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Pre-Design for Primary School Active Learning Module: A Triadic Reciprocal Needs Analysis Framework

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Abstract

This paper presents a framework to analyse students' learning needs in Malaysia primary school active learning based on the conceptualisation of theorists' ideas. The needs analysis framework is a good reference for module designing and active learning implementation by clarifying learners' needs through a triadic reciprocal approach, using theories that draw on the perspective of personal development (constructivism), self-regulation, and environment (ecology). These three perspectives build up a holistic needs analysis framework to discover the needs, potential, and constraint of the active learning route (learning process) in Malaysian primary schools. The needs analysis "route" in the framework contains the criterion available (external feature – ecology / the condition of active learning situation), the existing feature within the pupils' mind (internal feature – personal development/knowledge, skills, and strategies), and the pupils' motivation for engaging (bridging of external and internal features – self-regulation). It explains how needs analysis can highlight the potential of full-scale active learning investigation of learners' needs from the interrelation of internal and external features. The discussion can be generalised to invite future research by providing a firm active learning theoretical foundation, a conceptual lens for active learning needs analysis, and prospects of active learning instructional and pedagogical interventions.

Keywords: Malaysia primary school, Active learning, Needs analysis, Triadic reciprocal, Pre-Design, Framework.

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Contents

Contribution of this paper to the literature
This study contributes to the existing literature by analysing students' learning needs in Malaysia primary school active learning based on the conceptualisation of theorists' ideas.

1. Introduction

A significant rethink of the school curriculum is an essential procedure to equip new generations to better prepare them for future life and work. Coulby (2012) verified that political and economic power has influenced cultural patterns at a global level and these patterns are the normative assumptions that form education systems. Consequently, there is a series of New Jersey Minority Educational Development (NJMED) (2016-2020) published by the New Jersey Minority Educational Development (NJMED) to annually rank nations' education systems. The report's mission is to identify areas of needs among students, parents, teachers, educators, and taxpayers from different countries. Overall, the report displays a needs analysis that mirrors the needs of current international education policy. Eventually, the information gathered to reflect the major education needs that help countries and their youths to improve their education quality.

Undeniably, we can summarise that identifying needs is essential in educational planning or implementation. Therefore, this paper would argue that there is a need for, to begin with, a planned integrated process to first investigate learners' needs, before designing a module or widely implementing active learning in Malaysian primary schools. As though the intention of this paper, needs analysis is the most required stage and a prerequisite in any educational planning. Needs analysis is the fundamental step in module design to provide validity and relevancy for all the follow-up design activities (Johns, 1991; Nunan, 1988; Richards, 1990). It refers to the activity involved in gathering information that serves as the basis for developing a module or curriculum that meets the learning needs of a particular group of learners and establishing priorities among them (Brown, 2001; Iwai et al., 1999; Srijono, 2006). It supports designing tests, compiling materials, designing teaching activities, evaluating strategies, as well as for re-evaluating the precision and accuracy of the original needs analysis for future design (Brown, 2001; Johns, 1991). Therefore, a systematic needs analysis is required to gain a general overview of what has been accomplished through the particular learning situation and what the learners want and need in the future (Li, 2014a). Eventually, this paper proposes a triadic reciprocal framework to run the active learning needs analysis in Malaysia primary school.

2. Background and Issue of Focus

The education transformation in Malaysia is keeping step with present educational circumstances. The Malaysia Education Blueprint 2013-2025 shifts responsibility for education towards the individual child, so that learners become "self-paced (MOE, 2013) in setting their learning targets, be expected to pace their learning, and be able to pursue their interest actively (Joseph, 2017; MOE, 2013). One of the prominent T&L programmes in Malaysia currently is active learning, which is highly reflecting the transformation plan mentioned in the blueprint: (1) challenging and high level "active homework" that corresponds to international standards (Ebert-May, Linton, Hodder, & Long, 2005; MOE, 2013) active learning serves as formative assessment which supports instruction and learning (Adkins, 2018; Demirci. & Düzenli, 2017; MOE, 2013); (3) teachers sharpen their skills and abilities to support learners' learning (Edwards, 2015; MOE, 2013); (4) applying technology learning tools to enhance student-centred learning (Gallou & Abrahams, 2018; MOE, 2013; Schrand, 2008).

Active learning is believed to be an important approach to improve Malaysian education development, beginning from primary school. However, Paramasivam and Ratnavadivel (2018) discovered that pupils face difficulties in accepting new T&L methods because of environmental influences that affect their learning style. Similarly, Sardareh (2014) found that the pupils played an active role in monitoring their learning progress; unfortunately, during class discussions, they were dominated by certain pupils but still highly depended on teachers. Therefore, Lee (2019) concluded that active learning (e.g. flipped learning, self-paced learning) relies heavily on the principle that pupils are self-motivated and committed to their learning; learning goal can't be achieved because the pupils are less motivated or disciplined. In other words, pupils need a lot of hands-on coaching and constant monitoring rather than self-reliance (Kanyakumari, 2020; Wan, 2020). In summary, pupils are aware of this type of learning, however, they appear to be having a problem shifting from the teacher-based method to actively playing their role in learning (Melor & Nur Rashidah, 2011; Siti & Nurahimah, 2016).

This situation is urgently in need of figuring what factors would probably help the learners to improve their active learning. The field of active learning appears to need effective T&L module guidance as well. However, as a new module emerge, new theories and concepts are needed to initially answer the resulting questions. As such, the focus of this paper is to suggest a needs analysis framework that affiliates with active learning theories and concepts. As though to understand a situation before chasing after solutions, this framework provides a foundation for investigating the current active learning situation of learners. It is seeking to offer information for active learning module design and implementation via learners' needs and the factors that influence learners' learning. Although this paper mainly provides framework reference for Malaysian primary schools, undeniably, the framework can be generalised to wider areas or other countries that are akin to the situation raised in this paper.

