research topic. Extended observations of participants in various contexts, afforded the researcher to elicit quality data, described and explained that are, and almost impossible to obtain with other approaches that, certain experiences cannot be meaningfully expressed by numbers.

Researcher constructed 5 lesson plans assisting as observation-based instrument to elicit cognitive knowledge from the participants to generate data during lesson via observation and evaluation. The 5 lesson plan structures are relevant to TPR activities. The summary of Lesson plans (1 to 5) as instrument in line with the Research Questions, shown as Table 1.

Table 1. Summary of lesson plan (1 to 5) as instruments in line with the 3 research questions of this study.

Research Question	Instruments / Lesson Plans (LP)	Characteristics
1. Why integrating English with TPR is important for cognitive development in preschool classroom?	LP1, LP4 and LP5-generated observational data, gathered & coded into observational checklist, via participants' responds i.e. nod, gesture, facial expressions & joyful learning attitudes as cognitive attributes. Field notes processed the data &	<ul style="list-style-type: none"> • LP1 – Active learning experience of initiative & interaction through language & (TPR) action, stimulates whole brain, leads to think. This, strengthen the neurological pathway of both left & right hemisphere of the brain, promoted cognitive development. • LP4 – Language, math & science, Physical & mental activities using vocabulary via active

Research Question	Instruments / Lesson Plans (LP)	Characteristics
	the researcher's reflective notes analyzed the data as finding line with (RQ 1).	<p>learning (TPR), enhanced thinking i.e. sorting, classifying, understanding etc. promoted cognitive development.</p> <ul style="list-style-type: none"> • LP5 - real learning happened when participants used thinking skills via whole brain activities, showed cognitive attributes, ability to think aloud, retain and recall (story telling). Strong indication there is cognitive developmental processes achieved.
2. How important is it for Preschool establishments to provide an appropriate learning curriculum by integrating English with TPR in preschool classrooms, create an environment which is conducive and produce competent teachers to deliver action based lessons for pre-schoolers' cognitive development?	LP2, LP4 and LP5-generated observational data, gathered and coded into observational checklist, via participants' responds i.e. nod, gesture, facial expressions & joyful learning attitudes as cognitive attributes. Field notes processed data & researcher's reflective notes analyzed the data as finding in line with (RQ 2).	<ul style="list-style-type: none"> • LP2 – social relations; social, emotional & communication skills overlaps as adaptive skill to develop internal sense of right & wrong, inculcate values i.e. respect & self-respect. Learner centered & active learning (TPR), participating in active learning opportunities in areas to develop cognitive, emotional, physical & social growth, promoted cognitive development, rather than teacher-directed, sedentary lessons in cluttered classrooms, applying rote learning. • LP4 – Activity based learning, diverse curriculum, conducive environment, The learners listen, visualize, think & understand to internalize concepts & learn by doing, i.e. involve in mathematics, science experiment & recall story to relate in own words showed ability to retain & recall active knowledge & experience are, important to promote cognitive development. • LP5 –Integrating English with TPR promoted language & literacy in a fun-filled environment, learners got involved in storytelling. Resources are relevant to cultural background, routines, learner needs & experience of the real world. Appropriate curriculum, competent facilitation in a conducive environment are important to promote cognitive development.
3. What are the potential benefits of TPR to pre-schoolers?	LP3, LP4 and LP5-generated observational data, gathered and coded into observational checklist, through participants' responds i.e. nod, gesture, facial expressions & joyful learning attitudes as cognitive attributes. The field notes processed the data consistently during the teaching & learning process & the researcher's reflective notes analyzed the data as finding in line with (RQ 3).	<ul style="list-style-type: none"> • LP3 – creative representation stimulates imagination and creativity (TPR), revealed via responses i.e. gesture (playful), facial expressions (joyful smile) and emotional (laughter & happiness) were aesthetic, indicated cognitive developmental attributes. (TPR) whole brain stimulating activities facilitated cognitive and social development. Motivated attitude for continuous learning, become life-long learners as adults. • LP4 – Ability to think, identify, sort, prompt, based on action based activities. (TPR) for mathematics & science indicated action based learning, enhanced thinking skills i.e. creative, logical mathematical, analytic and problem solving skill are cognitive developmental attributes. • LP5 - Language and literacy promoted listening, thinking, speaking, reading, & writing skills, communicative-interactive skills, indicated cognitive attributes. Via

Research Question	Instruments / Lesson Plans (LP)	Characteristics
		integrating English with TPR, ability to speak & write competently &comprehensibly aids to meet the challenges of globalization. Builds a strong cognitive foundation to help create thinkers with attitude & culture for learning intrinsically, creatively & constructively with potential benefits to grow up to be quality human capital & become life-long learners.

