

## PRE-TESTING ASSESSMENT OF REASONING ABILITY TO THE COLLEGE STUDENTS (Case Study in IKIP Bojonegoro East Java)

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## ABSTRACT

In relation of the reasoning process, language structure actually reflects the structure of the mind itself. Language are tightly related to the thinking and reasoning. This process are proceeds from the observation of the senses or the empirical observation in the mind which then produces a number of propositions. As an thinking activity to draws a conclusion, it is necessary to do an evaluation in the form of evaluative question to measure one's reasoning ability in order to achieve effective and objectives results. The research purposes were determined a valid question that can be used to measure reasoning abilities in according with indicators and reasoning dimensions. This research is quantitative research with data analysis techniques used R point Biserial and KR-20. Based on the experiments of 46 items, the r-pbi value of each drop question is (1) 0.120, (2) 0.444, (3) 0.443, (4) 0.263, (5) 0.341, (6) 0.014, (7) 0.011 and (8) 0.382. The value of KR-20 is 0.531 with an average value of pi 0.323, qi 0.677, k 38, totally var of 14.83, and p\*q 0.219,  $\Sigma$  p\*q 7.159. Thus to test the reasoning ability on the students were obtained the number of valid items as the final instrument is 38 items of 46 items that have been tested first.

Keywords: pre-testing, asessment, reasoning ability

## INTRODUCTION

In general the meaning of the instrument is a tool that meets academic requirements, so it can be used as a tool to measure an object or collect data on research variables for research needs. In the educational field, instruments were used to measure student achievements, the success of the learning process, the development of student's learning outcomes, the success of teacher's teaching and learning process, and the success of a particular program. Sudijono (2015: 7-8) was presented three main functions of instrument (1) measuring progress, (2) supporting the plan preparation, (3) and improving or refining.



Evaluation is a process of providing information that can be taken into consideration to determine the price and service tasks of the achieved purposes, design, implementation and impact to help make decisions, help accountability and improve understanding of the phenomenon (Widoyoko, 2009: 3). In this case the essence of evaluation is the provision of information that can be used as considerations in decisions making.

Basically the instrument can be divided into two groups, test and no-test. Included in the test group is the achievement test, the intelligence test, the talent test, the academic ability test, while the non-test group is the attitude scale, the assessment scale, the observation guideline, the interview guide, the questionnaire, the document examination and so on. Instruments in the form of tests are of maximum performance while non-test instruments are typical performance. In general, the test was defined as a tool used to measure the knowledge or mastery of a measuring object against a particular set of content and materials (Mardapi, 2012: 108; Mardapi, 2008:

## **REVIEW LITERATURE**

## Language and Reasoning

In relation to the process of thinking or reasoning, it was assumed that the language structure actually reflects the structure of the mind itself. Language is closely related to the thinking and reasoning. The thinking process is proceeds from the observation of the senses or the empirical observation of this process in the mind, generating a number of propositions. The reasoning was defined as thinking activity to draw a conclusion or thought process in order to make a new statement based on a statement that the truth has been proved or assumed (Fajar in Amelia, 2014: 1).

Basically the reasoning is the development of basic terms of classical Greek of logic *(logos)* whose original meaning is said or suggested. Logic is the study of argumentation or proofing. The argument in question is an example of reasoning accompanied by one or more statements as a support, reason, consideration, or evidence for other statements. The supported statements are conclusion of argumentation while the supporting statement is the premise of argumentation (Yunus, 2007: 3).

The argumentation sets the truth of the conclusion relative to the premises and the rules of inference (how to draw conclusions). To judge an argument, only



two aspects or attributes of argumentation are need to take attention, namely the truth of the premise and the validity of reasoning leading to conclusions. In this case, logic is study reasoning to the exclusion of doubt on the validity or truth of empirically premise and results of the investigation.

Furthermore, Stenberg (2008: 410) was suggested the purpose of reasoning is to drawn conclusion deductively from certain principles. Thus reasoning is a thought process that attempts to relate known facts to a previously unknown conclusion.

