



## THE IMPLEMENTATION OF PASS (PLANNING, ATTENTION-AROUSAL, SIMULTANEOUS, SUCCESSIVE PROCESSES) INTELLIGENCE THEORY IN EDUCATION

Muhammad Fikri Pratama<sup>1\*</sup>, Anggiet Noviana Puteri<sup>2</sup>, Fitri Andriani<sup>3</sup>

<sup>1,2,3</sup>Fakultas Psikologi, Universitas Airlangga, Indonesia

\*muhammad.fikri.pratama-2022@psikologi.unair.ac.id

### Abstrak

Ketika siswa memulai perjalanan belajarnya di sekolah, mereka sering dikaitkan dengan nilai *intelligence quotient* (IQ) yang diasumsikan tidak sepenuhnya menggambarkan proses kognitif siswa yang terlibat dalam pembelajaran. Penilaian berdasarkan teori PASS dianggap lebih mampu memenuhi kebutuhan pembelajaran di kelas karena dapat mengidentifikasi kebutuhan siswa yang beragam. Tujuan dari penelitian ini adalah untuk mengetahui implementasi teori PASS dalam lingkup pendidikan. Metode penelitian ini menggunakan studi literatur dengan sumber data dari artikel jurnal dan buku yang relevan yang membahas tentang teori kecerdasan PASS. Implikasi dari teori PASS dalam dunia pendidikan adalah pentingnya mengenali kekuatan dan kelemahan siswa dalam setiap proses kognitif untuk memberikan pengajaran yang efektif dan memfasilitasi perkembangan kecerdasan yang optimal. Oleh karena itu, teori PASS memberikan kontribusi yang signifikan dalam mendesain ulang penilaian kecerdasan dan menciptakan pengajaran yang lebih personal dan efektif.

**Kata kunci** : asesmen pembelajaran; kecerdasan, pendidikan, teori PASS

### Abstract

When students start their journey of learning in the school, they often associated with intelligence quotient (IQ) scores which is assumed that this does not fully depict students' cognitive processes involved in learning. Assessment based on PASS theory is considered more capable of meeting the learning needs in the classroom as it can identify the diverse needs of students. The purpose of this study is to investigate the PASS-theory implementation in educational scope. This study method uses literature review which is the resources are from relevant journal articles and book discussing the PASS theory of intelligence. The implication of PASS theory in education are the importance of recognizing students' strengths and weaknesses in each cognitive process in order to provide effective teaching and facilitate their optimal intelligence development. Therefore, the PASS theory makes a significant contribution to redesigning intelligence assessment and creating more personalized and effective teaching.

**Keywords**: education; intelligence; pass theory; learning assessment

Diserahkan: 21-05-2023 Disetujui: 23-06-2023. Dipublikasikan: 13-07-2023



Kutipan: Pratama, M. F., Puteri, A. N., & Andriani, F. (2023). The Implementation Of Pass (Planning, Attention-Arousal, Simultaneous, Successive Processes) Intelligence Theory In Education. *Educate*, 157-166.

## I. Introduction

In the learning process in the classroom, students are often evaluated based on their intelligence, which is how well they absorb information and solve problems they are facing. It is not uncommon for a student to be required to take various tests, including an IQ (intelligence quotient) test, when they are starting their education. Then, to what extent can IQ scores be used to assess a student's potential. When comparing a student's prospective accomplishment level to their actual performance, IQ tests are frequently used to evaluate that level of potential achievement. If there is a difference between the measured IQ score and the student's success, learning issues might be to fault. As the general intelligence test has been demonstrated to be insensitive to the individual learning issues that students suffer, this is one of its criticisms (Kroesbergen et al., 2015).

Swanson (2015) states that traditionally, intelligence is divided into two categories, namely fluid intelligence, which is defined as a person's basic ability to reason, while crystallized intelligence is defined as the ability acquired through education and cultural knowledge that has been learned. Verbal and numerical abilities are included in crystallized intelligence, which even students with learning difficulties possess. Therefore, it can be imagined what the results would be like if only one side is considered. In contrast, the PASS (Planning, Attention-Arousal, Simultaneous, Successive processes) theory of intelligence views ability as a multidimensional notion and takes a cognitive processing approach to intelligence. In comparison to general intelligence, this strategy offers greater details about individual parts and processes (Kroesbergen et al., 2015).