Research findings

Finding for research question 1 (RQ1)

The researcher’s reflective notes as findings was associated with (RQ1), derived from (LP1, LP4, LP5) stated the importance of integrating English with TPR for cognitive development. The whole-brain stimulation activities provided participants with active learning opportunities, encouraging participants to think. This strengthens the coordination of neurological pathways of both hemisphere of the brain, as movement facilitates the development of new connections (synapses) among brain cells and the overall organization of the brain. LP1- active learning experience of initiative and interaction through language develops communication. Yoga as TPR activity puts the participants’ mind to focus via the repetitive breathing, sends oxygenated blood to the brain, which activates the neurons and the synapses, creates alertness to the participants thus supported cognitive development.LP4- Language, math and science, physical and mental activities using vocabulary via active learning (TPR) enhanced understanding, sorting, classifying, etc. associated with thinking skills, promoted cognitive development. Participants’ response to TPR activities indicated participants adapted well to this approach. LP5- real learning happened when participants used thinking skills (cognitive) through whole-brain activities showed, ability to think aloud, retain and recall (story telling), strongly indicated, there is cognitive developmental achieved. Storytelling focused on awareness of intonation, pronunciation and vocabulary learning. Participants listened attentively to the story via researcher’s TPR movements, expressing, gesture, prompting, probing, to encourage participants to pay attention and elicited for response using concept check questions, to encourage the participants to get involved in the story-telling process, to stimulate the participants’ brain to think.

This approach emphasized on ways minds organized, interpreted information and memory processes and also as social process, involving the participants’ communication and interaction with others. This encouraged and provided participants with active learning opportunities with new learning experience, leading participants to think aloud, strengthens the neurological pathways of the brain, is significant to cognitive development. Therefore, it is evident that, the (LP1, LP4,LP5) generated observational data, the through the field notes and researcher’s reflective notes which analysed and justified the findings for (RQ1) that, integrating English with TPR is important for cognitive development in preschool classroom.

Finding for research question 2 (RQ2)

The researcher’s reflective notes as findings was associated with (RQ2) was derived from(LP2, LP4, LP5) relates, the importance for preschool establishments to provide appropriate learning curriculum by integrating English with TPR in preschool classrooms, create a conducive environment and produce competent teachers to deliver action based lessons for pre-schoolers’

cognitive development. This learner-centered action and activity based education approach, focused on diversity of curriculum for whole-brain stimulation. Integrating English with TPR activates more parts of the brain than, when sitting still in a traditional, teacher-directed lesson. LP2–social relations via social, emotional and communication skills overlaps as adaptive skill to develop internal sense of right and wrong, inculcate values i.e. respect and self-respect, turn-taking etc. This learner-centered and active learning (TPR) activities without knocking into each other, participating to develop cognitive, emotional, physical, social growth. Hence, fun-filled action based indoor activities, are important to promote cognitive development rather than, teacher-directed, sedentary lessons in cluttered classrooms applying rote learning. LP4 – Activity based active learning, diverse curriculum, in a conducive learning environment, where learners are facilitated using strategies to listen, visualize, think and understand to internalize concepts via learning by doing with prolonged interest in this action based learning approach.. During mathematics and science subjects participants could physically manipulate materials by sorting objects and identifying sequence, patterns, counting etc. This, indicated participants understand the concept, learn and think better, showed cognitive development. LP5– during language and literacy, learners were encouraged to get involved in story telling in this active learning approach, promoted the intonation, correct pronunciation and voice modulation. Hence, this helped participants to utter correctly the new vocabulary which, enhanced language and literacy which, promoted cognitive development is, of great importance as curriculum for preschool classrooms. The age appropriate resources implemented are relevant to learners’ needs, culture, routines and their experience of the real world. Therefore, an appropriate curriculum in a conducive environment with competent teachers to facilitate, are important for cognitive development.

Integrating English with TPR as curriculum, in a conducive environment, is important for learning, based on relationship of learner and the learning environment to promote cognitive development. Therefore, it is evident that, (LP2, LP4,LP5) generated observational data, researcher’s field notes and the researcher’s reflective notes, analysed findings for (RQ2) substantiated; that it is important for Preschool establishments to provide an appropriate curriculum, conducive environment and competent teachers to deliver lessons for pre-schoolers’ cognitive development, through integrating English with TPR for pre-schoolers’ cognitive development.

