INTERCONNECTION SCIENCE AND ISLAM: RELIGIUSITY AND MASTER CONTROL CHEMICAL CONTENT

Prima Aswirna[1]

[1]Universitas Islam Negeri Imam Bonjol Padang.

Article Info

Article history:

Received Jul 12th, 2017
Revised Aug 20th, 2017
Accepted Oct 26th, 2017

Keyword:

Religiousity
Science and Islam
Chemical content

ABSTRACT

This research departs from the search for empirical evidence of the interconnection between science and general science (particularly Chemistry). The facts show that until now the achievement of student learning in Basic Chemistry course is still relatively low. Later this research using model *trait treatment interaction* to improve learning outcomes. This research is run at State Islamic University Imam Bonjol Padang. The population of this study as many as 97 people although only complains 66 students included in this study. D i where pen elitian this involves only students who are following the teaching of Basic Chemical. Sampling technique is done by using random side simpel. Then the data collection through questionnaires and interviews. Data analysis techniques using Pearson correlatin. Results of the study found that: (1) Distribution of mean religiosity of students is high. (2) Chemical scholarly content Mastery of students increased, if the teaching methods are adapted to the prior knowledge possessed. (3) control of the content I LMU Chemistry students increased after getting learning model self-learning (self-learning) for students with high starting capabilities. (4) the capability of Chemistry student content increased when they learned with regular methods of teaching plus tutorials for students with lower initial ability. (3) There is a relationship between religiosity and mastery of scientific content Chemistry. Where the higher the student religiosity, the higher the c apaian learning (*)

Corresponding Author:

Prima Aswirna,
Universitas Islam Negeri Imam Bonjol Padang
Email: primaaswirna1971@yahoo.com

1. INTRODUCTION

The problem of education is due to a low k Quality of learning in which one of the problems is learning that has been developed, has not been able to appreciate and accommodate individual differences of students. In the implementation of the learning process, educators provide learning services are the same for all students, both students who have the ability of fast *(faster* learner), moderate / *moderate* or slow *(slower* learner).

Students with different learning speeds have not yet got a learning service that suits their respective abilities. Slow students still fall behind the middle class. Students who are fast have not received optimal service in learning. The learning process that took place tends not to encourage students to advance and develop in accordance with their respective abilities.

Evidence of poor quality of learning in Department of Tadris of Sciences of Nature (TIPA) - Physics, Faculty of *Tarbiyah* and Teaching (FTK) IAIN Imam Bonjol Padang obtained through data Table 1 below. Basic Chemistry Course I still many students who scored less than 60 (with a category C). The data has been described of academic performance of students in the Table 1.

The data in Table 1 illustrates the achievement of learning in Basic Chemistry Subject I is still relatively low then, it is necessary to study how to improve the quality of learning that is run. By identifying the problems encountered in the teaching and learning process in college are: materials that are difficult to digest by the students, the differences in the initial ability of each student, monotonous learning strategies, learning models that have not accommodated differences in student skills and so forth.

To bridge the above issues, the researcher considers it necessary to use the Trait Treatment Interaction (TTI) learning model, where the learning model is concerned with individual differences owned by students. So that students will be treated according to their potential or ability.

Table 1. The Achievement of Learning in Basic Chemistry Subject I

Semester & Academic Year	Academic Score of Students Jurusan TIPA-Fisika					Amount of Students
	A	**B**	**C**	**D**	**E**	Jumlah
Odd Semester 2013/2014 Class A	5	13	14	7	-	39
Odd Semester 2013/2014 Class B	0	5	12	15	2	34
Odd Semester 2014/2015 Class A	3	10	13	5	-	31
Odd Semester 2014/2015 Class B	1	6	10	15	1	33

The use of Trait Treatment Interaction (TTI) learning model as an effective learning model is used for students who have different characteristics in order to optimize learning achievement (Berliner & Cahen,1973 and Abbott & Abbott, 1977). Cronbach and Snow (1977) stated that the Aptitude-Treatment Interaction or Trait Treatment Interaction (TTI) model is assumed to optimize student learning outcomes, if the learning model is in accordance with the students' initial ability. Cronbach and Snow stated that, "As a theoretical framework, aptitude treatment interaction (ATI) or Trait Treatment Interaction (TTI) suggests that optimal learning results when the instruction is exactly matched to the traits of the learner".

The above conditions coupled with the fact that the process of learning chemistry that is run not to mention the individual differences owned by students who actually have different competencies from one to another. Students who are classified as high ability in learning chemistry and on the other hand there are also students who have ability classified as moderate or average and students who have ability classified as low.

Yeh & Lin (2015) conducted a study that aims to see the interaction between differences in the treatment of learning and the ability of students to increase learning outcomes optimally. The Yeh & Lin (2015) study was conducted within 17 weeks. The result of the research shows how the influence of the learning treatment to the student's creativity where the media used is the media electronics, while the sample is 31 undergraduate students with the average age of 19 years.

The phenomenon described above, both concerning the low quality of academic achievement and achievement of student learning in Basic Chemistry course I, as well as learning services that have not appreciated and accommodate individual student differences. It encourages the need to do research to get a model in learning that is really effective for students who have different initial capabilities, in order to optimize the achievement of learning.