Planning, Attention, Simultaneous, and Successive (or more often known as the PASS cognitive process) are the four fundamental psychological processes that Das et al (1994) identified as constituting intelligence. This theory of cognitive processing characterizes intelligence in terms of these four cognitive states. The PASS processes can be used to evaluate students' abilities and weaknesses and provide an explanation of how each student's cognitive performance relates to academic success. Also, the PASS assessment offers crucial details on individual cognitive processes, which improves teachers in understanding the educational requirements of students, especially those with learning difficulties (Kroesbergen et al., 2015). As a result, by identifying the various needs of each student, PASS is thought to be better able to meet learning needs in the classroom. The purpose of this study is to examine the potential implications of the PASS theory in the field of education.

## II. Research Method

This study utilized a qualitative methodology in addition to a literature review approach. Literature review is conducted by analyzing, synthesizing, and evaluating certain topics (Miles et al., 2013). A literature review aims to present a thorough

overview of prior studies related to a particular subject, assess the caliber and significance of the sources in an unbiased manner, and recognize any deficiencies or incongruities in the current understanding (Fink, 2014). The sources for this study come from relevant journal articles on the research topic and reference books discussing the PASS theory of intelligence. Keyword selection in literature search is based on the concepts of PASS theory, history of PASS, and implications of PASS in education. The findings are then described descriptively based on the information obtained from the literature sources.

### **III. Results and Discussion**

#### **A. Background Theory PASS**

The PASS theory of intelligence (Planning, Attention-Arousal, Simultaneous, Successive processes) is a theory that explains intelligence based on a neuropsychological, information processing, and cognitive psychology approach (Naglieri et al., 2012). This theory was developed by Das et al (1994) who created a model for cognitive processes that aimed to clarify the concept of intelligence and redesign its assessment methods. The theory is rooted in Luria (1966, 1973, 1980, 1982) functional aspects of brain structure. Luria (1973) explains that PASS is a theory based on complex cognitive systems that occur in three interconnected and interacting functional brain systems with a set of knowledge. Overall, the PASS theory of intelligence provides a rich and detailed perspective on the complexity of human cognitive processes and has made significant contributions to the redesign of intelligence assessment.

#### **B. Three Functional Units**

According to Luria (1973), The attention-arousal system is the first functional unit. The brainstem, diencephalon, and medial cortical areas are where this unit is found. The first functional unit is in responsible of supplying the proper amount of arousal and attention required to concentrate on particular stimuli. Depending on the resources at its disposal, the first functional unit is crucial in limiting reactions to irrelevant stimuli and directing attention to central dimensions when faced with a complicated set of stimuli. Furthermore, in order for more complicated attention to take place, such as selective recognition of particular stimuli and blocking of responses to irrelevant stimuli, appropriate arousal conditions are necessary. Only under conditions of sufficient arousal and focused attention can the second and third functional units be used.

The brain's occipital, parietal, and temporal lobes, which are situated behind the central sulcus, contain the second functional unit. Information gathered from the external world is received, processed, and stored by the second functional unit. This component processes sequentially and simultaneously. Organizing stimuli into groups

while simultaneous processing helps the brain recognize the connections between various parts. While decoding unfamiliar words, forming grammatical elements, articulating speech, and following sequences like the order of operations in mathematical problems all need sequential processing, successive processing is employed for linearly ordered information integrated into sequences. On the other hand, grouping together distinct pieces is a part of simultaneous processing (Luria, 1973).

The prefrontal area of the frontal lobe contains the third functional unit. The third functional unit is in responsible of integrating knowledge gathered from the external environment and deciding how to behave in response to it (Luria, 1980). This functional unit is in responsible of several different activities, including asking questions, solving problems, and self-monitoring, and it has an essential function in the development of procedures, regulation, and behavior verification. Furthermore, the third functional unit is in charge of controlling voluntary actions, deliberately suppressing impulses, and other language abilities including impromptu speech (Luria, 1973). This is the most complex functional component and is in responsibility of characteristics of human behavior including awareness and personality (Das, 1980).