Finding for research question 3 (RQ3)

The researcher’s reflective notes analysed findings, associated with (RQ3), derived from (LP3, LP4, LP5) relates, the potential benefits to pre-schoolers through integrating English with TPR in preschool curriculum. LP3 - creative representation stimulates the sense of imagination and creativity (TPR), revealed via participants’ responses i.e. gesture (playful), facial expressions (joyful smile) and emotional (laughter & happiness) were aesthetic and indicated cognitive developmental attributes. Creative representation, based on music and movement produced an alarming response whereby, most of the participants were graded an E. The reason that, lesson was completely movement related action-based (TPR) activities with instruction, imperatives, demonstrations and command in English. All the participants were enthusiastic and were able to follow lesson effectively through observing and listening to researcher and their peers. Therefore, creative representation of movement and music showed an optimum impact of thinking via observation and creativity for the participants’ learning experience, thus enhanced cognitive development.

LP4 - Ability to think, i.e. identify, sort, prompt, during action based activities (TPR), enhanced thinking skills i.e. creative, logical mathematical, analytic and problem solving skill are cognitive developmental attributes. Mathematics via integrating English with TPR through

movement and music provided participants the experience through dancing, forming imaginary figures like, triangle, circle, square etc. with their feet are associated with body–mind coordination. This benefitted the participants to understand, learn and think about mathematical vocabulary and develop balance and coordination of body and mind, thus enhanced cognitive development. For science, participants had no prior experience with experiments, whereby, participants were excited and enthusiastic. This provided participants the benefit of a new active learning experience with science and vocabulary like, water, salt, sugar, stir, solution etc.

LP5 - Language and literacy are, key to this study therefore, promoted listening, thinking, speaking, reading and eventually, writing skills which are clear cognitive attributes. This showed the potential benefits as, ability to listen, think, speak, read and later, write competently and comprehensibly. For competence in language and literacy, participants P1, P2, P5, P10 were graded E for excellent with a capability to use more than three syllable words, state more than two word sentences and the ability to answer questions and ask questions. Participants had an added advantage in spoken English for they came from a background with professional parents therefore, they spoke English at home. However, all 10 participants were actively involved during the whole lesson and showed sign of improvement in their attitude and progress in language and literacy, due to the fun-full activity related TPR approach to learning. Learning to speak much comprehensively via listening, understanding, grasping intonation and adapting proper pronunciation benefitted participants. The participants P1, P2, P5, were able to recollect and tell the story in their own words in a sequenced order, indicated the understanding that, stories have beginning, middle and end while, making sense of the text.

This is essential, for participants' potential benefit to begin to read independently later on to progress cognitively. It was evident, that participants got involved in their learning and enjoyed the learning process, indicated that, most of the participants showed satisfactory level of cognitive progress via integrating English with TPR through participants' responses during the qualitative naturalistic observational study. Besides, this creates strong cognitive foundation with potential benefits to help form thinkers with right attitude, culture for learning intrinsically, creatively and constructively. Hence, integrating English with TPR played an important role in literacy, language, mathematics and science progress, promoting cognitive development for pre-schoolers. Therefore, it is evident, (LP3, LP4, LP5) generated observational data, researcher's field notes processed data and the researchers reflective note, analysed findings for (RQ3), determined the potential benefits to pre-schoolers through integrating English with TPR in preschool curriculum.

Limitations of the study

This research was conducted only in one private preschool classroom with 10 participants, a comparatively small sample size as diversity of participants was limited. The lesson plans, movement based activities, observation records and checklist are authentic, designed by researcher. The instruments were validated by experts before the final study, to ensure there would not be unattended issues. For reliability and validity, a pilot study have had been done to further review and evaluate instruments and research design. Integrating English with TPR, had proved to draw joy and creativity while gaining English acquisition for communication-interaction purposes. This study though limited in scope to investigating TPR in language and vice versa, by and large, is quite valuable and should provide insights to both classroom teachers of English language in elementary schools and curricular planners of primary school English language syllabus.

Conclusion

The findings of this research has clearly indicated that teaching English with TPR helps pre-schoolers' cognitive development. Teaching pre-schoolers higher level thinking skills pertinent to cognitive development is achievable through integrating English with TPR for pre-schoolers. It is hoped that this research findings may be used collaboratively with other research on similar curricula or different disciplines to align and refine the existing curriculum. It is also hoped that other preschool institutions with similar curricula can use these findings comparatively, to enable pre-schoolers' cognitive development, in preschool classrooms nation-wide, to create preschool thinkers.

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