Two types of reasoning or thinking are described Eysenck (1994); Bluedorn (1995); and Copi and Burgess-Jacson (1996), are deductive and inductive thinking is one of the cognitive components which is a higher level mental process that can explain how humans reason, analysis-synthesize, solve problems, make generalizations and draw conclusions from what was perceived based on the premise or the existing phenomena, whether in the form of events, written and verbal statements, or images (Ramelan, 2008: 76). The fundamental difference between deductive reasoning is between the premise and the conclusion. In deductive reasoning, the relationship should be strong and conclusions follow the premise of the necessity, while on inductive reasoning, the conclusion follows the premise of the possibility (probability).

## Inductive Reasoning (Inductive Logic)

Inductive reasoning in addition to its premise is a factual proposition, its conclusions appear to be broader than what is in its premise, and also the character of the rational credibility contained in inductive reasoning. These characteristics must be realized in every form of inductive reasoning, for example, although conclusions are not binding, but normal human beings will accept the conclusion as long as there is no reason to reject it.

Inductive reasoning, in addition to its conclusions broader than its premise, is also the truth of conclusion in its reasoning is possibility (Karomani, 2009: 33). Beside to the inductive reasoning in logic, there is another kind of reasoning commonly called deductive reasoning.

The process of inductive reasoning arises in the form of generalizations, inductive analogy, cause-effect and effect-cause.

# 1) Generalization

Generalization is a process of reasoning that departs from a number of individual phenomena that derive a general conclusion that includes all these

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phenomena (Karomani, 2009: 108). Another argument suggests that generalizations can also be made with only a few special points, even with one particular thing or a special event. The actual generalization must satisfy three conditions, namely (1) generalization is not necessarily numerically limited, this means it is not tied to a certain number, (2) generalizations must be unlimited spatially-temporally, this means unlimited in space and time, it must behave anytime, (3) generalizations should be made as a basis in presuppositions (Jacobus, 20 15: 146-147). In inductive logic there is no conclusion that has a definite truth, which exists in inductive logic only conclusions with low or high probability (Karomani, 2009: 109; Jacobus, 2015: 153).

## 2) Inductive Analogy

Inductive analogy is a process of reasoning that departs from two special events that resemble each other, and then concludes that what applies to one thing will apply also to another (Keraf in Karomani, 2009: 112). In the inductive analogy, the conclusions depend on the subjects compared in the analogy. The subject's presence in the analogy can be individually, particularly, or universal but still with a broader conclusion than the premise.

The reasoning of the inductive analogy can be formulated because D is the analogy of A, B, and C, then what applied to A, B, and C can be expected also applicable to D. The inductive analogy is differs from the inductive generalization. Inductive analogy is broader than the premise. The subject of the inductive analogy can be individual, particular, or universal. Reasoning used inductive analogy has weaknesses when done carelessly, hastily, recklessly and subjectively.

The conclusion drawn by analogy is the conclusion of a particular opinion with some other special opinions by comparing the conditions of the two comparable things. The analogy is to compare two things and take similarities from both of them. Analogy was defined as the inter-form equations that become basis for other forms

#### 3) Causality

In the logic associated with causation is known two kinds of conditions namely absolute and adequate conditions. The absolute condition is the cause which, if it does not exist, the result also does not exist. For example, result A only exists if there is cause S. The adequate conditions are the causes that if any, the consequences certainly exist (Soekadijo in Karomani, 2009: 113).



In the case of causal relations, not forever a cause is only under an absolute condition, and the other cause was classified as absolute and adequate condition. Thus, for a causal cause occurred, an absolute cause must exist. In causation it is also commonly seen in direct and indirect causes.

The conclusion in inductive reasoning is a generalization. Generalization can be applied not only to the facts of experience which can be mentioned in the premises but also to all other facts that are similar to the facts that are easily known. So the analysis in inductive reasoning is only the provisions of the form of induction which ensures the concussion with high probability.

From the several definitions put forward above, the conclusions of an inductive inference are broader than the general premises. The reasoning results are generalizations that are always universal or general. The high probability of conclusion was influenced by a number of factors, called probability factors.

## Deductive Reasoning (Deductive Logic)

Deduction is a way of making the decision opposite from induction. Deduction is a way of thinking from a general decision to a special decision (Ranjabar, 2015: 162). If it is known that the general decision is a true benchmark, so that it applies to all and each individual, in that general category, the specific decision which is the conclusion of its, will come into being by itself and correctly.

