

# Meta-Analysis of Action Proses Object Schema (APOS) Model In Language Skills Implementation

1st Ryan Hidayat<sup>1</sup>, 2nd Andayani<sup>2</sup>, 3rd Atikah Anindyarini<sup>3</sup>

{ryan.hidayat@student.uns.ac.id<sup>1</sup>, andayani@staff.uns.ac.id<sup>2</sup>, atikahanindyarini@staff.uns.ac.id<sup>3</sup>}

Universitas Sebelas Maret, Street Ir. Sutami, No. 36, Jebres, Surakarta, Central Java, Indonesia <sup>1,2,3</sup>

**Abstract.** The meta-analysis aims to determine whether the APOS model can be implemented in language skills. The research method used is descriptive qualitative. Descriptive research is a study to collect information regarding the status of an existing symptom, namely the state during which the research was conducted. The research procedure employed three steps, namely viewing, filtering, and investigating. The article search is the target of research operated Google Scholar web platform to find national and Scopus international journals. From the results of the literature review, the APOS model can be implemented for Indonesian language lessons. It can be determined that writing, listening, and speaking skills require the concept of mental development. This mental development begins with the emergence of the APOS theory concept created by Dubinsky.

**Keywords:** Meta-Analysis, Action Process Object Schema (APOS) Model, Language skills

## 1 Introduction

Teaching as an intellectual framework of the young generation of the country is currently challenged by various problems. Regarding the current state, as a drive for problems in teaching, schools must be coordinated to adapt to changes. The learning implementation that has been supported by the state approach in the future must be adjusted to the expectation of the respective region [22]. As suggested by Purwasasmita in Aunurrahman [4], the biggest drawback of educational and learning institutions is that schools do not have a clear basis for social progress. Educational institutions depend solely on the financial model to create or develop human workers that have been defined by the economic value framework.

Given the current problems of education, it implies that the learning system is teacher-centered. As stated by [6], "Teachers must compete in learning, by providing learning space for all students, to develop their potential ideally." Teachers should be provided with choices to use learning models or strategies creatively and effectively so that learning is not repetitive and monotonous for students in the classroom. Student development is a goal that must be achieved

by schools and teachers. It denotes that it is contradictory for the teacher only to be responsible for delivering topics within their field of study [15]. Before initiating learning using an approach, teachers must determine the implementation sequences so that the learning process can be appropriately conducted according to the objectives [28].

APOS Learning Model is explicitly intended for mathematics, a mathematics learning approach characterized by mentally constructing or compiling a representation in understanding a concept. Reflective abstraction, which Piaget considered as the basic process for mental construction in the formation of reasoning and the mental mechanism through which all logical-mathematical structures are generated in an individual's mind, was one of his main ideas [10].

Dubinsky describes these attributes as an intellectual alternation of events starting with an Activity (an incomplete "application") that is penetrated into a Cycle (operationally measurable covariation) and then exemplified into an Object to which a new activity can be applied (various varieties). The APOS theory is a model founded on Piaget's intelligent deliberation of progression from Activities to Cycles to Process Patterns [10].

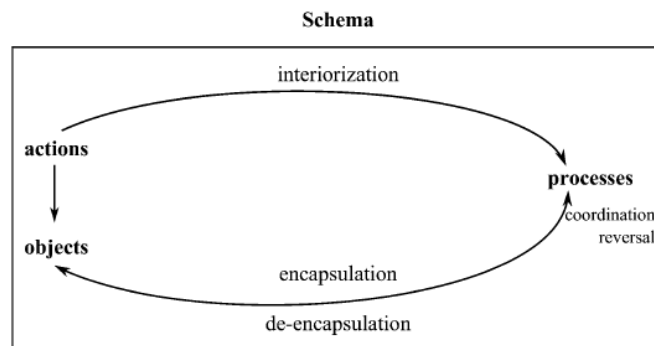


Figure 1. APOS Theory  
Source: Arnon [10]

Utilization of the APOS hypothesis is to clarify the development of mathematics based on straight variables, regardless of hypothetical methodology has been used effectively in research on learning numerical ideas in Analysis, Abstract Algebra, Conceptual Variable Mathematics, and Discrete and Rational Mathematics. The APOS hypothesis is intrigued by the mental development of students in learning concepts. When using this hypothesis, analysts first create a model description that can explain how students will continue to make the suggested development [7].