3. The Literature Review

A. Needs Analysis

A systematic process is needed in creating, designing, and developing an efficient educational module, to meet the requirements and needs of a specific target learning group (Khalil & Elkhider, 2016). By the way, Donmez and Cagiltay (2016) summarised 33 types of design models for both original and implemented sources from the "Google Scholar" database. Approximately, Seels and Glasgow (1998) discovered that there is a common framework that applied for analysing and identifying learners' learning needs and goals, and the development of a learning system or strategy to meet T&L objectives: Analysis, Design, Development, Implementation, and Evaluation. However,

Donnelly and Fitzmaurice (2005) highly suggested beginning a design activity by identifying the areas that need to be assessed.

Hence, among the five processes of module design, "Analysis" is the most important phase in module designing that uses information gained to make plans to meet learners' needs (Aldoobie, 2015). While, needs analysis is a systematic collection and analysis of all subjective and objective information necessary to define a defensible curriculum proposes that satisfy the learning requirements of learners (Brown, 1995; Brown, 2009), it can serve as a device for gathering an extensive range of input into the content, design, and implementation of the particular module; help in setting goals, objectives, and content by determining general and specific needs of a definite group of learners for further improvement; and provide data which can be used for reviewing and evaluating an existing module (Brown, 1995; Richards, 1990). In brief, needs analysis is a process to find out what someone needs and how those needs can be met (Hyland, 2006; Patton, 1982) to provide the basis for establishing priorities of the related needs and making a decision regarding module planning, development, and operations (Sava, 2012b).

B. Active Learning

Generally, active learning comprises a wide range of activities that are defined as any instructional method that engages learners in the learning process; as long as they do meaningful learning activities and think about what they are doing (Prince, 2004). There are multiple ways for instructors to integrate active learning elements into T&L. Van Hout-Wolters, Simons, and Volet (2000) recommended two forms of active learning, namely self-directed learning and independent work; McManus and Taylor (2009) suggested collaborative learning, cooperative learning, problem-based learning, and work-based learning as active learning strategies; Gardner and Belland (2012) indicated that active learning incorporates problem-solving, collaboration and discussion, animations, and technology-enhanced activities; Lestari, Suprapto, Deta, and Yantidewi (2018) suggested multimodal active learning which includes problem-based learning, cooperative learning type jigsaw, think-pair-share, and direct instruction. Still, some instructors have committed to this call to action by flipping the classroom (Nouri, 2016), blended learning (Hains-Wesson & Tytler, 2015; Jeffrey, Milne, Suddaby, & Higgins, 2014; Precel, Eshet-Alkalai, & Alberton, 2009), concept mapping (Chen & Wang, 2012; Erasmus, 2013), Socratic discussion (Delic & Becirovic, 2016) and peer reflection/feedback or self-reflection (Jamila & Maslawati, 2017).

On account of keeping pace with current T&L, active learning has been broadly applied in the Malaysian curriculum. Khairiyah, Jamaludin, and Mohd (2004) indicated that cooperative learning and problem-based learning are the most common active learning techniques being promoted across all disciplines as well as levels of studies in Malaysia. With the aspiration of Malaysia Education Blueprint's 2013-2025 initiatives, the necessities to adapt technology tool in T&L has become imminent. Therefore, recently, Mun et al. (2019) suggested digital smart board as one of the interactive technologies to facilitate active learning, which is fundamental to mastery of skills in primary school pupils. Lee (2019) promoted active learning with the application of flipped learning methodology with the integration of ICT in accommodating the needs of different learning styles, abilities, and interests in primary school pupils; which is similar to the study done by Chis, Moldovan, Murphy, Pathak, and Muntean (2018) that combined flipped classroom and problem-based learning in a computing conversion course to motivate learners to learn actively.

This paper agrees with Daniel (2016)'s proposed view that documenting evidence of "gains in academic success" from the active learning approach and providing a "model for manageable transformations" are two ways to push forward on transforming current education. Built on Daniel (2016)'s first statement, several studies strongly support active learning as the preferred, successful, and empirically validated teaching practice in regular classrooms (Aji & Khan, 2019; Alharbi & Yang, 2019; Demirci, 2017; Freeman et al., 2014; Jamila & Maslawati, 2017; Kalem & Fer, 2003; Luna & Winters, 2017; Sasikumar, 2014; Unal & Sarı, 2013; Zheng, Young, Brewer, & Wagner, 2009). However, Daniel (2016)'s second statement underlined that it still needs clear guidance for manageable transformations that supports the implementation of active learning to be integrated into new T&L reform (Kimonen & Nevalainen, 2005).

4. Fundamentals for Active Learning Needs Analysis Framework

Overall, situations and functions of a needs analysis are set within the frame based on Munby (1978)'s needs analysis approach of "communication needs processor". Based on Munby's work, among the best-known needs analysis, according to Jordan (1997) are target situation analysis, present situation analysis, and pedagogic needs analysis (which includes deficiency analysis, strategy analysis or learning needs analysis and means analysis).

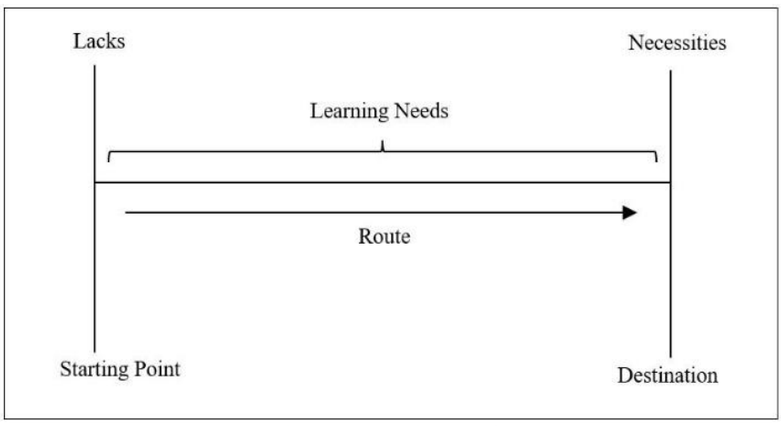

Figure-1. Learning needs analysis model (Hutchinson & Waters, 1987).
Source: Hutchinson and Waters (1987).

