Analysis of piaget-anderson theory in learning modern economy

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Abstract: The more complicated the development of information technology in the twentieth century one has become a challenge for education in Indonesia. Various stages of the development of the education curriculum never stop doing in order to adjust to the existing development. Based on cognitive theory that are discussed and suggested by Jean Piaget, to build and develop cognitive structure that meaningful for students, required model of teaching which is based on the stages of cognitive development students. The Integration of Jean Piaget stages of cognitive development theory and technology in the implementation of the teaching of the modern economy cause multimedia technology will support development of student reasoning, reversal thinking, creative thinking and stimulate the development of cognitive structure individually. The addition of more communicative learning resources causes the cognitive structure of students to experience expansion more quickly because of the many sources of information that can be absorbed to serve as cognitive capital in the equilibration phase in the dimension of knowledge afterwards. Multimedia learning is also able to support students to reach their accommodation phase, information support from various sources and communicative causes the growth of reversal thinking patterns that cause students to have propositional, combinatorial logic and reasoning thinking capacity in hypothesis. So students can immediately determine whether the cognitive schemes they have learned are only sufficiently expanded or must be replaced as a form of their adaptation to the environment.

1. Introduction
The more complicated the development of information technology in the twentieth century one has become a challenge for education in Indonesia. Various stages of the development of the education curriculum never stop done in order to adjust to the existing development. The implementation of the teaching and learning the economy in 2013 curriculum at senior high schools as a form of response, has emphasized that the economic learning management focused on the process of the construction of the knowledge of the students related to the fact or symptoms of dynamic economy and real.

A shift in the jurisdiction of modern economic learning on the upper secondary schools should be modelled on the learning paradigm constructivist and cognitive learning theories. According to Sadulloh Uyoh learning model with constructivism approach supports the implementation of the curriculum 2013, because based on the student of continuous so that the students is the key in learning [17]. Based on cognitive theory that are discussed possible by Jean Piaget, that to build cognitive structure that means for the life of the students required model of teaching which is modeled on the stages of cognitive development students.

Dorothy and Tracey Ravenson in Primary Piaget convey Piaget theory is continuous on cognitively intact development mental processes such as perceiving, remembering, believing, reasoning [10]. So that development of cognitive inside human involves the growth of an individual's thinking, emotions, and strategies for coping with the environment.

Piaget theory in Soepeno (2017:244) convey that cognitive process is a genetic process that is based on the biological mechanism of the nervous system development [2] because related to the nervous system and cognitive process of assimilation and accommodation will be continued in the students to reach the adaptation phase. Piaget in How a child thinks convey that adaptation is duality
process of seeking equilibration between the self and the environment. This equilibration is the result of balancing process between the dualism process of assimilation and accommodation [10].

So when the theory Piaget in economic learning applied, then the teachers should have the ability to help students achieve equilibration phase through assimilation and accommodation in cognitive developmental stages. Jean Piaget in Adaptation and Intelligence stated that The starting point of processes of equilibration is naturally, evident in the subject's earliest motor-sensory actions when he attempts to cannot reproduce or generalize these actions, and when he seeks to apply the scheme of these actions to a multiplicity of objects. This will happen with subsequently representative schemes or concepts, with functions, and finally with the operational schemes [7].

D be interpreted that equilibration process should happen during natural conditions for learning in the modern economy which is integrated with the technology using factual examples, will provide an opportunity to the students to interact directly with multimedia in building their own knowledge scheme which ended to the development of operational cognitive scheme each student. The integration stage of cognitive development Jean Piaget and technology in the implementation of the teaching of the modern economy cause unnecessary multimedia technology that can support emphasize student and stimulate the development of cognitive structure individually. Richard E. Mayer in the handbook of Multimedia convey multimedia the presentation of material using both words and pictures. By words, I mean that the material is presented in verbal form, such as using heading printed or spoken text [13], so, I mean that this multimedia material are static graphs, dynamic graphs or the combination between static and dynamic with audio. So with the presence of multimedia in learning the economy, students are expected to develop the cognitive scheme or knowledge economy to a higher level. In addition multimedia is expected to have a vital role in learning modern economy, because of its ability in transmit data knowledge that can help the formation of learning individualization. Richard E. Mayer conveyed that multimedia is the premise that make learners can better understand an explanation when it is presented in words and pictures than when it is presented in words alone [13]. So multimedia will be an opportunity to deliver subject materials based on the cognitive development of each student.

The integration cognitive theory and multimedia not only support the process of learning individualization, but also can increase the percentage of success in learning the economy. Because it has been adapted to the stage of cognitive development students so that the students are able to develop their own knowledge as well as the capable modified the experience obtained from the environment with different characteristics.

Emphasize student in cognitive process related to the election of the information knowledge is expected to be increased, because multimedia capable to represent the cognitive learning coherent. According to Munir (2013:115) characteristic of multimedia is responsive namely happens two-way communication between teachers and students is the audio visual merger and is independent in the sense of ease and completeness of the contents of the so users can use it without the guidance of other people. Then Swajati (2005:11) added that the ability in the management of the files or data to digital knowledge cause multimedia is very much needed in learning modern economy.