### **C. PASS Model**

In the PASS intelligence theory, the key point of this theory's component lies in the role played by the individual's information base (Das & Abbott, 1995). Each process comprises a knowledge foundation made up of prior experiences, knowledge, feelings, and motives that serve as context and information sources to be processed. This information is obtained from external sources through senses (Naglieri et al., 2012). When sensory information reaches the brain for analysis, the central process becomes active (Naglieri & Das, 1988). However, internal cognitive information, such as mental imagery, memory, and thinking, also contribute as part of the input. Hence, these four processes can only occur in the context of the individual's knowledge base (Naglieri & Das, 2005).

The prefrontal cortex, which sets human intelligence apart from that of other primates, performs the planning function. To perform tasks that call for solutions, the prefrontal cortex facilitates us in selecting and creating the essential plans or methods. Hence, for tasks requiring problem-solving, attention control, simultaneous and sequential processes, and the selective application of knowledge and skills, planning is crucial (Naglieri et al., 2012).

Attention is closely related to orientation response and can be controlled by intentions and goals, as well as involving knowledge and skills and other PASS processes. The longer the attention is directed toward a stimulus, the more detailed the analysis and processing will be (Naglieri et al., 2012).

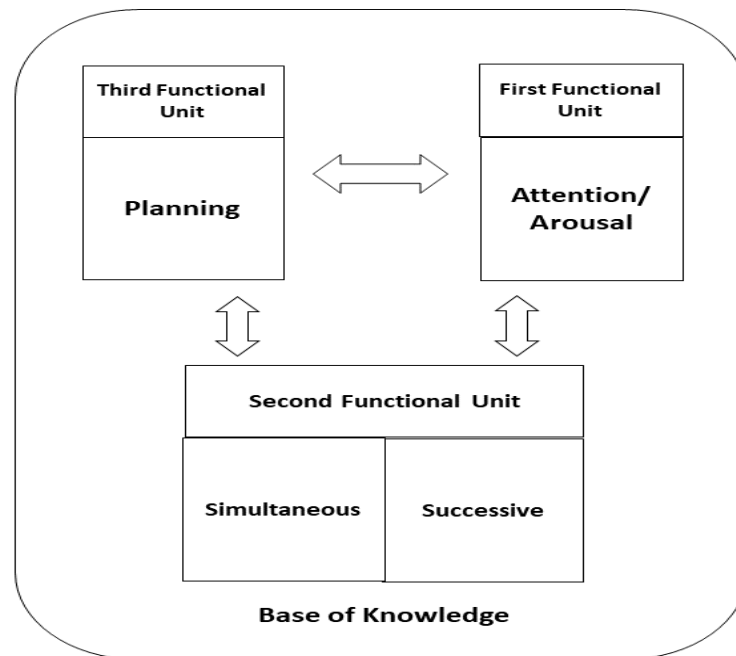


Figure 1. PASS Model

In accordance with the PASS model scheme depicted in Figure 1, Das (1999) argues that there are three basic divisions: input, processing, and output. As well as sensory receptors like the eyes, ears, nose, tongue, and skin, input also comes from body muscles, joints, and internal organs, which are how individuals experience movement and discomfort. Processing is the act of categorizing, evaluating, storing, and typically interpreting all of these inputs. The knowledge is then applied to a performance, which is an output. Sensory organs convert input into messages, which are then transmitted for processing. Three functional units or blocks process input. Luria emphasizes greatly on the connection between planning and attention. There are four processes that affect cognitive performance, output, or performance, which are responses or behaviors that may be quantified. People occasionally display gaps between their knowledge and performance, or between knowledge and capability. Before a person can communicate what they know, the output, or performance, must be properly digested. Hence, motivational and personality characteristics as well as cognitive issues like failing motor programs can have an impact on performance.

An important component of the PASS intelligence theory is basic knowledge. Individuals can solve any problem when they have adequate foundational knowledge for those tasks. Foundational knowledge is formed by learning both formally and informally. Foundational knowledge also increases through information processing or from responses or outputs. Prior knowledge affects all processing and output.