Based on the background of the problem obtained identification problem as follows:

1. Government-made programs in Higher Education have not been focused on education issues in universities, mainly related to the learning process, where the lecturers have not considered any individual student differences.
2. The curriculum changes that are expected to improve the learning achievement have not been implemented optimally in accordance with the curriculum change message.
3. Existence of credit system that enables student to be able to develop student to be able to develop its potency has not been done optimally. And the credit system has not been able to accommodate students with fast and low-ability students.
4. Still found learning-oriented educators (Teacher Centered) in colleges and lecturers are less creative and innovative in following the development of science, especially in applying variations of learning models.
5. Lectures are generally still classical and have not distinguished the characteristics of students.
6. Most students are less motivated in lectures because students find it difficult to understand chemicals that contain theories and concepts they find difficult and abstract.
7. Lectures have not distinguished students with fast and low ability. Speedy students are always eager to follow lectures while low-ability students quickly get bored because it is difficult to receive lecture materials.
8. Especially for students who follow basic chemistry lecture I in the department of *Tadris* IPA Physics FTK IAIN IB Padang is dominated by the value of C and D in the last 2 years (2013-2015).

2. Method

This study uses a quantitative approach, explorative emphasize on causal (causal). Means that research is being done more to study "how it is" than "what it is", in the form of study of Learning Trait Treatment Interaction Model in Chemical Learning to improve student learning achievement by controlling students' early ability carefully and systematically with probabilistic theory.

The research design is the plan and structure of the research arranged in such a way that the researcher get answers or research questions. Based on the description will be discussed: Trait Treatment Interaction learning model in chemistry learning, variables used and controlled implementation steps.

The study population was used to describe the aggregate of individuals to be targeted for generalization and from which samples were taken, and if the samples taken were the same as the population containing the required information referred to the target population as recommended (Kerlinger, 2006). The target population in this study were all students in the Department of Tadris of Natural Sciences - Physics (TIPA-Physics) Faculty of Tarbiyah and IAIN Imam Bonjol Padang. Affordable populations are students who are studying in Semester I in Tadris Department of Natural Sciences - Physics (TIPA-Physics) Faculty of Tarbiyah and IAIN Teacher Imam Bonjol Padang, who is taking the first randomly selected Chemistry I course that is 97 people. The use of affordable populations is intended to overcome the limitations of controlling research variables. With affordable population taking, there are limitations or weaknesses of research, research results cannot be generalized to all PTKI (Islamic Religious Higher Education) or Higher Education (PTU) within the province of West Sumatra.

The categorization of mastering scientific content (chemistry especially Basic Chemistry) from students in class A in the Department of Natural Sciences Tadris (T-IPA) is described in Table 2.

Table 2: Population

No	Classes	Amount of Students
1	Class A	32 Orang
2	Class B	31 Orang
3	Class C	34 Orang
	Jumlah	97 Orang

3. Result and Discussion

Categorizing of capability in natural science (Basic Chemistry) of the class A students can be describe in the Table 3.

Table 3: Categorization of Early Student Ability in Class A

Category	Range	Amount	Percentage
Tinggi	59-78	27	84,38
Rendah	40- 58	5	15,62
Total		32	100,00

Source: Research Data

Based on table 3 above, it can be seen that the scientific competence (mastery of chemistry, especially Chemistry of Basic) students of Tadris of Natural Sciences (T-IPA) Faculty of Tarbiyah and Teacher of Imam Bonjol State Islamic Institute is high. Where the high category range is between: 59-78, as many as 27 people or equivalent to 84.38%. While the low category between 40-58, as many as 5 people or equivalent to 15.62%. This means that the students in class A has a mastery of the science of Basic Chemistry is very good. Thus the achievement of student learning in class A is high or satisfactory.

The categorization of the religiosity aspect of students in class A in the Tadris Sciences Natural Sciences (T-IPA) is described in Table 4.

Table 4: Categorization Aspects of Religiosity Class A

Category	Range	Amount	Percentage
High	95 - 114	31	96,88
Low	76 – 94	1	3,12
Total		32	100,00

Source: Research Data

Based on table 4 above, it can be seen that the religiosity aspect of students of Tadris Science Department (T-IPA) of Faculty of Tarbiyah and Teacher of State Islamic Institute of Imam Bonjol is high. Where the high category range is between: 95-114, 31 people or equivalent to 96.88%. While the low category range between 76-94, as much as 1 person or equivalent to 3.12%. This means that students in class A have excellent religious behavior. So they tend to follow the command of religion, in accordance with the teachings of Islam which he believes as a Muslim.

While the categorization of the mastery of chemical science (especially Basic Chemistry) students in class C at the Department of Natural Sciences Tadris (T-IPA) is described in Table 5.

Table 5: Categorization Aspects of Religiosity Class C

Category	Range	Amount	Percentage
High	50-68	12	35.29
Low	31-49	22	64.71
Total		34	100,00

Source: Research Data

Based on Table 5 above, we can see that the mastery of chemical science (especially Chemistry) of Tadris Natural Sciences (T-IPA) students of Tarbiyah Faculty and Teachers College of Imam Bonjol State Islamic Institute is high. Where the high category range is between: 50-68, as many as 12 people or equivalent to 35.29%. While the low category between 31-49, as many as 22 people or equivalent to 64.71%. This means that the students in class C have the mastery of science (especially Basic Chemistry) low. They tend to have less Basic Chemical learning.