Table-1. Ideas of active learning

Theorists	Active Learning Ideas	Resources
Jean-Jacques Rousseau	Freedom	Lu (2019)
	Governed by own will	John (2014); Peckover (2012)
	Mind-body relation	Curtis and Boultwood (1977); Rousseau (1979)
Friedrich Froebel	Hands-on / learning by doing	Peerzada (2016); Provenzo Jr (2009); Reinhold, Downton, and Livy (2017)
	Freedom	Peerzada (2016)
	Social participation	Peerzada (2016)
	Child individuality	Roszak (2018)
John Dewey	Freedom	Dewey (1937); Dewey (1938); Manav (2016); Sikandar (2016)
	Individual approach	Miovska-Spaseva (2016)
	Equity	Manav (2016); Sikandar (2016)
	Value of child's personal experiential learning of knowledge through interaction with the environment	Dewey (1910); Liu (2013); Manav (2016); Miovska-Spaseva (2016); Sikandar (2016)
	Collaborative learning experience	Haynes et al. (2007); Hohr (2013)
	Social interaction and intercommunication	Dewey (1937); Dewey (1938); Miovska-Spaseva (2016)
	Hands-on/ learning by doing	Haynes et al. (2007); Hohr (2013)
	Learning as a process	Miovska-Spaseva (2016)
	Learning as inquiry and problem-solving	Miovska-Spaseva (2016)
	Integrated learning environment	Miovska-Spaseva (2016)
Rudolf Steiner	Free human being	Steiner (1894)
	Autonomous process	Aarau (1995); Schieren (2012)
	Learning with interest	Nuremberg (1996)
	Integrated learning environment	Gidley (2012)
Maria Montessori	Learning with interest	Lillard (2005); Powell (2009)
	Learning with materials	Cohen (1968)
	Social needs and collaborative arrangement	Lillard (2005); Powell (2009)
	Order in a classroom environment	Cohen (1968); Lillard (2005); Montessori (1912)
	Movement and cognition are closely entwined	Lillard (2005)
	Controlling over work-cycle and own learning time	Isaacs (2012); Lillard (2005)
	Reduce extrinsic rewards	Lillard (2005)
	Learning in context	Lillard (2005)
Ovide Decroly	Learning with interest	Davenport (1987); Decroly (1904)
	The natural development of the child	Decroly. and Buyse (1923); Van Gorp (2007)
	Homely living environment	Davenport (1987)
William H. Kilpatrick	Elicits "wants" or desires, followed by effort and interest	Beyer (1999); Kruger (2015)
	Interactions with social and physical environments	Beyer (1999); Pecore (2009)
	Actions-in-context	Beyer (1999)
Alexander Sutherland Neill	Freedom of choice	Darling (1992); Lucas (2005)
	Equity	Davenport (1987)
	Individual interest	Neill (1960); Neill. (1985)
	Innately wise	Humes (2015)
Peter Petersen	Suitably organised human relationships and interaction	Kruger (2015)
	The child is free to express his opinion	Kruger (2015)
	The free development of a child's inherent potential	Kruger (2015)
	Play	Kruger (2015)
Susan Isaacs	Develop thinking from materials	Grenier (2009)
	Learn with curiosity	Grenier (2009)
	Independence	Isaacs (2013)
	Play	Isaacs (2013)
	Real and active experience	Isaacs (2013)
	Consider learners' emotional development and understand their internal needs	Isaacs (2013); Shapira (2017)
	Warm human relationships	Isaacs (2013)
Loris Malaguzzi	Child rewarded by own efforts, own intelligence, own activity, and energy	Malaguzzi (1993)
	The child is given the rights to be an active constructor of knowledge	Hewett (2001); Rinaldi (2012); Rinaldi (2013)
	Social constructivist approach	Edwards (1995)
	Space and relation	Rinaldi (2012); Rinaldi (2013)
Vivian Paley	Play	Paley (1981); Vygotsky (1978)
	Friendship	Board of Trustees of the University of Illinois (2009)
	Fairness	Board of Trustees of the University of Illinois (2009)
Marva Collins	Desire and interest to learn	Collins and Tamarkin (1982); Davenport (1987)
	Take care of their learning	Collins and Tamarkin (1982)
	Respecting and trusting learners' ability to learn independently	Collins and Tamarkin (1982)

This paper proposes learning needs analysis or strategy analysis as an approach to find out what learners need before providing education (Pilcher, 2016). This type of needs analysis has to do with the learning strategies that

learners employed under learners' view of learning (West, 1998). In other words, a learning needs analysis helps learners to identify where they are in terms of their knowledge, skills, and competencies, rather than where they wish to be or what are their learning goals. Hence, it starts from the learners' perceptions of their needs on their terms (Jordan, 1997). The learning needs analysis applied in this active learning framework advocates a process-oriented approach but not product- or goal-oriented (Songhori, 2008).