#### **D. Implementation of the PASS theory in Education**

##### **CAS (Cognitive Assessment System)**

Due to the fact that CAS was created to measure the four PASS processes, Kranzler & Keith (1999) claim that it covers a wider range of cognitive abilities than standard IQ tests, such as WISC-III. In seeking out cognitive process limitations linked to learning challenges, CAS is thought to be more useful than other intelligence tests. According to Nishanimut & Padakannaya (2014), the Cognitive Assessment System (CAS) is a collection of cognitive tests created to assess children's cognitive processing abilities between the ages of 5 and 17. Based on the PASS model, this test evaluates cognitive function (Rijumol et al., 2010). The four PASS processing areas (Planning, Attention, Simultaneous, and Successive) consist of four scales that form the CAS (Naglieri & Das, 2002). CAS has two types, namely the standard assessment series and the basic assessment series. In the standard assessment series, there are three subtests in each scale. Meanwhile, in the basic assessment series, there are two subtests. Each PASS scale's subtest scale scores are totaled up to create a standard score, which has an SD of 15 and an average of 100. The full-scale standard scores for the basic assessment (12 subtests) and the basic assessment (8 subtests) are calculated from the sum of the subtest results.

The planning subtest of CAS requires individuals to think about how to solve each problem, plan actions, execute plans, check whether the actions are consistent with the initial goal, and adjust plans if necessary. Although this subtest is relatively easy, it requires individuals to make decisions about how to solve new tasks. The planning subtest includes matching numbers, code planning, and relationship planning.

The cognitive activity focus, recognition of certain stimuli, and the capacity to regulate reactions to competing stimuli are requirements for the attention subtest. In order to accomplish this, individuals must focus on the characteristics of the stimuli and choose to react to one stimulus while ignoring others. The expressive attention, number detection, and receptive attention components make up the attention subtest.

Simultaneous subtests in the CAS require the integration of separate elements into related groups. Nonverbal matrices, spatial-verbal linkages, and image memory are examples of concurrent subtests. Subtests of successive processing need repetition or comprehension of the ordering of events. Individuals are required to manage data provided in a particular sequence, which provides the sequence meaning, in all successive processing subtests. Word sequence, phrase repetition, and speech level are the following subtests.

The PASS scale is used to represent children's cognitive performance and to help pinpoint certain areas of cognitive processing strength and weakness. By understanding a children's cognitive performance, early diagnosis and intervention can be performed. The PASS scale primarily examines a child's capacity for planning and paying attention to a task, which leads to the simultaneous and sequential processing of information to produce an outcome. In addition, the CAS can be used to

compare a children's abilities and achievements. This can serve as an individual assessment tool to help determine mismatch, eligibility, re-evaluation, and instructional planning.

### PASS Remedial Program (PREP)

When elementary school students are found to be intelligent yet have trouble reading, they are classified as having learning impairments, being poor readers, or having dyslexia. We adopt the cognitive remedial program PREP (The PASS Remediation Program) to treat their word-reading issues, which also cause challenges with reading comprehension (Das, 1999).

Instead of directly teaching word reading abilities like phoneme segmentation or blending, PREP strives to develop processing techniques, particularly simultaneous and successive processing, which are the cornerstones of reading skills. Moreover, PREP is founded on the idea that inductive inference rather than deductive reasoning facilitates the transfer of ideas more effectively (Das, 2001). PREP successfully aids students in enhancing their reading ability, according to numerous prior studies using experimental study on readers (Boden & Kirby, 1995; Das & Abbott, 1995; Parrila et al., 2000; Wang et al., 2012).

There are 8 tasks in PREP, each with a curriculum and instruction in global processing. Instead of reading material, the training offers a number of structured tasks that call for the use of techniques that enhance planning, attention, simultaneous, and succeeding functions. Letters and letter combinations are used in the training form. There are three levels of difficulty for each activity, with the easiest allowing the youngster to succeed with the subject first and get accustomed to the assignment and program expectations. The evolution of the easiest level with more complexity results in the harder levels. Depending on how each student is doing, PREP typically lasts between 15 and 18 hours over the course of 12 weeks. Four students receive PREP from a single teacher during each session (Das, 1999).