Deductive conclusion usually used a thinking pattern called 'syllogism'. Syllogism is composed of two statements (premise) and a conclusion. The statement that supports the syllogism is called the major and minor premise. The conclusion is the knowledge was gained from deductive reasoning through both premise and major statements.

# 1) Syllogism Hypothesis

Hypothesis syllogism or supposition syllogism is a kind of deductive reasoning pattern that contains hypotheses. This syllogism departs from a standpoint, that there is a possibility that what was mentioned in the proposition does not exist or does not occur. The major premise was contained hypothetical statements, and its minor premise was contained a statement of whether the first condition occurred or not. Parera (Karomani, 2009: 97), in short the formula of major proposition and syllogism is if P then Q. The examples are as follows:

If children are neglected, they will suffer from social problems.

Children do not suffer from social problems.



So, children are not neglected.

In this reasoning the conclusion is valid. Here the minor was premise stated 'no' to one of the major premise conditions.

## 2) Alternative Syllogism

This syllogism was called alternative syllogism because its major proposition is an alternative proposition, a proposition that contains possibilities or choices. Instead the minor proposition is a categorical proposition that accepts or rejects one of its alternatives. The conclusion of alternative syllogism depends on its minor premise (Karomani, 2009: 99). If the minor premise accepts an alternative, then other alternatives were rejected. If the minor premise was rejected one alternative, then another alternative was accepted in the conclusion.

Example:

Major premise	: Father is in the office or at home.			
Minor premise	: Father is in the office			
Conclusion	: So father is not at home.			

Formally, if the alternative is more than one amount, then the major premise will also contain such an alternative. To get an alternative syllogism, then some premise was solved into two alternatives only.

# 3) Categorical Syllogism

Categorical syllogism is a standard syllogism. The category syllogism is consists of categorical propositions. Thus the category syllogism is the structure of a deduction in the form of a logical process consisting of three parts in which each part is a categorical statement (unconditional statement) (Ranjabar, 2015: 174). The logical form of categorical syllogism can help point the way or the stages of reasoning. The rules or laws of categorical syllogism are:

a) Terms S, P, and M in one thought must remain the same. In syllogism, S, P is united on the basis of their respective comparisons with M, if the major premise and minor premise are "imprecise" equally it is meaning cannot be drawn conclusion.



- b) If S and/or P in the particular premise, then in conclusion should not be universal. Conclusions should not be drawn about 'all' if the premise only gives some information.
- c) Term M must be at least one time universal
- d) The conclusion must correspond to the "weakest" premise. If the sentence is universal with a particular sentence, then the particular is called "weak". Similarly, the affirmative sentence (affirmation)

#### 4) Withdrawal Conclusions based on Entiment

The meaning of entiment is a distorted syllogism because its proposition element is incomplete (Karomani, 2009: 101). Entiment or entimena as a form of argument only has meaning when propositions that are not explicitly stated are self-evident, either in the sense that they are already common or obvious in the context of the communication itself.

Basically syllogism consists of three propositions, major, minor, and conclusion, then the form of such entiment as stated by Soekadijo (Karomani, 2009: 102).

## 5) Deductive Reasoning Error

The guiltiness of reasoning (fallacy) or reasoning error is a bad argument, either deductive or inductive. Reasoning error (fallacy) is the wrong or misguided of idea, estimates or conclusions. In a reasoning error we do not follow the proper way of thinking. The argument can only 'bad', due to several reasons including: (1) one or more premises that may be incorrect, irrelevant, reasoning invalid, stating the language ambiguous or unclear.

An argument is valid if the truth of the premise guarantee the truth of its conclusions; or if the conclusion is true on the assumption that all of the premises are true; or if it is impossible that the conclusion is wrong along with all the right premises; or if the conclusions can be drawn from the premises in accordance with certain applicable rules. All of these meanings are equivalent and are usually used alternately in accordance with the argument to be judged for its validity. If an argument does not meet the above conditions, then the argument is said to be invalid.