The research done by Gunawardhana shows that the multimedia enhances cognitive power students so that the learning was effective for long-term memory and the students were very helpful in finding the easiest way to learn and remember the material of learning materials [18]. In addition the research by Urges Gede Wirayanti shows that in the implementation of Indonesian curriculum has refers to the stages of Piaget cognitive development [15]. Then according Brenda Hutton-Prager's research shows with Piaget Cognitive theory framework facilitated by Bloom's cognitive theory [9] or Anderson Krathwohl cognitive theory, This framework is useful to increase developing of experiments in undergraduate chemical engineering unit operations.

Related to the above statement and based on the observation that is done by the researchers that the learning achievements for economic subjects the eleven grade students of Social Studies in senior high school 1 Jember is still far from the expected. Although senior high school 1 Jember has a complete multimedia room and equipped with wi-fi facilities and this school also provides an LCD Projector in accordance with the number of classrooms, but the learning achievements is not significant. Not yet optimal learning achievements can be seen in the table 1 where the result of the average students were still under the standard passing grade (KKM specified SMA Negeri 1Jember).
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Table 1. table of the standard passing grade (KKM)

| No | Class                        | Total Students | The standard passing grade (KKM) | The Average Value | The percentage of students above standard Passing Grade | The percentage of students below standard Passing Grade |
|----|------------------------------|----------------|---------------------------------|-------------------|--------------------------------------------------------|-------------------------------------------------------|
| 1  | Eleven Grade Social studies class 1st | 24             | 76                              | 65                | 40%                                                   | 60%                                                   |
| 2  | Eleven Grade Social Studies class 2nd | 34             | 76                              | 72                | 35%                                                   | 65%                                                   |
| 3  | Eleven Grade Social Studies class 3rd | 35             | 76                              | 70                | 40%                                                   | 60%                                                   |

Source: The results of the average value of students, December 2018

Analysis while the low percentage of learning in line with the economic subjects students due to a lack of active students in the explore related information economic material that is taught by the teacher. The ability of understanding the students in receiving the subjects the economy needs to be improved and emphasize student in the issuing of the opinion of the need to be trained in accordance with the stages of the cognitive development. The majority of the students who are still under the value of learning in line with the minimum of having difficulties in developing the cognitive aspect scheme related to the pattern of thinking or fact based analysis of the dynamic economic symptoms and real.

Based on observation and interview with teachers and students the development of cognitive structure that does not match the cause of differences in the level of assimilation, accommodation and equilibration in the students themselves. It caused the students have difficulty to understanding the concept learning economy.

In addition based on the results of an interview with members of economic teacher organization (MGMP) Jember, 70% of the member said that the skills of economic teachers in Jember to utilization of computer and multimedia devices are still lacking, and need more training to increase the skills. And from questionnaire reported that the maximum utilization of multimedia in learning the economy that the utilization of the LCD projector by teachers is still limited and in general use to transfer the content of learning material from paper into the form of the presentation only. So that although learning has been using visual technology, but has not been able to improve the involvement of students in learning about the clear examples of economic phenomenon in the community.

To get a more clearly about the main problem experienced by the students, researchers further want to know and analyze how the results of cognitive achievement students in learning the economy related student competencies in analyzing the price index. Then the next stage researchers will analyze the stages of cognitive development of students based on the theory of Piaget when lesson without multimedia and use multimedia.

Based on the fact that the basic concept of cognitive theory and the results of the earlier research, then this research will analyze how economic learning based on cognitive theory Piaget can cause the formation of assimilation, accommodation and equilibration students.

2. Methods

In the chapter of this research method will be explained about the research approach, the place and time, social situation, research design, engineering and data acquisition tools and techniques of presentation of data.

Research approach

The approach used in this research is a qualitative research approach. Creswell in Educational Research convey qualitative research is best suited because to explore phenomenon based on key concept, idea or process of studied [1]. In this qualitative research, researchers interact directly with the respondents for several months to learn the background, conventions, behavior, physical features, mental characteristics and phenomenon that happens in the field. With qualitative research approach, researcher will be able to analyze the result of assimilation, accommodation and equilibration from the perspective of students cognitive. Characteristics of qualitative research approach that is naturally will be more appropriate to describes data, analysis with inductive coupling, and the meaning is more important than generalizations.

The reason for choosing this qualitative approach based on two problems. The first is how to
analyze the result of assimilation, accommodation and student equilibration in economic learning based on Anderson-Piaget theory in senior high school 1 Jember. The second reason based on the relevance of the problem is examined with primary data that has been found in the research object of the still high percentage of students get the results of the study under the standard passing grade for economic subjects

Research Design

The research design is case study, according to Soepeno explains that the case study is a series of scientific activities conducted intensively, detailed and deeply about a program of events and activities[2], both at the individual level, a group of institutions or organizations to obtain deep knowledge about the event. So the researchers aimed to focus research to analyze in depth about what causes the majority of the students of the eleven grade students of Social Studies score below the standard passing grade (KKM). How cognitive Piaget theory will be effective in getting description of the formation of cognitive stages students using the terms of reference from Taxonomy Anderson-Krahtwohl.