Then based on the categorization of the religiosity aspects of students in class C at the Department of Tadris of Natural Sciences (T-IPA), Faculty of Tarbiyah and Teacher of Imam Bonjol State Institute of Islamic Studies is described in Table 6 below:

Table 6: Categorization Aspects of Religiosity Class C

Category	Range	Amount	Percentage
High	75 - 90	8	23,53
Low	59 -74	26	76,47
Total		34	100,00

Source: Research Data

Based on Table 6 above, it can be seen that the religiosity aspect of the students of the Tadris of Natural Sciences (T-IPA) School of Tarbiyah and the Teachers of State Islamic Institute of Imam Bonjol is high. Where the high category range is between: 75-90, as many as 8 people or equivalent to 23.53%. While the low category between 59-74, as many as 26 people or equivalent to 76.47%. This means that students in class C have a low level of chemistry (especially Basic Chemistry). They tend to less run religious orders, in accordance with the teachings of Islam which he believes as a Muslim

More specifically, this research seeks to see the relationship between the mastery of scientific content (Chemistry of Basic) with the application of religious values using the statistical method pearson correlation (product moment), this is illustrated in the explanation in the figure 1.

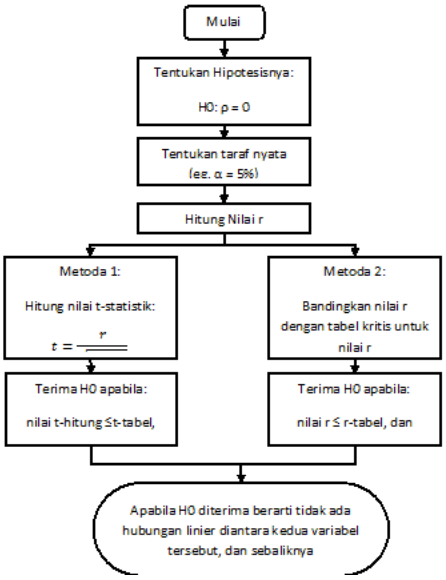

Figure 1. Research Flow

Pearson correlation is one of the correlation measures used to measure the strength and direction of the linear relationship of the two variabels. Two variables are said to be correlated if the change of one variable is accompanied by another variable change, either in the same direction or the opposite direction. It should be remembered that the value of the correlation coefficient is small (not significant) does not mean the two variables are not interconnected. It may be that two variables have a strong relationship correlation but the correlation coefficient value is near zero, for example in the case of non-linear relationship. Thus, the correlation coefficient measures only the strength of the linear relationship and not on the nonlinear relationship. It should also be remembered that a strong linear relationship between variables does not necessarily mean causality, cause and effect.

To interpret the strength of the relationship between two variables is done by looking at the correlation coefficient of calculation result using the following criteria: (1) If the correlation coefficient number is 0, then the two variables have no relationship, (2) If the correlation coefficient number is close to 1, (3) If the correlation coefficient number is close to 0, then the two variables are weaker, (4) If the correlation coefficient number is equal to 1, then the two variables have a perfectly positive linear relationship, (5) If the coefficient number Correlation equals -1, then both variables have a perfectly negative linear relationship.

Furthermore, to see the closeness of the relationship between each variable (initial ability, namely: scientific knowledge or chemistry content, especially Basic Chemistry and student religiosity) according to Sugiyono (2007) guidelines to provide interpretation of correlation coefficient as follows:

0.00 - 0.199 = very low
0.20 - 0.399 = low
0.40 - 0.599 = medium
0.60 - 0.799 = strong
0.80 - 1,000 = very strong

Then, bagan flow for testing the correlation illustrated in the Table 7.

Table 7. Correlation between Relgiousity and Capability in Chemical Science

Correlations			
		Religiousity	Capability in Chemistry Science
Religiousity	Pearson Correlation	1	.803
	Sig. (1-tailed)		.021
	N	66	66
Capability in Chemistry Science	Pearson Correlation	.803	1
	Sig. (1-tailed)	.021	
	N	66	66

The following formula used to calculate Simple Correlation Coefficient is described as follows: (This formula is also called Pearson Product Moment)

$r = n\Sigma xy - (\Sigma x)(\Sigma y)$
$. \sqrt{\{n\Sigma x^2 - (\Sigma x)^2\}\ \{n\Sigma y2 - (\Sigma y)\ 2\}}$
Where:
N = Number of X and Y Data Pairs
Σ x = Total Number of variable X
Σ y = Total Number of Variable Y
Σ x2 = Square of the total amount of variable X
Σ y2 = Square of the total amount of variable Y
Σ xy = Result Multiplication of Total Number of variable X and variable Y

Based on the results of correlation test (Pearson Correlation or Product Moment) between mastering chemical scientific content with the application of religiosity values, obtained r = 0, 803. While r table = 0.232. Then If r arithmetic> r table, then Ho is rejected. If r arithmetic <r table, then Ho is accepted. Given the results of this correlation analysis found r count> r table, then Ho is rejected. This means there is a relationship between mastering the content of science and religiosity of students Tadris Scientific Sciences (T-IPA) Faculty of Tarbiyah and Teacher of State Islamic Institute Imam Bonjol Padang.

Further correlation is positive with a very close relationship category. This means that the higher the mastery of scholarly content (Basic Chemistry) students Tadris Scientific Sciences (T-IPA) Faculty of Tarbiyah and Teachers of State Islamic Institute Imam Bonjol Padang hence, the higher the behavior diverse (religious / increasing *tawadhu*) among students Tadris Department of Sciences Natural Science (T-IPA) Faculty of Tarbiyah and Teacher of State Islamic Institute Imam Bonjol Padang.