### The Planning Facilitation Method

The Planning Facilitation Technique has been used with both individual and group students who struggle with math. Throughout the course of a 2-month period, students complete math worksheets that have been created in accordance with the mathematics curriculum in a series of baseline and intervention sessions. Three sessions are held during the baseline and intervention phases, with each session lasting 10 minutes for math, 10 minutes for conversation, and 10 minutes for math again. The conversations during the baseline phase focus on issues outside of mathematics. Group conversations, on the other hand, are intended to promote self-reflection throughout the intervention phase, helping kids realize the value of making plans and employing effective tactics. The teacher asks questions or makes observations that promote discussion and inspire students to think of different

strategies for achievement. It is suggested that you answer the following questions: "How do you calculate it?," "What can you do to be more accurate?," and "What will you do next time?".

Indirect statements like "That's correct" or "Remember to utilize the same method" are not used by teachers. Instructors also don't provide feedback on math accuracy before the assignment is finished or solutions to problems. Teachers' duties are to help students reflect on themselves and to motivate them to finish worksheets in a methodical way (Naglieri & Das, 2005).

Prior studies have shown that strategic planning and training can raise PASS scores and the effectiveness of strategic learning in mathematics learning. The ability of the children in this study to perform academic and non-academic tasks improved as a result of the strategy that was employed to encourage planning by the children. The approach is predicated on the idea that planning should be encouraged rather than explicitly taught, allowing kids to discover the advantages of employing tactics on their own. Teachers execute it by assisting students with reflection and encouraging them to complete worksheets in a systematic way (Naglieri & Gottling, 1997; Naglieri & Johnson, 2000).

#### **E. Advantages and Criticism of CAS**

CAS has superior substance, features, and qualities when compared to standard exams like the Stanford Binet, Weschler scales, and Differential Ability Scale (DAS). Well-designed and simple to use include the record form, score conversion tables, manual scores, and interpretive handbook. The results' explanation to parents, educators, and special educators is clear and concise (Nishanimut & Padakannaya, 2014).

In the world of intelligence testing, CAS can be viewed as a novel concept. The first reason why CAS hasn't gained acceptance as a legitimate method for testing intellect may be controversy surrounding the new concept of measuring intelligence. This is so because traditional testing does not capture the crucial test components of preparation and attention. Second, even if utilizing a multi-factor intelligence assessment has advantages over traditional measurement, researchers or medical professionals could find it challenging to interpret the results as simply as they do when using IQ scores. Third, according to some researchers, planning and attention appear to overlap, which can lead to results that are less apparent (Nishanimut & Padakannaya, 2014).

#### **IV. Conclusion**

Planning, Attention-Arousal, Simultaneous, and Successive (PASS) are the four interconnected cognitive processes that make up human intelligence, according to the PASS hypothesis of intelligence. This theory has important implications for intelligence assessment, emphasizing that each individual has unique strengths and weaknesses



in each of these cognitive processes. By using neuropsychological, information processing, and cognitive psychology approaches, the PASS theory can help to understand the complexity of human cognitive processes and provide a richer and more detailed view of intelligence. The implications of this theory in the world of education are the importance of recognizing students' strengths and weaknesses in each cognitive process in order to provide effective teaching and facilitate their optimal intelligence development. Therefore, the PASS theory makes a significant contribution to redesigning intelligence assessment and creating more personalized and effective teaching.