More information Creswell in Educational Research explains a case study is an important type because case study researchers may focus on a program, event, or activity involving individuals rather than a group [1]. The Researcher will be analyze the students cognitive “case” through single individual, several individuals separately or in a group, a program, events, or activities and focus on an in-depth exploration of the actual “case” called Assimilation, accommodation and student equilibration.

The Writer in doing research case study focused on the model of the instrumental because researchers want to clarify about analyze the result of assimilation, accommodation and student equilibration in economic learning based on Anderson-Piaget theory in senior high school 1 Jember

Data Analysis

The data analysis technique used in this study is Miles and Huberman's data analysis technique which discusses qualitative research activities conducted interactively and continues to be done until the data is saturated. Following are the steps that need to be considered in Figure 3.1 below

![Figure 1, Miles and Huberman's Data Analysis technique used in this research](image)

So that the data collection must be prepared by researchers are observation (observation), the recording, interview and questions pretest - posttest. The data collected and arranged in the form of field Data.

3. Result and Discussion

3.1. Learn according to the theory of Jean Piaget Cognitive

Jean Piaget proposed that the learning process will occur when there is the activity of the individual to interact with the social environment and physical environment. The growth and development of the individual is a social process. The individual does not interact with the physical environment as an individual bound, but as part of the social groups.

As a result of his social environment is located in between the individual with physical environment. The interaction of the individual with others play an important role in developing his views of nature. Through the exchange of ideas with other people, individuals who had have
subjective views about something that will change his views became finch species he observed the objective.

Piaget proposed that, cognitive development has a very important role in the learning process. Cognitive development is basically a mental processes \cite{4}. Mental processes in the first and foremost is the development of logical reasoning ability (development of ability to respond logically). For Piaget, think in mental processes are far more important than just understand.

3.2. The stages of cognitive development

According to Piaget, knowledge formed by individuals through to continuous interaction with the environment. There are four stages of cognitive development according to Piaget, namely:

1) Sensorimotor stage (age 0-2 years). Individuals understand something or about the world by coordinating experiences sensory apparatus, (like saw and heard) and acquire knowledge using their sensory skills such as touch, sight, baby to talk time started \cite{10}.

2) The pre-operational stage (age 2-7 years). The individual began to portray the world through behavior and the words. But it has not been able to perform operations, which is to carry out internalized mental actions or to carry out mental actions on what was previously done physically.

3) Concrete operational stage (age 7-11 years). Individuals began to think logically about the events which are concrete steps. The individual is able to distinguish the same object in different conditions. The individual can extend the process of thinking and overall intelligence by inserting the logic, compare objects and understand the concrete ideas.

4) Formal operational stage (11 years). While Salvin explained that in the formal operations occurred at the age of 11 until adult beginning. At this time the individual starts to enter the world of the "likely" from the real world or the individual experiencing the development of abstract reasoning. The individual can think in the abstract, much more logical and idealistic.

According to Piaget, there are three process that underlies the development of the individual is assimilation, accommodation, and equilibration. When someone receives the information or new experiences and the information will be modified to in accordance with the structure of the cognitive possesses. This process is called assimilation. On the contrary, when cognitive structure that must be adjusted with the information received, then this process is called accommodation.

Assimilation and accommodation will occur when there is a cognitive conflict or an imbalance between what is known with what is seen or experienced now. Adaptation will occur when there had been a balance in cognitive structure. The adjustment process occurs in a balanced and continuously done by assimilation and accommodation named equilibration.

In a study by Wu and Chiou (2008;43) conveyed that the levels of development in the view of the theory of Piaget said includes two stages more information namely relativistic thought: and dialectical thought. In the minds of relativistic, students started to observe the contradiction with potential solutions and finally accept that more than one solution absurd considering the different ways of looking at certain situations \cite{16}. The acceptance of other perspectives this allows more new solutions finally found. In the minds of the dialectical, students open to new knowledge and in fact expect to change their mindset knowledge today as the newly found or served.

3.3. The model of teaching approaches Piaget-Anderson

Cognitive Learning theory Piaget have given a clear picture that individuals will have two cognitive characteristics namely assimilation and accommodation. Vanessa Tang convey that Piaget maintains that the learner has two cognitive characteristics \cite{11}. First the learner is assimilate that new concept into their cognitive schema which are also two-fold: understanding and acting on the now shifting experiential understanding changes are ‘plans’ as it were, and the learner knows that the external reality can confront these plans or desires and the second response (as part of the duality) is that the learner must change the cognitive structures or accommodate this new concept with the external world.