Hereby, this paper channels (Hutchinson & Waters, 1987)'s learning needs analysis model into the active learning framework to investigate pupils' motivation of learning, the way they prefer to learn, the available source, the possible essence for the particular learning situation take place, and the learners' personal information (Li, 2014b). Based on Figure 1, by considering the starting point as "lacks" and the destination as "necessity", although there might be some "wants" discord over what the destination should be, there's a must to consider the "route" as well to understand how do learners going to get from starting point to the destination (Hutchinson & Waters, 1987). Generally, a gap occurs along the "route" between what is known and what should be known (Fox & Bennett, 1998); but the definition can be moved beyond to include individual's behaviour or whether he or she acts on the knowledge (Norman, Shannon, & Marrin, 2004). Hence, the "route" presented in (Hutchinson & Waters, 1987) learning needs analysis model is the main discussion of this paper. This paper suggests detailed concepts, theories, features, and elements to be implied in the "route" of this active learning needs analysis.

A. The Seven Key Concepts

Since this paper intends to contribute to primary schools, the focus group is the young students. The idea of active learning for young students is influenced by well-known educators in the 19th and early 20th century. There are rich conceptions embedded in every idea of these theorists, which have explicitly provided a firm philosophical and conceptual foundation for active learning. A list of related active learning theorists with their ideas is illustrated chronologically in Table 1.

Based on the ideas collected from active learning theorists, there are duplicating ideas among them. From the ideas displayed in the table above, they can generate into categories by summarising the similar notions into seven key concepts. Details are shown in Table 2.

Table-2. Seven key concepts of active learning.

	Ideas	Key Concepts
1	Freedom Free human being Freedom of choice Controlling over work-cycle and own learning time Take care of their learning. Child is free to express his opinion. Child is given rights to be an active constructor of knowledge. Equity/ fairness Autonomous process Respecting and trusting learners' ability to learn independently. Governed by own will. Child individuality/ individual approach	Freedom of choice
2	Hands-on/ learning by doing. Mind-body relation Movement and cognition are closely entwined. Real and active experience	Hands-on and cognition
3	Learn with curiosity. Learning with interest / desire Play Elicits "wants" or desires, follow by effort and interest	Interest
4	Social interaction/ intercommunication/ social participation Social constructivist approach Social needs and collaborative arrangement Suitably organised human relationships and interaction Warm human relationships Friendship Collaborative learning experience	Collaborative and interaction
5	Reduce extrinsic rewards. Child rewarded by own efforts, own intelligences, own activity and energy. Innately wise Free development of child's inherent potential Consider learners' emotional development and understand their internal needs	Intrinsic motivation
6	Actions-in-context Natural development of child Learning as a process Learning as inquiry and problem-solving Learning in context	Learning in context
7	Value of child's experiential learning of knowing through interaction with environment. Order in classroom environment Homely living environment Integrated learning environment Interactions with social and physical environments Space and relation Develop thinking from materials. Learn with materials	Environment and materials

B. Element of "Self" under Active Learning Concepts

As a result, there are seven key concepts found within the ideas of active learning theorists, which brace the foundation for active learning implementation. To dive deeply, the theorists highly underpin the "self" element of learners within applying the active learning key concepts. First, Vivian Paley believes that "no matter what age of the learner, someone must be there to listen, respond, and add a dab of glue to the important words that burst forth" (Paley, 1986). In line with this, John Dewey thinks that active learning gives better quality of human experience, which human rights are being more respected; freedom helps learners learn how to control over their impulses and desires as "the ideal aim of education is to create intelligent self-control", which enable the learners to feel empowered to engage and work towards developing real solution (Dewey, 1937; Dewey, 1938). Similarly, Loris Malaguzzi indicated that a child should be given rights to be an active constructor of knowledge, a researcher, and a social being (Hewett, 2001); while, Peter Petersen also lays emphasizes on child's free development and rights (Kruger, 2015). These are the discussions about learners' responsibility to autonomously control and engage in regulating their learning (Biggs, 1994; Peko & Varga, 2014; Simons, 1997; Vickery, 2014).

Thereby, Stephen, Ellis, and Martlew (2009); Stephen, Ellis, and Martlew (2010) proposed that there is no formal or fixed adherence to "active learning" guidance. Normally, integration of different learning strategies will gain engaged learners to choose and learn freely (Soyemi, Ogunyinka, & Soyemi, 2011) Therefore, Curtis and Boultwood (1977) defined active learning as a system of democratic self-government and freedom as self-regulation that highly display the importance of character and self-determination (Humes, 2015). Then, Jean-Jacques Rousseau asserted that a child can self-reliant and use reason to guide his action (Curtis & Boultwood, 1977), by stressing strongly on the nature self, that is to pursue the natural nature of human beings through education to achieve the state of freedom (Lu, 2019). This notion is supported by Ovide Decroly's education model of "learning-by-living", which allows children to progress using independent activities, investigation, and experimentation with their centres of interest Davenport (1987). He intends to ensure the child-oriented and child's progressive enjoyment of life (Decroly, 1904).

According to Sellars (2006), supporting learners to be independent learners is currently more important than it has ever been in the past. Similarly, Susan Isaacs understands the importance of the work of Jean Piaget and Cyril Burt, and gives each learner opportunity for self-assertion and independence (Grenier, 2009; Isaacs, 2013). Moreover, Rudolf Steiner emphasises the autonomous learning process by which the knowledge is generated in a person (Aarau, 1995; Schieren, 2012). The autonomous notion displays on human individuality of a child, which the interest lying within a child's character and his/her intelligence or talent should be recognised (Nuremberg, 1996). Hence, Friedrich Froebel's respects children's individuality regarding to their different learning and growing pace as well (Roszak, 2018), and contributes to children's active learning with self-activity (Peerzada, 2016)). Furthermore, William H. Kilpatrick underlines that the educative process is approached from child's intention, and tend to be child-oriented, autonomous, and individualism (Pecore, 2009). In precise, Marva Collins offered "philosophy for living" (Collins & Tamarkin, 1982) to develop learners' minds and enduring self-esteem. The key is the children must be taught to be self-pride, self-control, and resourceful enough to take care of their learning. Based on respecting and trusting learners' ability to learn independently, Collins emphasizes on teaching the learners to be self-reliance and self-respect (Collins & Tamarkin, 1982).