## V. References

- Boden, C., & Kirby, J. R. (1995). Successive processing, phonological coding, and the remediation of reading. *Journal of Cognitive Education*, *4*, 19–32.
- Das, J. P. (1980). Planning: Theoretical considerations and empirical evidence. *Psychological Research*, *41*(2–3), 141–151. <https://doi.org/10.1007/BF00308652>
- Das, J. P. (1999). A neo-Lurian approach to assessment and remediation. *Neuropsychology Review*, *9*, 107–116. <https://doi.org/https://doi.org/10.1023/A:1025611924842>
- Das, J. P. (2001). *Reading difficulties and dyslexia*. Sarka Educational Resources.
- Das, J. P., & Abbott, J. (1995). PASS: An Alternative Approach to Intelligence. *Psychology and Developing Societies*, *7*(2), 155–183. <https://doi.org/10.1177/097133369500700204>
- Das, J. P., Naglieri, J. A., & Kirby, J. R. (1994). *Assessment of cognitive processes*. Allyn & Bacon.
- Fink, A. (2014). *Conducting research literature reviews: From the internet to paper*. SAGE Publications Inc.
- Kranzler, J. H., & Keith, T. Z. (1999). Independent Confirmatory Factor Analysis of the Cognitive Assessment System (CAS): What Does the CAS Measure? *School Psychology Review*, *28*(1), 117–144. <https://doi.org/10.1080/02796015.1999.12085952>
- Kroesbergen, E. H., Van Luit, J. E., & Van Viersen, S. (2015). *PASS theory and special educational needs: A European perspective*. In *Cognition, intelligence, and achievement*. Academic Press.
- Luria, A. R. (1966). *Higher Cortical Functions in Man*. Basic Books.
- Luria, A. R. (1973). *The working brain*. Basic Books.
- Luria, A. R. (1980). *Higher cortical functions in man* (2nd ed.). Basic Books.

- Luria, A. R. (1982). *Language and cognition*. Wiley.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative data analysis: A methods sourcebook*. SAGE Publications Inc.
- Naglieri, J. A., & Das, J. P. (2002). Practical implications of general intelligence and PASS cognitive processes. In *The general factor of intelligence: How general is it?* Erlbaum.
- Naglieri, J. A., & Das, J. P. (1988). Planning-arousal-simultaneous-successive (PASS): A model for assessment. *Journal of School Psychology, 26*(1), 35–48. [https://doi.org/10.1016/0022-4405\(88\)90030-1](https://doi.org/10.1016/0022-4405(88)90030-1)
- Naglieri, J. A., & Das, J. P. (2005). Planning, Attention, Simultaneous, Successive (PASS) Theory: A Revision of the Concept of Intelligence. In *Contemporary Intellectual Assessment: Theories, Tests, and Issues*. Guilford Press.
- Naglieri, J. A., Das, J. P., & Goldstein, S. (2012). Planning, attention, simultaneous, successive: A cognitive-processing-based theory of intelligence. In *Contemporary intellectual assessment: Theories, tests, and issues*. Guilford Press.
- Naglieri, J. A., & Gottling, S. H. (1997). Mathematics Instruction and PASS Cognitive Processes. *Journal of Learning Disabilities, 30*(5), 513–520. <https://doi.org/10.1177/002221949703000507>
- Naglieri, J. A., & Johnson, D. (2000). Effectiveness of a Cognitive Strategy Intervention in Improving Arithmetic Computation Based on the PASS Theory. *Journal of Learning Disabilities, 33*(6), 591–597. <https://doi.org/10.1177/002221940003300607>
- Nishanimut, S. P., & Padakannaya, P. (2014). Cognitive Assessment System (CAS): A Review. *Psychological Studies, 59*(4), 345–350. <https://doi.org/10.1007/s12646-014-0253-y>
- Parrila, R. K., Das, J. P., Kendrick, M. E., Papadopoulos, T. C., & Kirby, J. R. (2000). Efficacy of a Cognitive Reading Remediation Program For At-Risk Children in Grade 1. *Journal of Cognitive Education and Psychology, 1*(2), 114–139. <https://doi.org/10.1891/194589500787383562>
- Rijumol, K. C., Thangarajathi, S., & Ananthasayanam, R. (2010). The PASS theory of cognitive processing. *Journal on Educational Psychology, 3*(4), 51–55.
- Swanson, H. L. (2015). Intelligence, Working Memory, and Learning Disabilities. In *Cognition, Intelligence, and Achievement* (pp. 175–196). Elsevier. <https://doi.org/10.1016/B978-0-12-410388-7.00010-5>
- Wang, X., Georgiou, G. K., & Das, J. P. (2012). Examining the effects of PASS cognitive processes on Chinese reading accuracy and fluency. *Learning and Individual Differences, 22*(1), 139–143. <https://doi.org/10.1016/j.lindif.2011.11.006>