That means that the process of assimilation and accommodation can happen because the results of the response of the individual to the outside world. The impact of the process produces two response, first the individual will confront or wanted as the expansion of knowledge while the second response is the reconciliation will occur or accommodation of the accepted concept of the outside world.
In addition Vanessa Tang convey latter sees as fundamental, the need for an external facilitator in this dual process. Sandwiched in between the learner and the external reality is a conjuncture that an instructor helps the learner negotiate. This is where Bloom’s (1984) paper is explicit as to the role of the instructor or tutor indicating that his roots are firmly in the Piaget camp via the influence of Vygotsky [11]. Which can be interpreted that Bloom’s taxonomic role will be needed as a facilitator of Piaget theory which will be a guide for teachers to help students reach their cognitive equilibration stages. This Piaget-Bloom model approach will be very useful in learning the material economy because will be cognitive mapping tools for teachers to know the stages of cognitive development students. In addition Flavell convey Piaget’s and Bloom’s educational theories and realist-constructivist views construct learners as ‘the manufacturers of their own development [4].

That in Piaget and Bloom's learning theory views that in constructivism learning, students will be the main core in developing their own cognitive abilities. Although along with the times there has been a revision of Bloom's taxonomy conducted by Anderson. Even Dorothy and Tracey Ravenson in conveying that Piaget theory is continuous on cognitively intact development mental processes such as perceiving, remembering, believing, reasoning. Applied to psychology, development involves the growth of an individual's thinking, emotions, and strategies for coping with the environment [10].

So teachers should implement this Piaget-Anderson approach as the framework of cognitive mapping students in the learning process is a modern economy based multimedia. In addition Anderson-Krathwohl in A taxonomy for learning teaching and assessing convey this revision of the Taxonomy will help teachers make sense of the curriculum, plan instruction, and design assessments that are aligned with the objectives inherent in the curriculum and ultimately improve their teaching quality [6]. So that the Anderson-Kratwohl taxonomy integrated in multimedia learning will produce a learning model that has the potential to increase students' skills and readiness to become independent learners in the field of modern.

3.4. Economic learning materials Price Index with the approach of Piaget Anderson
The material price index is one of the material in the eyes of the Economic lessons that emphasize the competencies think C4 or analysis. The material price index is the subjects that require the mastery of mathematics method, reading data statistics, graph price movement and the ability to interpret based on facts or symptoms of dynamic price index and real. On the taxonomy of Anderson is a revision of the taxonomy also known the term HOT (Higher Order Thinking). What is meant by HOT is the ability to think high level, and Taxonomy of Anderson and Krathwohl is divided into two dimensions namely

a. The first dimension is the Knowledge Dimension (knowledge dimension) knowledge dimension consists of 4 levels namely

1) Factual knowledge
2) Conceptual knowledge
3) Procedural knowledge and
4) Meta-cognitive knowledge.

b. The second dimension cognitive Process Dimension (the dimension of the process of cognitive aspect).

The researcher said that in compiling observation items, composing interview questions, evaluation guidelines using tables that have been developed. The following is an example of a researcher development indicator table in analyzing the results of student assimilation, accomodation and student equilibration in economic learning based on an competency achievement index
Table 2. analysis guide table for student assimilation results

| NO | ASPECT | INDICATOR | SUB-INDICATOR | SUB-SUB-INDICATOR 1 | ITEMS | TOTAL |
|----|--------|-----------|---------------|----------------------|-------|-------|
| 5  | Dimension of Cognitive Assimilation (Piaget) | 1. Concept knowledge (Anderson) | 2. Knowledge of principles and generalizations, so that principle knowledge and generalizations can be interpreted as knowledge relating to the ability to explain the process of interrelation between specific objects and ultimately the knowledge aims to explain the process of forming relationships between specific objects based on their classification and categories | Monitoring Factors influencing the movement of Consumer price index numbers (C1) | 17 | 4 |
|    |        |           |               | Explain the function of the Consumer price index for economic actors in Indonesia (C2) |     | 18 |
|    |        |           |               | Using the price index table data as information on consumer price developments (C3) |     | 19 |
|    |        |           |               | Analyzing the relationship of the movement of groups of products and services with the direction of movement of the Consumer price index (C4) |     | 20 |

Table 3. analysis guide table for student accommodation results

| NO | ASPECT | INDICATOR | SUB-INDICATOR | SUB-SUB-INDICATOR 1 | ITEMS | TOTAL |
|----|--------|-----------|---------------|----------------------|-------|-------|
| 6  | Dimension of Knowledge Accommodation (Piaget) | 1. Procedural Knowledge (Skinner) | 2. Knowledge of how to do things; Procedural knowledge is "knowledge of how to do things." This knowledge relates to routines that are fairly routine to the steps of testing in solving new problems | Explain the relationship between the results of the price index percentage to the inflation rate (C2) | 29 | 3 |
|    |        |           |               | Calculate the percentage of the price index by the aggregate method (C3) |     | 3 |
|    |        |           |               | Analyzing the impact of Price Index Calculating Factors on economic conditions (C4) |     | 31 |