Language skills comprise four aspects; listening, speaking, reading, and writing [5]. These four aspects of skills are interrelated in various ways and are simultaneously a fundamental thought process for human beings. Orsdemir & Yilmazer [7] suggest that listening is an essential component of language performance, whether learners communicate at school, work, or

community. Listeners must be able to discriminate between sound, vocabulary understanding, and structure grammar, as well as interpret pauses and intonation directly in the socio-cultural, in order to master this talent. Gilakjani & Sabouri [19], as quoted in (Alyousef, 2005), they define reading as an interactive process between the reader and the text that produces reading fluency. Readers engage with texts in order to extract meaning, and there are two sorts of knowledge: linguistic or systemic knowledge (bottom-up processing) and schematic knowledge (top-down processing). Writing is a basic skill in the Indonesian language. Productive writing skills are considered a cognitive challenge as they help assess language competence, memory skills, and thinking skills [12]. Tarigan in [20] asserts that speaking is a skill to convey messages through spoken language. Someone who can read and write will obtain many advantages in his life [8]. An important issue concerning early lexical skills is the possible role in predicting later language and related language skills [27].

Language skills students in learning effectively at school and interacting with others at home or in the community depend on spoken and written language skills in class, i.e., extended by language units consisting of several sentences [17].

Based on the description above regarding the APOS model and language skills, the researchers attempted to implement it into language skills; 1) describing the difficulties and language skills; 2) factors causing difficulties and language skills; 3) implementing the APOS model into language skills.

## **2 Research Method**

The research method used is descriptive qualitative. According to Arikunto [25] descriptive research is a study to collect information about the status of an existing symptom, which is the state during which the research was conducted. A qualitative study measures numerical alternatives, and measurement is not a separate research step. Because the process is more inductive, it simultaneously measures and creates new concepts with the data collection process [29].

This review employed a three-step systematic literature review, which is specific, view, filter, and investigate. Article search operated Google Scholar web to find national and Scopus international journals. The search engine was used to explore through the title, abstract, and exploratory article phrases and survey articles included in the Google Scholar and Scopus information bases[2].

Meta-analysis is a technique to combine the results of one or more corresponding studies to obtain quantitative blend data. Currently, meta-analysis is the most widely used for clinical trials. It is reasonable as clinical trials are more standardized in design and provide the most robust evidence of a causal relationship [21].

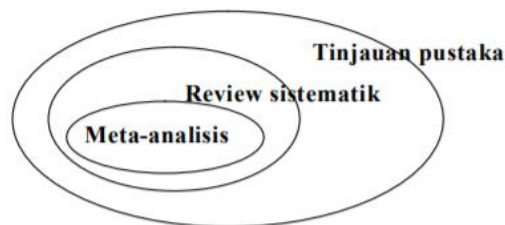


Figure 2. Venn diagram shows the relationship between literature review, systematic review, and meta-analysis

Source: Anwar [21]

Data analysis is one of the few, perhaps the only, parts of qualitative research in which there is a recommended method. As shown in the situation above, the most favored method of analyzing data in qualitative research is to do so simultaneously with collecting data [26]. At the beginning of a qualitative study, the researcher understands data collection to address the problem.

### 3 Result and Discussion

To achieve the objectives of this study, the researcher describes several literature reviews from various articles on language error and skills.