Conversely, if the lower level of scientific mastery (Basic Chemistry) among students Tadris Science Department (T-IPA) Faculty of Tarbiyah and Teachers of State Islamic Institute Imam Bonjol Padang then, the lower the religious behavior (less religious) Student of Tadris Department of Natural Sciences (T-IPA) Faculty of Tarbiyah and Teacher of State Islamic Institute Imam Bonjol Padang.

Then with p-value = 0,021. Then p-value = 0.021 smaller than $\alpha = 0.05$, H0 is rejected. This means that the relationship between each variable (scientific content, especially Basic Chemistry and religiosity) is significant. By ian demik can be concluded that there is a significant positive relationship between the mastery of science and religiosity Tadris students of Department of Natural Sciences (T-IPA) Faculty of MT and Teaching Institute for Islamic Studies Imam Bonjol Padang.

The development of lecturing tools is supported in lecturing and assessment process. The lecture tools used must be valid so it is worthy to be used in the lecture process. In this study validation is emphasized on content validation, constructs and languages. So that the lecture device used has been in accordance with the criteria that should be and the composition of the device made is in accordance and meet the requirements of the preparation of learning tools. The validity of Basic Chemistry lecture I with materials Atomic Structure, Periodic System and the Association of Chemistry department with TTI integrated religiosity equipped with validated by the categorized validator very good.

Based on the results of validation of Basic Chemistry lecture I on Atomic Structure material, Periodic System and Chemical Association using Trait Treatment Interaction (TTI) integrated religiosity it can be seen that the developed tools obtained validation of handouts are very valid categories, MFIs are categorized very well and Values are also categorized very valid. According Sugiyono (2008), an instrument is said to be valid if the

instrument can be used to measure what should be measured. Validity conducted in this study emphasizes the validity of the content and validity of the construct. The validity of the content is valid by the validator because the developed lecture device is in accordance with the material that should be presented. A product or program is said to be valid if it reflects the soul of knowledge, this is called validity, while the components of the product must be consistent with each other (construct validity). The above validation results indicate that the lecture device produced can be tested for quality and validated by the validator.

Conclusion

Based on the analysis and conclusions of research, that there is an increase in student learning outcomes, which further improved student learning outcomes with Self-Learning, if they belong to a group of students with high prior knowledge or fast (faster learner). While in the group of students with low or slow initial skills (slower learner) then, learning that can improve their learning achievement is ordinary learning + additional learning (Regular Teaching + Tutorial). Based on the results of this study, several implications are formulated with emphasis on the following.

As for efforts to improve learning achievement through self-learning and regular learning plus additional lessons (Regular Teaching + Tutorial) then, along with the enactment of Indonesian National Qualification Curriculum (KKNI) Curriculum at level 6 (S-1) Chemistry, Aspects of students' work skills need; Capable of generating the right conclusions based on the results of identification, analysis, isolation, transformation and synthesis of chemicals that have been done, able to solve the problem of Science of Technology (IPEKS) in common chemical field and in simple scope such as identification, analysis, isolation, transformation, and The synthesis of micro molecules through the application of knowledge of the structure, properties, molecular changes in both energy and kinetics, methods of analysis and synthesis in specific chemical fields, as well as the application of relevant technology, capable of analyzing various alternative solutions in the areas of identification, analysis, isolation, transformation, Synthesizing available chemicals and presenting analytical conclusions for appropriate decision making, able to use software for analysis and synthesis in general or more specific chemical fields (organic, biochemical, analytical, physical, chemical or inorganic). So that the lecturers need to give instruction in accordance with the initial ability owned by each student. Teaching by self-study by giving students the freedom to discuss materials to solve problems related to teaching materials (atomic structures, periodic systems and chemical bonds) will stimulate them to find out based on existing learning resources (books, journals and articles Scientific from internet). The role of lecturers more motivate them to construct or build their own knowledge based on knowledge sharing activities that they run. Thus the students do not feel bored or saturated because of learning materials that they have mastered repeatedly.

In a class with low or slow slower learner skills, regular learning + additional learning (Regular Teaching + Tutorial)) is a learning that can improve their learning outcomes. Where students feel helped by the delivery of taught material. Then if there are still less master then, they can follow additional learning (tutorial) involving other students who have mastered the material to help. The teaching materials are delivered, mainly related with the atomic structure, periodic system and chemical bonds. Thus regular learning + additional learning (Regular Teaching + Tutorial)) will help students to achieve improved learning outcomes, comparable if they have to join students with faster skills (faster learner). Given that they often find it difficult or difficult to follow the lesson, because the teaching materials conveyed by the educators according to them are too fast or difficult to understand. Here the lecturer is expected to be a personal figure who is able to categorize the initial ability of his students appropriately, students with high initial ability or faster (faster learner) need to get learning with Self Learning (Self Learning). While students with low or slow initial skills (slower learner) need to get regular learning + additional learning (Regular Teaching + Tutorial). For the development of regular learning + additional learning (Regular Teaching + Tutorial), which can improve student learning achievement, program development needs to be well planned by paying attention to aspects of feedback, assessment, monitoring or monitoring progress and guidance provided. Learning materials need to be chosen which are representative for affirmation and concretization. Initial capability is a prerequisite that needs to be considered in determining the model of learning that will be applied and exploring the ability or potential and development of students.

However models *Trait Treatment interaction* run the Department Tadris Natural Sciences - Physics at IAIN Imam Bonjol Padang can only be applied to Pergurruan Tinggi Ilmu All Islaman (PTKI) that has a purpose and a characteristic similar to what is applied to Department of Tadris Science Natural Science-Physics (T-IPA / Physics) that existed at the State Institute of Islamic Studies Imam Bonjol Padang. That is not true for all Department of Physics Education in Public Higher Education or Tadris Natural Sciences - Physics are developed by the State Islamic University, State Islamic Institute, and State Islamic High School in Indonesia.