Undeniably, it is reasonable for Maria Montessori to label the entire active learning as a self-paced method; in the meantime, self-paced becomes a benchmark for active learning as well (Cossentino, 2010; Kirk, Gallagher, Coleman, & Anastasiow, 2011; Montessori & Gutek, 2004). Precisely, Palaigeorgiou and Papadopoulou (2019) suggested that self-paced learners demonstrate impressive self-control, self-discipline, learning autonomy, and successfully manage their progress under particular tools supportive learning circumstance. However, Reinders (2010) indicated that to expect learners to take responsibility to their learning is a lengthy process. Therefore, without proper supports, learners will be generally unaware of the need to, unwilling to, or unsure how to take responsibility for learning on their own (Inkson & Smith, 2001). Allowing and trusting learners to control over their learning produces higher levels of performance than restricting learners' control (McKinley, Ross, & Benjamin, 2019; Tullis & Benjamin, 2011; Zhu, Yuan, & Guan, 2019). Hence, Nillsen (2004) indicated that the love of learning is unlikely to be taught, but it is certainly a way of increasing self-awareness. Moreover, Aktas (2017) summarised that the love of learning is the key that motivates learners to participate freely and actively, then results in positive outcomes. In short, self-paced is a primary element that actuates one's learning desire, to nurture the love of learning, and to assure active participation of learners in learning.

Eventually, the seven key concepts have delicately met an intersection point of "self" that display the necessity of learners to control over own learning when doing active learning. Undeniably, the "self-paced" has suitably covered the overall intention of "self" in active learning. The Figure 2 shows the genuine notion of active learning that brings out the seven key concepts of active learning and the significance of "self" elements which actuates the whole active learning process.

C. Implied Triadic Theoretical Structure

Generally, "theory" refers to a systematic body of knowledge, grounded in empirical evidence, which can be used for explanatory and predictive purposes (Fox & Bayat, 2007; Saunders, Gray, Tosey, & Sadler-Smith, 2015). Besides, Lauffer (2011) indicated that theories bring together related facts and concepts that describe and interpret. It is recognised that such relation will provide a more powerful explanatory and predictive basis for the framework proposed in this paper. To make it clear, we found that most of the journal studies in published literature that investigate active learning recruited similar theories. Table 3 shows only particular active learning research that have clear elaboration of theories in active learning investigation.

Based on Table 3, the constructivism theories occupy significant status in active learning, in terms of Cognitive Constructivism Theory and Social Constructivism Theory. Cognitive constructivism is a process of constructing a mental image that involved in remembering, problem-solving, and decision making through prior knowledge (Remmel, 2008); however, it gets toned by the external environment that can facilitate developing children (Bhagat, Haque, & Jaalam, 2018; Glasersfeld, 1989; Hirtle, 1996). Nonetheless, the active learning theoretical foundation doesn't look holistic if merely involve the constructivism theories. The self-paced element found and

implied in the seven key concepts of active learning acts as a core element that actuates the "self" practicality of entire active learning. Therefore, this paper suggests reference from self-paced theories listed in particular research to enrich active learning theories. Similarly, these research have clear elaboration of theories in their field of investigation.