Table 4. analysis guide table for student accommodation results

| NO | ASPECT | INDICATOR | SUB-INDICATOR | SUB-SUB-INDICATOR 1 | ITEMS | TOTAL |
|----|--------|-----------|---------------|----------------------|-------|-------|
| 7  | Dimension of Knowledge Accommodation (Piaget) | 1. Procedural knowledge (Anderson) | 2. Knowledge of the Determining When To Use Appropriate Procedures, Before engaging in an investigation, students can be expected to know the methods and techniques that have been used in the same investigations. At a later stage in the investigations, students can be expected to show the relationship between the methods and the techniques that actually do and the methods carried out by other students | Explain the relationship between the percentage results of the Lupayen price index to the inflation rate (C2) | 32 | 3 |
|    |        |           |               | Calculate the percentage of price index using the Lupayen method (C3) |     | 3 |
|    |        |           |               | Analyzing the Comparison Results of the Lupayen method price index calculation with an aggregate on the economy (C4) |     | 24 |

Table 5. analysis guide table for student equilibration results

| NO | ASPECT | INDICATOR | SUB-INDICATOR | SUB-SUB-INDICATOR 1 | ITEMS | TOTAL |
|----|--------|-----------|---------------|----------------------|-------|-------|
| 8  | Dimension of Knowledge Equilibration (Piaget) | 1. Unconceptual Knowledge (Bloom) | 2. Knowledge that reporting information in one's way to expressive information | Having a record of the completion of structured assignments and formal presentations related to the subject matter | 35 | 5 |
|    |        |           |               | Having documentation of subject matter in the form of pictures or schematic materials in the form of essay and bibliography |     | 37 |
|    |        |           |               | Having oral presentations that contain notes in the form of a script as a summary of material that has been received at the previous meeting |     | 4 |
|    |        |           |               | Having digital documentation in the form of slides and tables in one of them related to learning methods and can be accessed at any time |     | 35 |

3.5. Meta Cognitive Knowledge

Metacognition is derived from two words that stacked namely meta and Cognitive Aspect (cognition). Meta comes (Greek) μετά, English: after, beyond, with, adjacent), is a prefix used in English to show on an abstraction from a concept. According to Flavell metacognitive that is one's awareness of how
he learns, the ability to assess the difficulty of a problem, the ability to observe the level of understanding of himself, the ability to use various information to achieve goals, and the ability to assess the progress of learning themselves [3].

Knowledge meta-cognitive is a new category of Taxonomy knowledge that has been in the revision, however, knowledge meta-cognitive plays an important role in learning, this is something new only appears and much needed. Meta-cognitive knowledge have an important component in it namely strategy Knowledge refers to the knowledge of the strategy on learning and think. Knowledge of their task and the context they represent the knowledge about the differences of the various cognitive tasks such as class and the rules of the culture. Finally the knowledge itself is an important component of knowledge metacognitive generally listed definitely for learning. According to Anderson Knowledge meta-cognitive often called a process of thinking about thinking or knowledge about the process of cognitive aspect and strategy related to the implementation of this knowledge to improve learning results, often interpreted as a consciousness automatically (automatic awareness) that arise because of the knowledge and the capability to perform the control (control) and manipulate cognitive process [6].

Flavell 1979 in his classic study metacognitive article, revealed that meta-cognitive includes three kinds of knowledge is the knowledge of the strategy, knowledge of cognitive tasks and knowledge themselves [3]. Then Pintrich convey that Metacognitive knowledge includes knowledge of general strategies that might be used for different tasks, knowledge of the conditions under this is done by these strategies might be used, knowledge of the extent to is the strategies acres effective, and knowledge of self [12].

Can be interpreted that knowledge metacognitive contains about general knowledge of students about the general strategy to learn and think (knowledge about strategies and their knowledge for cognitive tasks and When and why using a different strategy (knowledge of cognitive tasks including contextual knowledge and the right conditional).

3.5.1. Standard Competency and Basic Competencies
Based on Indonesian Minister of Education Regulation number 24 2016 [8] learning materials that will be given to the students have been formulated in the competency code in the form of the table below is presented:

| The Class          | Core Competencies 3 | Core Competencies 4 |
|--------------------|---------------------|---------------------|
| Eleven Grade Social studies class | 3.4. Analyzing the Price Index | 4.4. Present the findings of the price index analysis |

That then core competence and basic competencies (KI/KD) was developed based on the index development methods create competence factors knowledge as follows:

**Figure 2.** The groove development of competency knowledge index
So that the end result of the development of the Price index materials based on competency table above is as follows:

### Table 7. Table of Competency Achievement Composite Price Index

| No | Core Competence | Core Competence Level | Cognitive Process | COMPE TENCY ACHIEVEMENT INDEX (CAI) | Economic Material and Sub-Material about price index |
|----|-----------------|-----------------------|-------------------|------------------------------------|-----------------------------------------------|
| 1  | Core Competence 3.4 | Analyzing price index and inflation knowledge | Training Process and Knowledge Dimension | SUPPORTING CAI: 1. Classify examples of price index data and price index data collection agencies | 1. Understanding of index numbers and price indices. |
|    | 1. Cognitive Process | Conceptual | Identifying C1 (conceptual) | PRIORITY CAI: 1. Identify the type and characteristics of the price index. | 2. Various Price Indices. |
|    | 2. Thinking Process | Analyzing (C4) | Explaining C2 (conceptual) | 2. Explain the definition of index numbers and price indices. | 3. The Purpose and Role of Price Indices in the economy. |
|    | 3. Applying C3 (Procedural) | 4. Analyzing C4 (Analysis) | 5. Deciding C5 (Evaluation) | | 4. Background on the development and role of price indices in the economy. |
| 2 | Core Competence 3.5.2. | Definition of Price Index | | | 5. Reporting price index policy data. |
| 3 | Core Competence 3.5.2. | Definition of Price Index | | | 6. Calculation of the price index with an aggregate model and aggregation method. |
| 4 | Core Competence 3.5.2. | Definition of Price Index | | | 7. Impact analysis of price index in the community. |
| 5 | Core Competence 3.5.2. | Definition of Price Index | | | Activities and behavior of economic agents related to price indices. |
| 6 | Core Competence 3.5.2. | Definition of Price Index | | | 9. Solutions and anticipations for changes in price indices in real life. |

### 3.5.2. Definition of Price Index

Do you know what is with the index number? Index Number is a concept that can provide an overview of changes in variables from one period to the next period. Index figures can also be interpreted as bandage numbers with relative changes expressed in terms of numbers.

Now the Price Index is a factor that shows about the changes that occurred in the price from one period to another period. Price Index can be interpreted also as a number that shows the change of the prices of goods in the period and specific place. The price index has the following characteristics:

1. Price Index as guidelines of the default values for doing cost comparison from time to time.
2. Announcement of price index is based on the result of the collection of data from the relevant source.
3. Price Index specified is not from all goods or goods population but from the sample.
4. The price index is specified in the form of numbers.
5. Announcement of the base year based upon the situation normal or stable economic conditions.

Now the type of price index in general can be divided into six as follows:

1) **The Consumer Price Index (CPI)**
   The index is commonly used to describe the movement of the price. In other words, CPI is the index that measures the changes in the retail prices of goods and services which prompted consumers from time to time. The CPI is an economic indicator that provides information about the prices of goods and services paid by consumers. The CPI calculation is performed to record changes in the purchase price at the consumer level (purchasing cost) of a group of fixed goods and services (fixed basket) which are generally consumed by the public. CPI calculation is done to record the changes price buy in consumer level (purchasing cost) of a group of goods and services remain (fixed basketball) that generally consumed by the community.

2) **The Producer Price Index (IHP)**
   Is an index of the prices of raw materials (raw materials products between (intermediate products and capital equipment machinery purchased by the business sector or company.

3) **Great Trading Price Index (IHPB)**
   The index which describes the movement of the price of the commodities traded in a region. In other words, IHPB is a price index measuring the price change that occurs on raw materials
and goods in the market. The Central Statistics Agency (BPS) explained that the massive IHPB describes price changes on the level of trade of commodities traded in a region.

4) The accepted price index farmers,
   The price index that related with the sacrifice (cost) which was sacrificed with the result received farmers.

5) The prices paid index farmers,
   The price index that includes the purchase of/cost and consumption expenditures for agricultural production costs.

6) Share price index,
   The price index that measures stock price changes in the capital market.

Cpi is an index, which calculates the average price changes in a period of a group of goods and services consumed by the inhabitants of/household in a specific period of time. In drafting the CPI in Indonesia, retail or consumer price data obtained from 66 cities and includes between 284 - 441 goods and services.

To measure the change in the price of goods and services the needs of life used the living cost index (IBH), to measure the change in the price of goods and services trade known Great Trading Price Index (IHPB), to measure price changes for the manufacturer imposed a cost index (IBP producers), to measure the change in the price of the properties calculated Property Price Index.

3.5.3. The purpose of Price Index calculation

In general the calculation of the number of the index aims to measure the changes or compare changes between economic variables such as consumer prices, share prices and so on. The calculation of price index is needed in a country economic activities. The results of the calculation is usually used as material information to know the development of the economy and one of the basis in formulating economic policy. In addition to the above general purpose, calculation of price index also has some special purpose as follows:

1) As guidelines to perform cost comparison from time to time.
2) As a guide to measure the development of the economy in general.
3) As the image of the development of the trade on a certain period.
4) As a basis for the determination of salary, including the basis for the change.
5) As the image of the exchange rate of the farmers.
6) As the basis for specifying the economic policy of the Government and the monetary policy by the Bank of Indonesia.