References

Armstrong, S. 2000. "The Influence of Individual Cognitive Styles on Performance in Management Education". Educational Psychology, 20 (3): 323-339.

Aswirna, Prima, and Aswati Reni. 2007. Chemistry. Padang: IAIN Imam Bonjol Padang Press.

Atkinson, RK, Derry, SJ, Renkl, A., and Wortham, DW 2000. "Learning From Examples: Instructional Principles from The Worked Examples Research". Review of Educational Research, 70: 181-214.

Ausubel, DP 1960. "Use of Advanced Organizers in The Learning and Retention of Meaningful Verbal Material". Journal of Educational Psychology, 51: 267-272.

Ausubel, D., P. 1963. The Psychology of Meaningful Verbal Learning. New York: Grune & Stratton.

Bahrick, HP 1984b. "Associations and Organization in Cognitive Psychology: A Reply to Neisser". Journal of Experiment Psychology: General, 113: 36-37.

Bandura, A. 1977. Social Learning Theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. 1986. Social Foundations of Thought and Action: A Social Cognitive Theory. Englewood Cliffs, NJ: Prentice-Hall.

Biggie, ML 1982. Learning Theories for Teachers. New York: Harper and Row

Bloom, B., S., Hastings, JT, and Madaus, GF (Eds.). 1971. Handbook on Formative and Summative Evaluation of Student Learning. New York: MacGraw-Hill.

Boyle, EA, Duffy, T., and Dunleavy, K. 2003.Learning Styles and Academic Outcome: The Validity and Utility of Vermunt's Inventory of Learning Styles in A British Higher Education Setting. British Journal of Educational Psychology. 73 (2): 267-290.

Brady, Gerard EH, 1986. General Chemistry: Principles and Structure, 4th edition, New York: John Willy and Son.

Briner, M. 1999. Constructivism. Http: //curriculum.calstatela.edu.htm, Retrieved June 12, 2003, from Calstate University, Los Angeles.

Brown, JS, Collins, A., and Duguid, P. 1989. "Situated Cognition and The Culture of Learning". Educational Researcher, 18 (1): 32-42.

Bruer, JT 1997. "Education and The Brain: A Bridge Too Far". Educational Researcher, 26 (8): 4-16.

Bruner, J. 1960. The Process of Education. New York: Vintage.

Bruner, JS 1961. "The Act of Discovery". Harvard Educational Review, 31 (1): 21-32.

Baseo, VV, Prins, FJ, Elshout, JJ, and Hamaker, C. 2000. "Intellectual Ability, Learning Style, Personality, Achievement Motivation and Academic Success of Psychology Students in Higher Education". Personality and Individual Differences, 29 (6).

Carbo, M., Dunn, R., & Dunn, K. 1986.Teaching Students Through Their Individual Learning Styles. Englewood Cliffs. NJ: Reston Book; Prentice Hall

Chall, SC, and Jacobs, VA 2003. Poor children's fourth-grade slump. American. Educator Retrieved from, (Online). Http://www.aft.org// Retrieved 10 March 2015.

Chandler, P., and Sweller, J. 1992. "The Split-Attention Effect As A Factor in The Design of Instruction". British Journal of Educational Psychology 62: 233-246.

Chang Raymond. 2003. General Chemistry: The Essential Concept. New York: Mc Graw Hill Inc.

Charles Y. Glock and Rodney Stark. 1965. Religion and Society in Tension. Chicago: Rand McNally and Company.

Chase, WG, and Simon, HA, 1973. Perceptions in Chess. Cognitive Psychology, 4: 55-81.

Clark, R., Nguyen, F., and Sweller, J. 2006. "Efficiency in Learning: Evidence-Based Guidelines to Manage Cognitive Load". San Francisco: Pfeiffer.ISBN 0-7879-7728-4.

Coffield, F., Moseley, D., Hall, E., and Ecclestone, K. 2004. Learning Styles and Pedagogy in Post-16 Learning. A Systematic and Critical Review. London: Learning and Skills Research Center.

Cronbach, L. 1957. "The Two Disciplines of Scientific Psychology". American Psychologist, 12: 671-684.

Cronbach, L. 1975. "Beyond The Two Disciplines of Scientific Psychology". American Psychologist, 116-127.

Cronbach, L. and Snow, R. 1977. TRAITs and Instructional Methods: A Handbook for Research on Interactions. New York: Irvington.

Cronbach, LJ 1951. "Coefficient Alpha and The Internal Structure of Tests". Sychometrika, 16: 297-334

Cronbach, LJ 1966. "The Logic of Experiments on Discovery. In L. Shulman S & ER Keisle Learning by discovery: A critical appraisal ".Chicago: Rand-McNally, 76-92.

Cronbach, LJ, and Snow, RE 1977. aptitudes and Instructional Methods: A Handbook for Research on Interactions. New York: Halsted Press.

Cronbach, L., J., and Snow, RE 1977. Trait and Instructional Methods. New York: John Wiley.

Dalgarno, B. 1996. Constructivist Computer Assisted Learning: Theory and Technique, ASCILITE Conference, (Online), retrieved from http://www.ascilite.org.au/

Davis, G., A. 1983.Educational Psychology. New York: Allyn & Bacon.