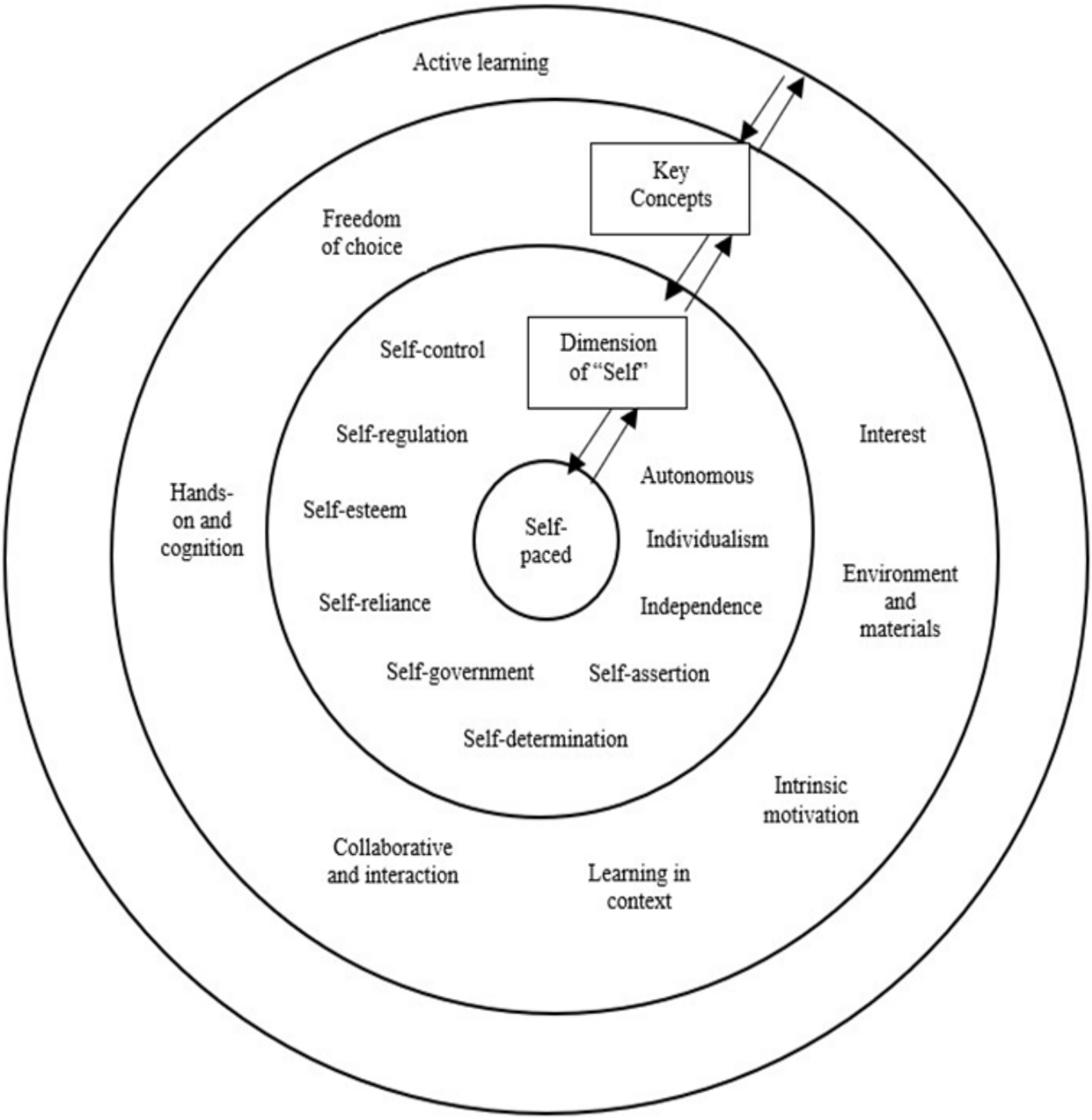

Figure-2. Active learning essence.

Table-3. Active Learning Theories in Research

Author / Year	Title / Source	Active Learning Theories
Pardjono (2002)	Active learning: The Dewey, Piaget, Vygotsky, and constructivist theory perspectives *Jurnal Ilmu Pendidikan*	John Dewey's Theory of Progressive Education Jean Piaget's Theory of Assimilation and Accommodation (Cognitive Constructivism) Lev Vygotsky's Theory of Social Context and Zone of Proximal Development (Social Constructivism)
Walshaw (2004)	A powerful theory of active engagement *For the Learning of Mathematics*	Lev Vygotsky's Constructivist Theory
Swiderski (2011)	Transforming principles into practice: Using cognitive active learning strategies in the high school classroom *The Clearing House: A Journal of Educational Strategies, Issues, and Ideas*	Jean Piaget's Psychological (Cognitive) Constructivism Atkinson and Shiffrin's Information Processing Theory
Cattaneo (2017)	Telling active learning pedagogies apart: From theory to practice *Journal of New Approaches in Educational Research*	Constructivism theories: Paulo Freire Jerome Bruner

Table-4. Self-paced theories in research.

Author / Year	Title / Source	Self-paced Theories	Remarks
Hoffman-Biencourt, Lockl, Schneider, Ackerman, and Koriat (2010)	Self-paced study time as a cue for recall predictions across school age *British Journal of Developmental Psychology*	Self-regulation Theory	Reciprocal causation (cognition – socialisation – environment)
Koriat and Ackerman (2010)	Metacognition and mindreading: Judgements of learning for self and other during self-paced study *Consciousness & Cognition*	Simulation Theory Theory of Mind	Constructivism
Hoffler and Schwartz (2011)	Effects of pacing and cognitive style across dynamic and non-dynamic representations *Computers & Education*	Interactivity (learning environment, behavioural activity, and cognitive or metacognitive activity)	Reciprocal causation (cognition – socialisation – environment)
Tullis and Benjamin (2011)	On the effectiveness of self-paced learning *Journal of Memory and Language*	Discrepancy Reduction Theory Region of Proximal Learning Theory	Constructivism
Bautista (2015)	Optimizing classroom instruction through self-paced learning prototype *Journal of Technology and Science Education (JOTSE)*	Zimmerman's Model of Self-Regulated Learning Strategy Bandura's Social Learning Theory	Reciprocal causation (cognition – socialisation – environment)
DeVore, Marshman, and Singh (2017)	Challenge of engaging all students via self-paced interactive electronic learning tutorials for introductory physics. *Physical Review Physics Education Research*	Cognitive Apprenticeship Learning Model (Scaffolding)	Constructivism

Based on Table 4, constructivism theories still play a major role. Apart from the constructivism factor, the theories are also dispersed in another aspect, namely self-regulation, which highly relates personal factor with the learning environment. Hereby, the environment component includes all the ecological level or external factor that influences learner's development, such as teacher, peers, activities, materials, time, space, home, school, social or culture, and educational background (Bronfenbrenner, 1997). In this context, Hoffler and Schwartz (2011) indicated that by allowing learners to adjust the rate of incoming information, the more complex controls of a learning environment may support higher-level metacognitive activity by requiring learners to focus on whether and when to utilize those controls. In addition, Koriat and Ackerman (2010) suggested that besides interpreting learners' behaviour and needs, they should be supported by giving chances to observe other person's behaviour and simulate their actions in minds. Therefore, we summarise that personal factors and environmental events all operate as interacting determinants of each other (Bandura, 1986; DeVore et al., 2017; Roszak, 2018). Hence, this paper suggests that to interpret active learning within its seven key concepts more precisely, it could be beneficial from a triadic reciprocal approach using theories that draw on the perspective of personal development (constructivism), self-regulation, and environment (ecology), as shown in Figure 3.

