

**LEARNING STRATEGIES USED BY STUDENTS
OF CHEMICAL ENGINEERING OF UMS
TO LEARN MATERIALS IN ENGLISH**



PUBLICATION ARTICLE

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by

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APPROVAL

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Surakarta, April 2016

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LEARNING STRATEGIES USED BY STUDENTS OF CHEMICAL ENGINEERING OF UMS TO LEARN MATERIALS IN ENGLISH

Abstract

This research is aimed at showing the differences of learning strategies used by high and low achiever students of Chemical Engineering of Muhammadiyah University of Surakarta. The subjects of the research are six students, three of them are high achiever students and the three others are low achiever students. This research is done by classifying the data using the learning strategies classification conducted by O'Malley and Chamot. The type of this research is case study. The data are obtained from the interview and document to the subjects. The result of this research shows that the subjects use various learning strategies classified by O'Malley and Chamot in learning materials in English. Those learning strategies used by the subjects are similar and the others are not. Although they use same strategies, some of those strategies are implemented differently. The differences of learning strategy used by the subjects are in metacognitive and cognitive strategies. The learning strategies that are only used by high achiever students are: advance organization (metacognitive strategies), grouping, auditory representation, and transfer (cognitive strategies). The other learning strategies are used by both high achiever and low achiever students, even by one student of each achiever. Beside the differences in learning strategies used by high achiever and low achiever students above, there are some strategies that are implemented differently by those subjects. The differences in implementation can be seen in metacognitive strategies (organizational planning, self-monitoring, self-evaluation, and self-management), in cognitive strategies (resourcing and elaboration), and both of the socioaffective strategies.

Keywords: Language Learning, Learning Strategy, Materials in English, Strategy

Abstrak

Tujuan dari riset yang dilakukan adalah untuk menunjukkan perbedaan dari strategi belajar yang dilakukan oleh siswa yang mendapat nilai tinggi dan rendah di teknik kimia UMS. Subjek dari penelitian ini ada enam siswa, tiga diantaranya adalah siswa yang mendapat nilai tinggi dan tiga yang lain adalah siswa yang mendapat nilai rendah. Penelitian dilakukan dengan mengklasifikasikan data menggunakan klasifikasi strategi belajar oleh O'Malley dan Chamot. Studi kasus kualitatif adalah jenis studi ini. Hasil studi menunjukkan bahwa para siswa menggunakan bermacam strategi dari klasifikasi O'Malley dan Chamot saat belajar. Beberapa strategi belajar yang digunakan sama dengan yang lain, dan ada pula yang berbeda. Meski mereka menggunakan strategi belajar yang sama, namun aplikasinya dapat berbeda. Perbedaan strategi belajar yang digunakan ditemukan di metacognitive dan cognitive strategies. Strategi belajar yang hanya digunakan oleh siswa yang mendapat nilai tinggi adalah: advance organization (metacognitive strategies); grouping, auditory representation, and transfer (cognitive strategies). Sedangkan strategi belajar yang lain digunakan oleh para siswa, meskipun hanya digunakan oleh satu siswa dari para siswa yang mendapat nilai tinggi atau rendah. Selain perbedaan pada strategi belajar yang digunakan, ada beberapa strategi yang diaplikasikan secara berbeda oleh para siswa yang menggunakannya. Perbedaan tersebut dapat terlihat di metacognitive strategies (organizational planning, self-monitoring, self-evaluation, and self-management), cognitive strategies (resourcing and elaboration), dan kedua strategi di socioaffective strategies.

Kata kunci: Belajar Bahasa, Materi dalam Bahasa Inggris, Strategi, Strategi Belajar

1. INTRODUCTION

People in many countries use English to communicate with the other people from other countries. English is the most important language in the world. It is widely used for keeping up with the developing of modern technology and science of various countries. Especially in Indonesia, people should be able to communicate in English. People in Indonesia may study English starting from school, because the government decides to give English lesson as one of the lessons in school. The government also decides that English lesson is one of the lessons in national examination.