DeVries et al. 2002.Developing Constructivist Early Childhood Curriculum: Practical Principles and Activities. Teachers College Press: New York. ISBN 0-8077-4121-3, ISBN 0-8077-4120-5.

Dewey, J. and Bentley, A. 1949. Knowing and The Known.Boston: Beacon Press.

Diane E. Papalia, et. 2008. Al. Human Development (Developmental Psychology), Jakarta; Kencana.

Diseth, A. 2002. The Relationship Between Intelligence, Approaches To Learning and.

Dog ru and Calendar. 2007. " Applying the Subject" Cell " Through Constructivist Approach during Science Lessons and the Te Acher's View" .Journal of Environmental & Science Education, 2 (1): 3-13

Dunn, R., and Dunn, K. 1999. The Complete Guide To The Learning Styles Inservice System. Boston: Allyn and Bacon.

Dunn, R. Dunn, K., and Perrin, J. 1994. Teaching Young Children Through Their Individual Learning Styles: Practical Approaches for Grades K-2 /. Boston: Allyn and Bacon.

Ellis, HC 1965.Transfer of Learning. New York: Macmillan.

Felder, RM, and Brent, R. 2005. "Understanding student differences". Journal of Engineering Education, 4 (1): 57-72.Lalley and Gentile Adapting Instruction 473

Gagne, RM, and Driscoll, MP 1988. Essentials of Learning for Instruction. Englewood Cliffs. NJ: Prentice-Hall.

Gagne, RM, and Paradise, NE 1961. "Abilities and Learning Sets in Knowledge Acquisition". Psychological Monographs, 75, NO. 14 (Whole No. 518).

Gardner, H. 1983. Frames of Mind: The Theory of Multiple Intelligences. New York: Basic Books.

Gardner, H. 1993. Multiple Intelligences: The Theory in Practice. New York: Basic Books.

Gardner, H., and Hatch, T. 1989. "Multiple Intelligences Go to School: Educational Implications of The Theory of Multiple Intelligence". Educational Researcher. 18 (8): 4-10.

Gentile, JR 1993. Instructional Improvement: A Summary and Analysis of Madeline Hunter's Essential Elements of Instruction and Supervision (2nd ed.). Oxford, OH: National Staff Development Council.

Gentile, J., R., and Lalley, JP, 2005. Educational Psychology. Dubuque, IA: Kendall-Hunt.

Gerjets, P. Scheiter, K. and Catrambone, R. 2004. "Designing Instructional Examples to Reduce Intrinsic Cognitive Load: Molar Versus Modular Presentation of Solution Procedures". Instructional Science. 32 (1): 33-58.

Glaser, R., and Bassock, M. 1989. "Learning Theory and The Study of Instruction". Annual Review of Psychology, 40: 631-666.

Good, RH, Vollmer, M., Creek, RJ, & Katz, L. 1993. "Treatment of utility of the Kaufman Assessment Battery for Children: Effects of matching processing instruction and student strength". School Psychology Review, 22 (1): 8-26.

Graham, N., A., and Kershner, JR 1996. Reading styles in children with dyslexia: A

Gregory, GH, and Chapman, C. 2002. Differentiated instructional strategies. Thousand Oaks, CA: Corwin Press.

Guilford, J., P. 1967. The nature of human intelligence. New York: McGraw-Hill.

GU l ü mall and O mar Ergin. 2006. " The Effect of Science leraning Through Discovery on Student ' s Academic Achievement Learning Approachs and Attitudes Towards Science" . Journal of Turkish Science of Education. (3) 1: 1-6.

Halpern, AR, and Bower, GH 1982. "Expertise and Melodic Musical Structure in Memory for Musical Notation". American Journal of Psychology, 95: 31-50.

Hardiman, MM 2003. Connecting Brain Research With Effective Teaching: The Brain-Targeted Teaching Model. Lanham, MD: Scarecrow Press.

Heacox, D. 2002. differentiating Instruction in the Regular Classroom. Minneapolis, MN: Free Spirit Publishing.

Heritage, M. 2007. "Formative Assessment: What Do Teachers Need to Know and Do?". Phi Delta Kappan, 89 (2): 140-145.

Hilbert, TS, and Renkl, A. 2007. Learning How to Learn by Concept Mapping: A Worked-Example Effect. Oral Presentation At The 12th Biennial Conference EARLI 2007 in Budapest: Hungary

Hilliard, RI, 1995. "How do Medical Students Learn: Medical Student Learning Styles and Learning Factors That Effect Reviews These Styles. Teaching and Learning in Medicine 7 (4): 201-210.

Hirsch, ED, Jr. 2003. "Reading Comprehension Requires Knowledge - of words and the world". American Educator, 27 (1): 10-13, 16-22, 28-29, 48.

Hmelo-Silver, Duncan, and Chinn. 2007. "Scaffolding and Achievement in Problem-Based Learning and Inquiry: A Response to Kirschner, Sweller, and Clark (2006)" Educational Psychologist, 42 (2): 99-107

Holt, J. 1964. How Children Fail. New York: Dell. Hopkins, k. D. (1998). Educational and Psychological Measurement and Evaluation. Boston: Allyn and Bacon.