#### 3.1 Language Skills

The effects of in-class debates on argumentation skills in second language education [1]. This study aims to determine the second language proficiency in argumentation speaking skills through the competencies carried out. Based on the results of this study, argumentation competence using a second language can serve as a learning tool that stimulates students to engage in cognitive processes, which directs students' minds to the argument perspective with solid evidence. This study risks the effectiveness of second language classroom debate to hone argumentation skills and metacognitive argumentation knowledge. The debate intervention in this study has improved several aspects of the argument structure and quality of the intervention group. Pedagogically, this research not only proves the effectiveness of second language debate as a means to develop students' argumentation, but this skill also explains a number of things that can galvanize reasoning skills outside the context of a second language – argumentation lies at the core of education. These characteristics encompass an authentic audience (opponents, peers, and teachers) involved in argumentation skills and involvement in systematic and sustainable practice.

Lexicon receptive, early expressive, language skills, and pre-literacy at 5;0 years – A longitudinal study [27]. This study aims to determine the relationship between the predictive ability of lexical receptive/early expressive and language skills/pre-literacy at the age of 5;0 years and examine the language profile at the age of 5 years. This study showed receptive lexical

skills and lexical expressive skills were sufficient at two years of age, and other different language domains at five years. Receptive language skills and lexical expressive skills explained the differences in subsequent language skills independently and as part of a regression model analysis. Gender contributed only slightly to early lexical skills and was not a significant predictor.

Aged-based differences in spatial language skills from 6 to 10 years: Relations with spatial and mathematics skills [11]. This study aims to present a new measure of spatial language and demonstrate differences in spatial language performance across age groups from 6 to 10 years. Secondly, showing size is developmentally sensitive by age using regression analysis to determine the relationship between spatial language and performance on various spatial tasks. Thirdly, it investigates the spatial relationship between different language and mathematical skills and proposes a mechanism for this correlation. The results of this study demonstrated age differences in spatial language skills throughout childhood. It obtained significance between spatial language and both spatial outcomes (extrinsic spatial tasks) and mathematics (class-based mathematics). Considering that finding new methods to improve mathematical thinking in children is an educational priority in the UK [18], these findings undoubtedly provide preliminary support for future spatial designs for intervention studies and highlight spatial language as a target for further interventions.

Dialogic classroom talk in early childhood education: The effect on language skills and social competence [9]. Research yielded found that children's receptive vocabulary and social skills were unaffected by dialogue class talk. Interestingly, this study discovered that dialogic classroom conversation has a favorable and small to medium impact on children's oral communication. Supporting teachers in establishing dialogic classroom conversation is an effective strategy to improve children's ability to communicate with others, according to the current study's findings.

### **3.2 Language Skills Difficulty**

Difficulties in Learning Short Story Writing Skills for Grade IXC Students at SMP Negeri 3 Singaraja in 2016/2017 [16]. The purpose of this study is to analyze the difficulty of learning writing skills in Indonesian language lessons. The results of this study obtained difficulties in learning short story writing skills encountered by class IXC students of SMP Negeri 3 Singaraja, including eight difficulties: (1) difficulty in determining topic, (2) difficulty in determining theme, (3) difficulty in creating writing framework, (4) difficulty in developing framework, (5) difficulty in connecting events into a storyline, (6) difficulty in determining conflict, (7) difficulty in composing effective sentences, (8) difficulty in composing coherent paragraphs.

Diagnosis of Difficulties in Learning the Indonesian Language in Writing Essays for Grade VII Students at SMP Islam Al-Mahmudiyah in 2019/2020 [14]. The purpose of this study is to investigate the attributes of learning difficulties in writing essays for grade VII students of SMP

Islam Al-Mahmudiyah. The results implied that the sub-topics of definition and components of writing showed 70-100% very significant after applying diagnostic techniques. In the sub-subject of determining theme and title, it can be classified that students who answered wrong were categorized as 35.29 - 64.71%, with a total of correct answers ranging from 6-11 out of 20 items. Meanwhile, 76.47% answering 13 items correctly, and 70.59% writing 12 correct items were categorized as easy and very easy, respectively. In the sub-topic of writing framework, 29.41% and 17.64% were categorized as difficult for students. In the sub-subject of spelling and punctuation, it earned 54.54% of students who experienced difficulties. In the sub-topic language, word choice /diction attained 65.36%, effective sentence acquired 46.10%, and paragraph secured 65.12%, shows that students experienced difficulty in general. Therefore, it can be concluded that some students encountered difficulty in each sub-topic of writing an essay. After using the diagnostic technique, students experienced a very significant improvement.