Validity was concerned with reasoning, not a proposition, whereas truth concerns the proposition, not reasoning. If the reasoning in an argument is valid and all premises are true, then the argument is said to be sound. If not so say that argument is not sounds (unsound). If a sound argument, then the conclusion must be true and it would be illogical if doubt the truth (Yunus, 2007: 4).

Similar to the reasoning error or inductive reasoning error, deductive error can occur due to several things, for example: the major premise cannot be limited, the drawn conclusion from two negative premises, the conclusion is too broad/unbounded, and the middle term is not a major part of the major premise.

#### METHOD

This research was used quantitative method with empirical validation technique. The data analysis was used validity formula of R-point biserial. After tested, the test results then calculated the items validation for the instrument that has a score of 1 or 0. Empirical validity was done with KR20 reliability. The trial was conducted at IKIP PGRI Bojonegoro East Java which addressed at Jalan Panglima Polim No. 46 Bojonegoro was conducted on the students of Indonesian Language and Literature department semester 7 level 3 on Friday, June 18, 2016. Respondent numbers are 31 students with the 46 questions number. The conceptual validation was performed by the expert by looking at the compatibility of the theory with the translation of the derived indicator tool.

To measure the validity level the language reasoning abilities test used correlation statistical formula of r-point biserial, with the description as follows:

$$r_{pbi=}\left(\frac{\overline{Y}_{1-\overline{Y}}}{\sigma Y}\right)\sqrt{\frac{px}{(1-px)}}$$

Keterangan: Rpbi :Koefisien korelasi point biserial Y :Rerata skor Y Rerata untuk skor total untuk Y Deviasi baku dari skor total Proporsi peserta tes yang menjawab benar Atau Rpbis  $=\frac{Mp-Mt}{st} \sqrt{\frac{p}{q}}$ 



Rpbis	: koefisien korelasi point biserial (coefficient correlation of biserial point)
Mp	: Mean skor dari subjek-subjek yang menjawab benar item yang dicari
	korelasi (Mean score of subjects who answered correctly the item searched for
Mt	: Mean skor total ( <i>Mean score total</i> )
St	: Simpangan baku Standard deviation
р	: Proporsi subjek yang menjawab benar item tersebut (proportion of
	subjects who answered correctly the item)
q	: 1- p
1	(Sudijono, 2015:93); Budiyono, 2015:107)

## Reliability

To find the reliability was used the KR 20 formula found by Kuder-Richardson.

K-R 20 = 
$$\left(\frac{k}{k-1}\right) \left(\frac{S^2 x - \sum p^2 (1-p_1)}{S^2 x}\right)$$

Keterangan:

P1 : Proporsi subjek yang mendapat skor 1 pada item i, yaitu banyaknya sbujek mendapat skor 1 dibagi dengan banyaknya seluruh subjek.

Sx : Varians skor tes X

k : Banyaknya belahan tes, banyaknya item tes atau

$$r_{11=\left(\frac{n}{n-1}\right)\left(\frac{S^2-\sum pq}{S^2}\right)}$$

r-1 : reliabilitas tes secara keseluruhan

P : proporsi subjek yang menjawab item dengan benar

q : proporsi subjek yang menjawab item dengan salah (q = 1 - p)

 $\sum pq$ : jumlah hasil perkalian antara p dan q

N : banyaknya item

S : standar deviasi dari tes (standar deviasi adalah akar varians) (Arikunto, 2015:115)

## FINDINGS AND DISCUSSION

In the development of evaluation tools, which will be measured in this case is the reasoning ability, and then this test was included in the cognitive domain. The cognitive domain was related to the intellectual ability and thinking competence, including the mental activity of the brain were related to thinking ability, including the ability to memorize, understand, apply, analyze, synthesize, and evaluate ability. According to Bloom (in Sudijono, 2015: 49) all efforts concerning brain activity are



included in the cognitive domain. Mastery of cognitive aspects were obtained in learning was demonstrated by intellectual ability.

According Susetyo (2015: 19) the knowledge ability can be seen from the cognitive behavior a person in the form of the skills can be observed (manifest) or unobservable (latent). This domain brings learners into thinking processes such as remembering, understanding, analyzing, linking, conceptualizing, solving problems, and so forth (Nurgiantoro, 2012: 57).