Hunt, DE 1979. Learning Style and Student Needs: An Introduction to Conceptual Level. In Nassp (ed), Student Learning Styles: Diagnosing and describing Programs (pp. 27-38). Reston, VA: Author.
Hunter, M. 1994. Enhancing Teaching. New York: Macmillan.
Hurlock, E. 2010. Developmental Psychology. The McGraw-Hill Companies: New York.
Iaccino, 1993. JF-Right Brain Left Brain Differences: Inquiries, Evidence, and New Approaches.Hillsdale, NJ: Lawrence Erlbaum Associates.
Jean, Piaget.1967. Logique et Connaissance scientifique, Encyclopédie de la Pléiade.
Jeffery, G. (ed). Creative 2005.The College: Building A Successful Learning Culture in The Arts, Stoke-on-Trent: Trentham Books.
Jensen, E. 1996. Brain-Based Learning. Del Mar, CA: Turning Point Publications
Jibril Abd. Rahman. 1990. He Sholeh: Dignity and Among Treatments and Properties Sifatnya.Kuala Lumpur: Pustaka Al Ansar.
Jonassen, DH 1997. "Instructional Design Models for Well-Structured and Ill-Structured Problem-Solving Learning Outcomes". Educational Technology Research and Development, 45 (1): 65-94.
Jonassen, D., Mayes, T., and McAleese, R. 1993. "A Manifesto for A Constructivist Approach to Uses of Technology in Higher Education". In TM Duffy, J. Lowyck, & DH Jonassen (Eds.), Designing Environments For Constructive Learning (pp. 231-247). Heidelberg: Springer-Verlag.
Joyce, B. and Weil, M. 1987. "Models of Teaching". Englewood Cliffs. NJ: Prentice-Hall.
Judd, CH 1908. "The Relation of Special Training to Intelligence". Educational Review, 36: 28-42.
Jung, J. 1962. "Transfer of Training as a Function of the First-List Learning". Journal of Verbal Learning and Verbal Behavior, 1: 197-199.
Kalyuga, S., Ayres, P., Chandler, P., and Sweller, J. 2003. "The Expertise Reversal Effect". Educational Psychologist, 38 (1): 23-31
Kavale, K., A., and Forness, S., R. 1987. "Substance Over Style: Assessing The Efficacy of Modality Testing and Teaching". Exceptional Children, 54 (3): 228-239.
Keefe, J., W., and Jenkins. JM 2000. Personalized instruction: changing classroom practice. Larchmont, NY: Eye on Education.
Keefe, J., W., Monk, J., S., Letteri, C., A., Languis, M., Dunn, R. Jenkins, J., M., and et al. 1990. Learning style profile. Reston, VA: National Association of Secondary School Principals.
Keenan. Chemistry 1984. For the University. Volume 1. Jakarta: Erland.
Keirsey, D. 1998. Please understand me ii: temperament intelligence character. Del Mar, CA: Prometheus Nemesis Book Company.
Kim.2005. "The Effects of a Constructivist Teaching Approach on Student Academic Achievement, Self-Concept, and Learning Strategies". Asia Pacific Education Review, 6 (1): 7-19.
Kirschner, P., A., Sweller, J., Clark, R., E. 2006. "Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and inquiry-Based Teaching ". Educational Psychologist, 41 (2): 75-86.
Kirschner, Sweller, and Clark. 2006. "Readings" .Stephen Downes, 12 November, 2007.
Klein, PD 2003. "Rethinking The Multiplicity of Cognitive Resources and Curricular Representations: Alternatives To" Learning Styles "and" Multiple Intelligences ".Journal of Curriculum Studies, 35 (1): 45-81. Lalley and Gentile Adapting Instruction 474
Kraiger, 2003. Handbook of psychology. New York: John Wiley & Sons, Inc.
Lalley, JP, and Miller, RH 2007. "The Learning Pyramid: Does It Point Teachers In The Right Direction?" Education, 128 (1): 64-79.
Lalley, JP & Gentile, JR 2009. Classroom Assessment and Grading to assure Mastery. Theory Into Practice, 48 (1), 28-35
Matthews, Michael R. Constructivism in Science and Mathematics Education.
Mayer, R. 2004. "Should There Be A Three-Strikes Rule Against Pure Discovery Learning? The Case For Guided Methods of Instruction". American Psychologist, 59 (1): 14-19.
Mayer. 2004. "Should There Be a Three-Strikes Rule Against Pure Discovery Learning?" American Psychologist, 59 (1): 14-19
McInerney, D., M., and McInerney, V. 1998. Educational Psychology. Sydney: Prentice Hall.
Messick, S. 1976. Individuality in Learning. San Francisco: Jossey-Bass.
Miller, G., A., Galanter, E., and Pribam, KH 1960. Plans And The Structure Of Behavior. New York: Holt, Rinehart & Winston.
Moreno, R., and Mayer, R. 1999. "Cognitive Principles Of Multimedia Learning: The Role of Modality and Contiguity". Journal of Educational Psychology, 91: 358-368.
Mufrodi, Ali. 2012. Islamic Education. Jakarta: The Logos.