Difficulties in Listening, Speaking, and Writing in Indonesian Language Learning among High School Students [3]. The purpose of this research is to instruct students to possess productive and receptive language skills. The difficulties in learning Indonesian they experienced could interfere with the learning achievement at school and self-confidence. However, this can be overcome by coordination between teacher, counseling teacher, and parents or relatives by accommodating remedial techniques and strategies for later use, such as administering individual assignments/study, discussions/questions, and answers, practice.

Analysis of Difficulties in Reading for Beginner in Elementary School Children [23]. The purpose of this study is to analyze the difficulty of reading for beginner in elementary school students. Students' ability in reading for beginner is very influential on their ability to read in the following stage. In every lesson, there are difficulties students must face, including reading for beginner. The difficulties students of elementary school in Tasikmalaya Regency experienced covered difficulty in distinguishing letters with similar shape, distinguishing letters with similar sound, difficulty in pronouncing syllables with double vowels or double consonants, and difficulty in reading words with multiple vowels or consonants, and difficulty in reading words with more than three syllables. In terms of reading fluency, the difficulties experienced by students included the halting reading process and the inappropriate pronunciation process.

Given the results of research on language difficulties and skills, language skills become a learning tool that stimulates students in cognitive processes, in line with the APOS model in which mental development is made by students when they learn a concept. Hence, the concept is not only learning mathematics described by Dubinsky, but also language skills because students develop thoughts and views to express their reasons in argumentative speaking skills. Language skills at the age of 2-5 years will differ in receiving lexical items from the community or school environment. Children of 5 years are already skilled at receiving expressive lexical language. It is in line with Piaget's opinion that the main mechanism for mental construction in

the development of thought, of course, age, dramatically affects the development of children's thinking process at a certain age.

Research on language skills difficulties, especially difficulties in writing found: (1) difficulty in determining topic, (2) difficulty in determining theme, (3) difficulty in creating writing framework, (4) difficulty in developing framework, (5) difficulty in connecting events into a storyline, (6) difficulty in determining conflict, (7) difficulty in composing effective sentences, (8) difficulty in composing coherent paragraphs. Based on the analysis, factors that influence writing difficulties are; (1) family factor, parental guidance and support may affect student ability, (2) school factor, school where learning has a significant impact on students' abilities, but in this case, school rarely conducted writing competition which could hone their writing skills. Another school factor is that Indonesian language teachers, based on observations, did not thoroughly guide students in writing skills. In relation to the APOS model, regarding the development of the mind, if the writing process continues to be developed using practices and competition, such writing difficulty will not occur, based on factors that have been analyzed by researchers above. Difficulty in reading found reading for beginner in general encountered difficulties, such as distinguishing letters with similar shape, distinguishing letters with similar sound, difficulty in pronouncing syllables with double vowels or double consonants, and difficulty in reading words with multiple vowels or consonants, and difficulty in reading words with more than three syllables. According to Piaget in Kohler [24], developing the potential serves to improve creativity

#### **4 Conclusion**

Given the literature review results, it can be determined that the APOS model, which is intended for mathematics lessons, can be implemented in Indonesian language lessons. It is shown by the writing, listening, and speaking skills requiring the concept of mental development. This mental development was born from the concept of APOS theory created by Dubinsky.

This literature review is a preliminary study from a dissertation, therefore it still requires data and experts to prove the study.

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