The indicators of development of this evaluation tool are as follows.

	Table of Spe	cification o	r Lattice of	of Evalua	tion Tool
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Measured Aspects	Indicator					
Inductive (Induction Reasoning)	Withdrawal conclusions by generalization way					
	Withdrawal conclusions by analogy way					
	Withdrawal conclusion by causal relation (linking a phenomenon with other phenomena)					
	Reasoning error because generalization at a glance					
	Reasoning error because the wrong analogy					
	Reasoning error because causal relationship					
	Withdrawal Conclusion by Hypothesis Syllogism					
Deduction	Withdrawal Conclusions by Categorical Syllogism					
(Deductive	Withdrawal Conclusion by Entiment way					
Keasoning )	Withdrawal of Alternative Syllogism					
	Deductive Reasoning Error					

Based on the trials results were conducted on 31 students used the validation formula of Rpoint biserial, obtained the trial test value, the number of question drop out is 8 questions with each details are as follows.



# Analysis Test (Attached)

Note: the red colored item number is items that drops when empirically validated.

Measured Aspects	Indicators	Number	Amount
Induction (Inductive Reasoning)	Withdrawal conclusions by generalization way	1, 2, 7, 8, and 34	5 questions become 3 questions
	Withdrawal conclusions by analogy way	9, 10, 11, 12, 32, and 33	6 questions become 5 questions
	Withdrawal conclusions by causation relation (connecting a phenomenon with other phenomena)	3, 4, 23, and 27	4 questions become 3 questions
	Reasoning error because of generalization at a glance	5, 6, and 18	3
	Reasoning error because the wrong analogy	1 6, 17, and 22	3
	Reasoning error because a causal relationship	13, 14, 15, and 21	4 questions become 3 questions
Deduction (Deductive	Withdrawal conclusion by hypothesis Syllogism	24, 25, and 26	3
Reasoning)	Withdrawal Conclusion by Categorical Syllogism	19, 20, 39, 40, and 43	5 questions become 4 questions
	Withdrawal Conclusion by Entiment way	30, 31, 36, 37, 38, and 44	6 questions become 4 questions
	Withdrawal of Alternative Syllogism	28, 29, 32, and 45	4
	Deductive reasoning error	41, 42, and 46	3
	Number of Question Remaining		38questionsfrom46questions

After passing first stage of validity, then calculated R-Point Biserial with results are as follows.



Number test	1	21	27	33	34	38	43	44
Score item	30	11	10	4	7	6	4	8
pi	0,97	0,3548	0,3226	0,129	0,23	0,19	0,129	0,26
qi	0,0323	0,6452	0,6774	0,871	0,77	0,81	0,871	0,74
Rerata benar	23,3	23,455	23,6	23,75	23,571	21,5	21,5	23,625
Mean Total	23,3	21,4	21,4	21,4	21,4	21,4	21,4	21,4
Standart								
Deviation	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431
r-bpi	0,1202	0,4441	0,4425	0,2636	0,3418	0,0143	0,0112	0,3825
Critis Value	0,456	0,456	0,456	0,456	0,456	0,456	0,456	0,456
Status	drop							

#### CONCLUSION

Inductive reasoning is the process of thinking within our mind of the knowledge on events or things that are more concrete and specific to conclude knowledge of a more general nature. Thus, inductive reasoning is a way of thinking that departs from specific statements and then drawn general conclusions.

Deductive reasoning is the thinking process within our intellect of knowledge on general events, and/or things to conclude to a special knowledge. Thus, deductive reasoning is a reasoning or thinking that departs from general statements then drawn specific conclusions. In a sense, deductive reasoning is a thinking activity that contrary to inductive reasoning.

After issuing the dropout question through the first stage of validity test and rpbi (R-point biserial), the tested question numbers are 38 items from the 46 items number previously. The final value of KR20 is 0.531 with value of pi of 0.323, qi of 0.677, k of 38, var total of 14.83, and p \* q of 0.219,  $\Box$  p\*q of 7.159 and KR20 of 0.531. Thus, the drop or invalid questions are eight items so that the items number that can be used to test the reasoning ability are 38 questions and the final instruments are 38 items.

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