3.5.4. Method of calculation of the Price Index

Generally there are two methods of calculating the price index is as follows:

1) The method cannot be weighed (Agregatif Simple)
   The Unweighted Method (Simple Aggregate) is obtained by adding up the price of goods and services each year divided by the price of the base year multiplied by 100. the mathematical equation is made as follows:

   \[ He = \frac{\sum P_n}{\sum P_0} \times 100 \]

   Description :
   He : agregatif index abundance without simple
   \( \sum P_n \) : the number of prices on the year in the count price index
   \( \sum P_0 \) : the number of prices on the base year

   Examples of cases:
   If known goods price data 2012 and 2013 as follows:
Table 8. Data table prices for 2012 and 2013

| Name of Products | Price 2012 (Po) | Price 2013 (Pn) |
|------------------|----------------|-----------------|
| A                | Rp200          | Rp300           |
| B                | Rp300          | Rp350           |
| C                | Rp500          | Rp500           |
| D                | Rp100          | Rp50            |
| E                | Rp200          | Rp300           |
| ∑                | 1,300          | 1,500           |

The sum price index 2013 with method not be weighed!
Answer:

\[
H_e = \frac{\sum P_n Q_o}{\sum P_o Q_o} \times 100
\]

\[
H_e = \frac{1,500}{1,300} \times 100
\]

\[
H_e = 115,38
\]

2) Without Weight Method

The Method Be weighed has three ways the calculation as follows:

a) Laspeyres Method

The Laspeyres method is obtained by adding up the prices of goods and services after being multiplied by the quantity each year and divided by the price of goods multiplied by the quantity in the base year, the ratio multiplied by 100%. The mathematical equation is as follows:

\[
H_e = \frac{\sum (P_n Q_o)}{\sum P_o Q_o} \times 100
\]

Description:

IL : Laspeyres Price Index  
Pn : Price in years calculated price index  
Po : Price in the base year  
Qo : Quantity on the base year

Examples of cases:

If known price data and quantity of goods 2012 and 2013 in Malang city as follows:

Table 9. price Data and quantity of Goods 2012 and 2013

| Name of Products | P 2012 | P 2013 | Q 2012 | Q 2013 | Pn . Qo | Po . Qo |
|------------------|--------|--------|--------|--------|---------|---------|
| A                | 200    | 300    | 50     | 100    | 15,000  | 10,000  |
| B                | 300    | 350    | 100    | 100    | 35,000  | 30,000  |
| C                | 500    | 500    | 200    | 250    | 100,000 | 100,000 |
| D                | 100    | 50     | 300    | 450    | 15,000  | 30,000  |
| E                | 200    | 300    | 150    | 100    | 45,000  | 30,000  |
| ∑                | 1,300  | 1,500  | 800    | 1,000  | 210,000 | 200,000 |

Calculate the Price Index 2013 in Malang city with Laspeyres method!

\[
H_e = \frac{\sum (P_n Q_o)}{\sum P_o Q_o} \times 100
\]

\[
H_e = \frac{210,000}{200,000} \times 100
\]

\[
H_e = 105
\]
b) Paasche Method

Paasche method obtained by way of using the factor who weigh out the quantity of goods in the calculated numbers its index.

Common mathematical knowledge because the following:

The formula:
\[ IP = \frac{\sum (Pn \times Qn)}{\sum Qn} \times 100 \]

Description:
- **IP**: Paasche Price Index
- **Pn**: Price in years calculated price index
- **Po**: Price in the base year
- **Qn**: Parameter quantity in which calculated the price index

Examples of cases:

If known price data and quantity of goods 2012 and 2013 in the city of Bandung as follows:

| Name of Products | P  | Q  | Pn . Qn | Po . Qn |
|------------------|----|----|---------|---------|
| A                | 200| 50 | 30,000  | 20,000  |
| B                | 300| 100| 35,000  | 30,000  |
| C                | 500| 200| 125,000 | 125,000 |
| D                | 100| 300| 22,500  | 45,000  |
| E                | 200| 150| 30,000  | 20,000  |
| **\(\Sigma\)**   | 1,300| 1,500| 242,500 | 240,000 |

The sum price index 2013 in Bandung with using Paasche method!
\[ IP = \frac{\sum Pn \times Qn}{\sum Qn} \times 100 \]
\[ IP = 101,04 \]

c) Marshall Method

The Marshall method is obtained by adding up the quantity in the base year with the quantity in the year calculated by the price index multiplied by the price in the year calculated by the price index. The results are divided by the sum between the quantity in the base year and the quantity in the year calculated by the price index multiplied by the price in the base year, the ratio multiplied by 100%. The mathematical equation is as follows:

\[ IM = \frac{\sum (Qn + Pn \times Qn)}{\sum Qn} \times 100 \]

Description:
- **IM**: Marshall Price Index
- **Pn**: Price in years calculated price index
- **Po**: Price in the base year
- **Qn**: Parameter quantity in which calculated the price index
- **Qo**: Quantity on the base year

Examples of cases:

If known price data and quantity of goods 2012 and 2013 in the city of Banda Aceh as follows:
Table 11. Data price and quantity of Goods 2012 and 2013

| Name of Products | P  | Q  | (Qo + Qn).Pn | (Qo + Qn).Po |
|------------------|----|----|--------------|--------------|
| A                | 200| 300| 50           | 100          |
| B                | 300| 350| 100          | 100          |
| C                | 500| 500| 200          | 250          |
| D                | 100| 50 | 400           | 150          |
| E                | 200| 300| 150          | 300          |
| Σ                | 1,300| 1,500| 800          | 1,000        |

| (Qo + Qn).Po |
|--------------|
| 452,500      |
| 480,000      |

The sum price index 2013 in the city of Banda Aceh using the Marshall method!
Answer:

\[ IM = \frac{452,500}{480,000} \times 100 \]

\[ IM = 102.8 \]

4. Conclusions

Based on research results that the stage of cognitive development will always be present in every human being characterized by assimilation, accommodation and a unique balance to understand the environment. Only difference is the level of cognitive development and mastery of each different phase of development of each student. The results showed that the economic learning model with multimedia gave significant results to the results of assimilation, accommodation and student equilibration. The addition of more communicative learning resources causes the cognitive structure of students to experience expansion more quickly because of the many sources of information that can be absorbed to serve as cognitive capital in the equilibration phase in the dimension of knowledge afterwards. Multimedia learning is also able to support students to reach their accommodation phase, information support from various sources and communicative causes the growth of reversal thinking patterns that cause students to have propositional, combinatorial logic and reasoning thinking capacity in hypothesis. So students can immediately determine whether the cognitive schemes they have learned are only sufficiently expanded or must be replaced as a form of their adaptation to the environment. Economic is dynamic and latest material so that teachers should develop multimedia-based teaching patterns so that students can determine the learning information needed by themselves to reach the cognitive equilibration phase. Economic learning that utilizes multimedia teachers can increase student involvement in learning because a student's involvement is closely related to his ability to manage his assimilation, accommodation and equilibration abilities to new knowledge.

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References

[1] Creswell J W 2012 Educational Research, Planning, Conducting, and evaluating Quantitative And Qualitative 501 Boylston Street Boston MA 02116: PEARSON EDUCATION INC.
[2] Soepeno B 2019 Paradigma, Rancangan Dan Proposal Ragam Penelitian Kualitatif Bidang Ilmu Ilmu Sosial dan Pendidikan. LaksBang PRESSindo, Yogyakarta
[3] Flavell J H 1979 Metacognition and cognitively intact Monitoring A New Area of cognitively intact Development Inquiry’, 34(10), pp. 826-911.
[4] Flavell J H 1996 Special Section Piaget S Legacy Psychological Science, 7(4), pp. 200-203.
[5] Joanna P Williams, J Grant Atkins 23 June 2009 The Role of Metacognition in Teaching Reading Comprehension to Primary Students from: Handbook of Metacognition in Education Routledge Accessed on: 08 Jul 2019
[6] Anderson LW & D R Krathwohl 2001 A Taxonomy for Learning, Teaching and Assessing, A Revision of's taxonomy's Taxonomy of Educational Objectives . ABRIDGED E. Addison Wesley Longman Inc
[7] Piaget J 1974 Jean Piaget Adaptation and Intelligence: Organic Selection and Phenocopy. The University of Chicago Press
[8] Permendikbud 2016 021 tentang standard Isi. Ministry of education and Cultural number 21 2016
[9] Hutton B Prager 2018 Utilizing a Differentiation Framework, Piagetian Theories and's taxonomy's to Foster Experiential Learning Activities in Chemical Engineering. http://dx.doi.org/10.5772/intechopen.75646
[10] Dorothy S and Ravenson, T 1996 A Primary Piaget, How a child thinks . The Revised Ed. NewYork: Penguin Group
[11] Tang, V 2011 A Piagetian- Bloomsian Approach to Teaching and Learning Economic Concepts . 2, pp. 35-58.
[12] Pintrich P R 2017 The Role of Metacognitive Knowledge in Learning, Teaching, and Assessing', 41(4), pp. 219-225.
[13] Mayer R 2014 The Cambridge Handbook of Multimedia Learning, Avenue of the Americas New York: Cambridge University of Press
[14] Amy Dugan 2006 Assessing The Validity And Reliability Of A Piagetian Based Paper-Pencil Test, Department of Counseling, Educational, & School Psychology and the faculty of the Graduate School of Wichita State University
[15] Estini Wirayanti Desak Gede 2015 Aktualisasi Pemikiran Jean Piaget dalam Implementasi Kurikulum 2013, Proceedings Seminar Nasional FMIPA UNDIKSHA V Tahun 2015
[16] Wu P-L, Chiou W-B. Postformal thinking and creativity among late adolescents: A post-Piagetian approach. Adolescence. 2008;43(170):237-251
[17] Sadulloh Uyoh 2004 Pengantar filsafat pendidikan. Bandung : Alfabeta
[18] Gunawardhana L K P D 2017 ‘Using Multimedia as an Education Tool’, (March 2016), p. 5.doi: 10.5176/2251-1679.