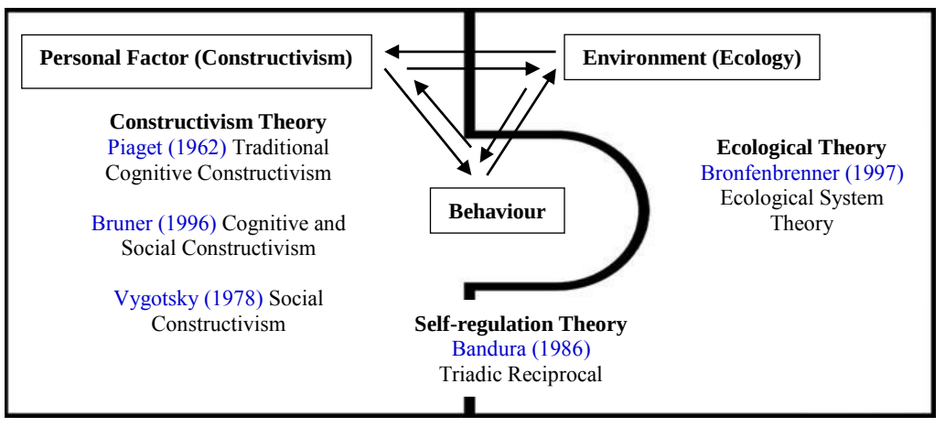

Figure-3. Triadic Theoretical Structure

5. Discussion: A Triadic Reciprocal Needs Analysis Framework

First of all, triadic reciprocal is a term introduced by Bandura (1986) refer to the multiple perspective influence between personal, behaviour, and environment factor. *Person-Behaviour* speaks to the consistency of individual differences and behaviour (Leikas, Lönnqvist, & Verkasalo, 2012). Personal factors include instincts, drives, traits and other individual motivational factors; whereas, behaviour is something that performed under a particular environment (Bandura, 1986). In other words, personality is what you are; behaviour is what you do (Stuart-Kotze, 2006). They are related because self-efficacy (a personal factor) can influence effort (achievement behaviour); and learners' behaviour can also change efficacy beliefs (Azizah, 2012).

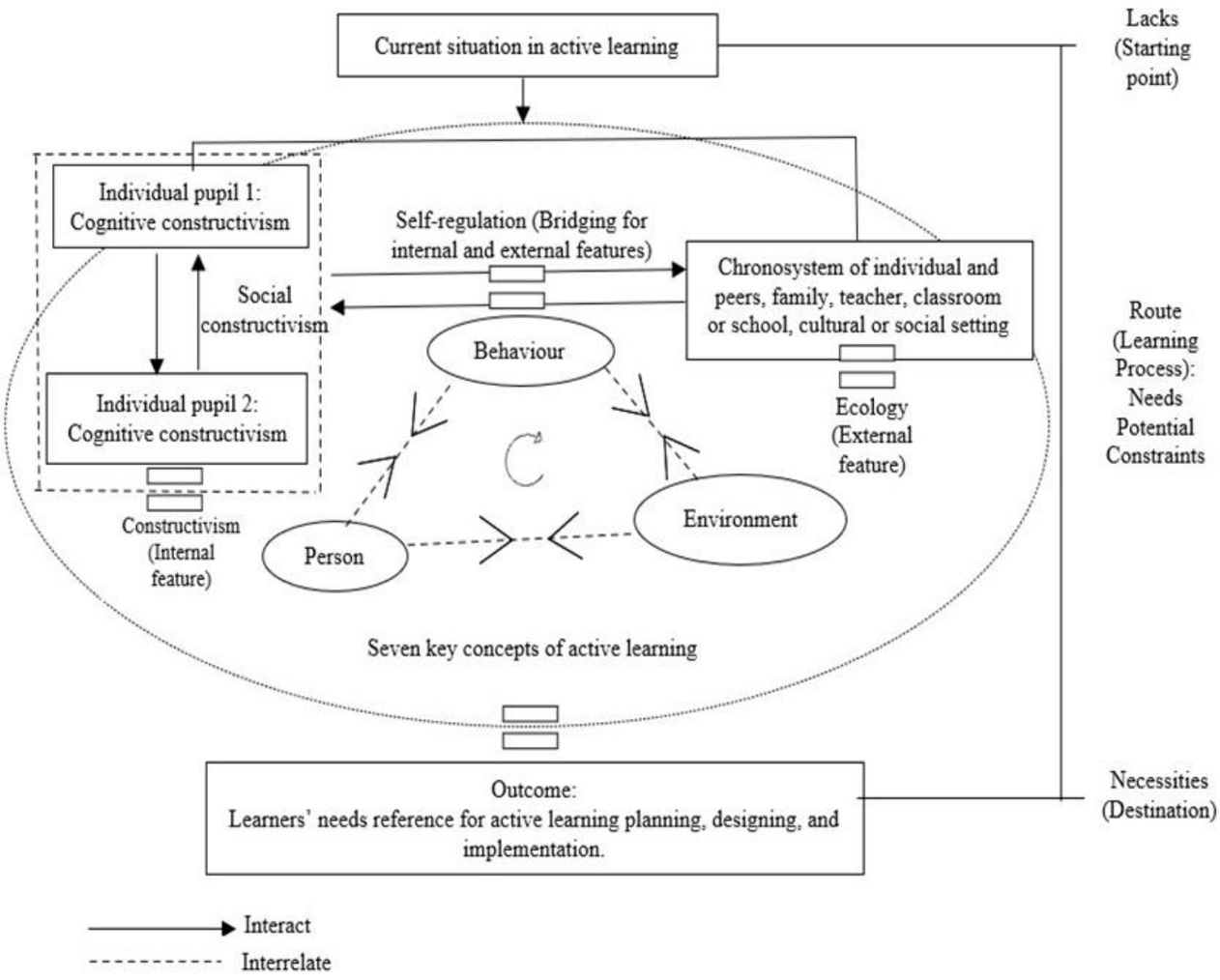

Figure-4. Active Learning Needs Analysis Framework.