Nana Sutesna. Chemistry 2003. For SMU Class 1. Jakarta: Grafindo.
Neisser, U. 1967. Cognitive psychology. New York: Appleton-Century-Crofts.
Nur, M., and Prima RW 2000. Teaching Centered On Learners and Constructivist Approaches in Teaching. Surabaya: Surabaya State University.
Parning, Mika, and horake. 2002. Chemical School, Jakarta: Yudhisthira.
Permendiknas. 2006.SI and SKL. Jakarta: Sinar Grafika.
Peterson, L., R., Maier, S., F., and Seligman, MEP 1993. Learned helplessness: A Theory for the Age of Personal Control. New York: Oxford University Press.
Piaget, J. 1954.The Construction of Reality in the Child. New York: Basic Book.
Piaget, Jean. 1950. The Psychology of Intelligence. New York: Routledge.
Postman, L. 1962a. Retention As A Degree of Overlearning. Science, 135: 666-667.
Postman, L. 1962b. Transfer Of Training As A Function Of Experimental Paradigm And Degree Of First-List Learning. Journal of Verbal Learning and Verbal Behavior, 1: 109-118.
Pujaat, A., Hadyana. Chemistry 1984. For the University Sixth, Kleinfelter, Wood. Jakarta: PT. Primary Literacy surge.
Renkl, A., Atkinson, R., Maier, U., and Staley, R. 2002. "From Example Study To Problem Solving: Smooth Transitions Help Learning". Journal of Experimental Education, 70: 293-315.
Robins, S and Mayer, RE 1993. "Schema Training in analogical reasoning". Journal of Educational Psychology, 85: 529-538.
Rumelhart, DE, and Norman, DA 1981. "analogical Processes In Learning". In JR Anderson (Ed.) Cognitive skills and their acquisition (pp. 335-359). Hillsdale, NJ: Erlbaum.
Chemical science. 2004 high school class X, Bekasi: Pt. Galaxy Puspa Mega.
Schneider, W., & Shiffrin, RM 1977. "Controlled and Automatic Human Information Processing: I. Detection, Search and Attention". Psychological Review, 84: 1-66.
Seligman, MEP 1975. helplessness: On depression, development, and death. San
Sevilla, Consuelo G. et. al, 2007. Research Methods. Rex Printing Company. Quezon City.
Shuell, TJ 1996. "Teaching And Learning In A Classroom Context". In DC Berliner and R. Calfe (Eds.), Handbook of educational psychology, (pp. 726-764). New York: Simon and Schuster Macmillan.
Silberman, M.1996. Active Learning Strategies 101 any Subject. Boston: Allyn and Bacon.
Snider, VE 1992. "Learning styles and learning to read: A critique". Remedial and Special Education, 13 (1): 6-18.
Snow, R. 1987. "trait complexes". In R, Snow and M. Farr (Eds.). Trait, Learning and Instruction, Cognitive Process Analyzes of TRAIT.Vol. 3, (pp. 11-34). Hillsdale, NJ: Erlbaum Associates.
Snow, R. 1989. Trait-Treatment Interaction as A Framework for Research on Individual Differences in Learning. In P. Ackerman, RJ Sternberg, & R. Glaser (Ed.), Learning and Individual Differences. New York: WH Freeman.
Snow, R., Federico, P., and Montague, W. 1980. "trait, Learning, and Instruction". Vol 1 & 2. Hillsdale, NJ: Erlbaum.
Spearman, C. 1927. The Abilities of Man: Their Nature and Measurement. New York: The Macmillan Company.
Specht, JA, & Martin, J. 1998. "Individual Differences In Imaginal And Verbal Thinking Habits Of Grade 6 Students". Journal of Mental Imagery, 22 (3): 229-236.
Springer, SP, and Deutsch G. 1985. Left brain, right brain. New York: WH Freeman.
Stahl, SA, and Kuhn, MR 1995. Does Whole Language Instruction or Matched to Learning Styles
Sugiyono. 2006. Qualitative and Quantitative Research Methods R & D Bandung: Alfabeta.
Sumadi Suryabrata. 1983. Research Methodology. Jakarta: Rajawali Pres.
Sweller, J. (1999). Instructional Design in Technical Areas. Camberwell, Australia: ACER Press. ISBN: 978-0-86-431312-6. (See also Tuovinen, JE & Sweller, J. (1999). "A Comparison of Cognitive Load Associated With Discovery Learning and Worked Examples". Journal of Educational Psychology, 91 (2): 334-341.
Sweller, J. 1988. "Cognitive Load During Problem Solving: Effects on Learning". Cognitive Science, 12 (1): 257-285.
Sweller, J. 2003. "Evolution of Human Cognitive Architecture". In B. Ross (Ed.), The Psychology of Learning and Motivation. San Diego: Academic Press. ISBN 0125433433.
Sweller, J. and Cooper, GA 1985. "The Use of Worked Examples as a Substitute for Problem Solving in Learning Algebra". Cognition and Instruction, 2 (1): 59-89.
Tarmizi, RA, and Sweller, J. 1988. "Guidance During Mathematical Problem Solving". Journal of Educational Psychology, 80 (4): 424-436
Tomlinson, CA 1999. The Differentiated Classroom: Responding to the Needs of All Learners. Alexandria, VA: Association for Supervision and Curriculum Development.

Vygotsky's. 2005. "Philosophy: Constructivism and Its Criticisms Examine Liu & Matthews" .International Education Journal, 6 (3): 386-399.

Wertsch, JV 1997. "Vygotsky and The Formation Of The Mind" Cambridge.

White, TG, 2005. "Effects of Systematic and Strategic Analogy-Based Phonics on Grade 2 Students' Word Reading and Reading Comprehension". Reading Research Quarterly, 40 (2): 234-255.

Willingham, DT 2003. "Why Students Think They Understand When They Do not". American Educator, 48: 38-41.

Wood, D. 1998.How Children Think and Learn2nd edition. Oxford: Blackwell Publishers Ltd. ISBN 0-631-20007-X.

Zhang, L., F., and Sternberg, RJ 2006. The Nature of Intellectual Styles. London: Lawrence Erlbaum and Associates.