Next, *Behaviour-Environment* can be illustrated by learners' behaviour and learning environment (Fiskum & Jacobsen, 2012). Normally, learners' behaviour can change the instructional environment with different form, outcome, and efficiency, which consequently occur differentiated learning; conversely, environment influences on learners' behaviour development in terms of instructions and physical setting (Azizah, 2012; Bandura, 1986; Harinie, Sudiro, Rahayu, & Fatchan, 2017). In the aspect of *Person-Environment*, learning environment supports learners' comfort, degree of flexibility, time-saving, and ownership of space and equipment (Higgins, Hall, Wall, Woolner, & McCaughey, 2005); on the contrary, learners with different self-efficacy and attribute can affect class atmosphere as well, which might result in either dynamic or lethargic learning environment (Holland, 1997; Robitschek & Woodson, 2006).

In brief, Bandura (1986) indicated that people are neither driven by inner force nor automatically shaped and controlled by external stimuli; rather, human functioning is operated in which behaviour, cognitive or other personal factors and environmental events interacting with each other. Based on Bandura (1986) description, and in the view of researchers' understanding, the factor that holds the link among behaviour, personal factors and environmental events is neither internal nor external force indeed; whereas, it needs affiliation of both internal force and external stimuli.

The choosing of needs analysis "route" in the framework is according to the criterion available (external feature - the condition of active learning situation), the existing feature within the pupils' mind (internal feature - knowledge, skills, and strategies), and the pupils' motivation for engaging (bridging of external and internal features – self-regulation). Each feature has implicated relationships with one another. Sava (2012a) indicated that the questions of "inside" and "outside" is the central importance of needs analysis. Such as, affective, or subjective needs refer to an "inside-out" process, which evolves internally in a variety of individual processes and is then directed towards the outside; however, analysing the environment plays an especially pivotal role as well because acting subjects will not develop a need without a clear perception of change and impact processes in their learning environment. Therefore, the "inside" and "outside" features are usually relying on each other.

Similarly, DeVore et al. (2017) indicated that a holistic framework can help a diverse group to learn effectively, especially focus on user's characteristics (internal) and the characteristics of the user's environment interaction (external). Moreover, Friedrich Froebel elaborated further about a child has internal (experiences, impressions, findings, emotions) and external worlds (social-environmental reality) to be taken into account (Roszak, 2018). Briefly, human functioning is explained in terms of a triadic reciprocal approach in which behaviour, personal factors, and environmental events all operate as interacting determinants of each other.

Based on Figure 4, this active learning needs analysis framework is braced by Hutchinson and Waters (1987) learning needs analysis model. Then, the seven key concepts of active learning activities as the main outline for this active learning needs analysis. To enrich the investigation structure of active learning, the key concepts are supplemented with another three perspectives: constructivism, self-regulation, and ecology. Each of them is embodied with related theories. In short, constructivism is a perspective that braced the internal feature which includes cognitive and social constructivism theories; ecology is a perspective that builds up an external context or

environment of active learning classroom which displays a chronosystem of individual and peers, family, classroom or school, and cultural or social setting based on the related community; whereas, self-regulation acts as a bridge to straighten up a clear equation expressing the relationship between internal (constructivism) and external (ecology) features, by interrelating the overall connection among person, behaviour, and environment into a triadic reciprocal state.

In brief, the framework specifically focuses on learners' essentiality in the educational context. The interaction and interrelation of every element, theories, features, and concept in the framework significantly act as the main route or process to investigate learners' needs in active learning. Precisely, this is where the needs, potential, and constraint of the route (learning process) acquired, to gain comprehensive information of active learning for further actions.

The integrated investigation through the triadic reciprocal approach provides a big picture of the active learning implementation process, and it contributes full-scale active learning needs analysis about further research. Overall, the findings from the framework contribute the subsequent research to gain a comprehensive understanding of the basic active learning learners' needs requirement and the prospect of active learning investigation. Accordingly, it informs administrators, instructors, curriculum developers and instructional designers to proceed with active learning mainly based on student's needs and responses to instructional and pedagogical interventions. By contributing to stakeholders' knowledge and understanding in this area, future design, implementation, and evaluation plans may be impacted positively, especially on the role of instructors and learners. In other words, when the designed module's content, materials, environment, and teaching approaches match with learners' perceived and actual needs, learners' motivation and success can be enhanced (Pushpanathan, 2012).

6. Conclusion

This paper makes several important replenishments to the field of active learning.

First, this paper provides a detailed summary of active learning theorists' notions. It displays overall acknowledgement about ideas, concepts, and elements to be applied in active learning. In addition, this paper further establishes the key concepts grounded from many duplicating ideas of active learning theorists. This is intended to highlight the structural foundation of active learning to serve as a basis to generate active learning theories.

Next, this paper explains how the seven key concepts and "self" elements of active learning can be used to build and elaborate active learning theories. In essence, this paper explains to readers what the theories are and from what perspectives do the related theories derive. It provides an elaboration of how to deploy the theories in the active learning needs analysis framework through the triadic reciprocal approach. This effort is intended to provide a blueprint for elaborating specific theories in active learning implementation through internal and external stimuli. It magnifies the full-scale process of developing a framework for further active learning investigation by including constructivism, self-regulation, and ecological features.

This paper makes a noteworthy contribution to future active learning module design by identifying learners' needs through learning needs analysis. This helps illustrate the aspects of needs where an active learning module can be accomplished for wider implementation. This effort is intended to spur further interest and action in the development of active learning. Based on active learning concepts, theories, elements, and features, this paper explains how needs analysis can be done through the proposed framework. This helps highlight to active learning researchers the potential of employing needs analysis to investigate learners' needs in active learning.

It is important to conclude by emphasising that sustained efforts and multiple studies on active learning are required. A fine active learning module can only be developed over time and would certainly benefit from the combined efforts of multiple studies by multiple researchers. This paper initially suggests the first step analysis of active learning learners' needs, it benefits the coming researchers to investigate the phenomena of interest around which part of active learning development is deemed necessary. This is particularly important for advancing the field.

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