In learning English, strategy is needed in order to understand the materials well. The strategies used in learning helps the learner to understand the materials. It also helps the learners to increase the easy learning. Each person has a different learning style to acquire language skills such as writing, listening, speaking and reading. Each aspect of skills might be studied in different way. Generally, people use different way to study different materials. At this resesarch, the researcher only focuses on learning strategies to learn materials in English.

When the students use the appropriate strategy to some materials, they can understand the content and remember it easily. Some of the students easily find the appropriate strategy, and the others feel difficult to find the appropriate strategy to learn and to study the materials. The students who easily find the appropriate strategy have good up to excelent scores. The other students, who haven't find the appropriate strategy, may feel hard to understand the materials, and sometimes they get bad scores. The high score achiever student may has different learning strategies with the low achiever students. Although they use the different strategies, they have same purpose to get the good or best score. It is necessary to find the appropriate strategy to make the materials being understandable to learn.

Muhammadiyah University of Surakarta has many departments, such as Mathematic Department, English Department, Chemical Engineering Department, etc. In some faculties English skill is important since the references for the subjects being taught are written in English. There are many subjects in Chemical Engineering at UMS. Three of them are using English book as their reference. Those subjects are KR-Homogen (4th semester), KR-Heterogen (5th semester), and Reaktor (6th semester). Even those subjects are in the different semester, they use only a book and are taught by same lecturer. The book used in those subjects is *Elements of Chemical Reaction Engineering* by Fogler.

They have to master these materials because the materials will be used by them to do their research and final examination in the seventh semester. The book is used to get the materials for their presentation, in KR-Heterogen, and the assignments are from the book. For KR-Heterogen, there is only one chapter to be learned by the students. This chapter is the tenth chapter, CATALYSIS AND CATALYTIC REACTORS. This chapter consists of seven sub chapter. The first is introduction, and the second until seventh is the materials. Each subchapter consists of concepts, formulas, examples and exercises. All of the materials are connected, so they have to understand start from begin. To answer the exercises, they have to understand the materials, because the exercises are about the final reaction in chemical using catalyst. They have to study the materials in English to master the subjects using learning strategy. The book is used to get the material for their presentation, in KR-Heterogen, and the assignments are from the book. They have to study the materials in English to master the subjects using learning strategy.

To get the best score, the students of chemical engineering of UMS have to master the materials by learning using the appropriate strategy. Some of the chemical materials are written in English. To understand the content, students have to learn them. The students have to read and understand the content, because reading is one of the ways to get the information from written text or other printed text. Based on Sutarsyah (2014:45), there are many kinds of reading techniques such as skimming, scanning and SQ3R (Survey, Question, Read, Recite, and Revise).

In this opportunity, the researcher is interested in conducting the research in Chemical Engineering of Muhammadiyah University of Surakarta. The researcher assumes that they have different learning strategies between high and low achiever in learning materials by reading. From the description

above, the researcher is interested in carrying out the study on “Learning Strategies Used by Students of Chemical Engineering of UMS to Learn Materials in English”.

2. RESEARCH METHOD

The type of this research is case study. According to Fauziati (2002: 184), it is a study of an individual or an instance of action that is done to provide a portrait of individual case. The researcher decides to use a case study because the writer needs to know detail about the learning strategies used by the fifth semester students. The researcher doesn't investigate the teaching process. The researcher needs to know the similarities and the differences of learning strategies used between students.

The object of the study is the learning strategies used by low and high achievement students of Chemical Engineering to learn material in English by using reading comprehension strategies. The subjects of the study are fifth semester students of Chemical Engineering of Muhammadiyah University of Surakarta who studied materials in English. The subject is categorized by their score. The low achievers subjects are the students who have the average of the score less than 3,50. The high achiever subjects are the students who have the average of the score more than 3,50. The low achievers subjects are ASM, RPS, and EW. The high achiever students are TK, RHW, and FRZ.

The data of this research are the information about chemical engineering students' learning strategies gotten from the answer of interview, documentation. The researcher had interviewed the fifth semester learning strategies of students of Chemical Engineering of UMS who study material in English at this semester. The documentation is the questionnaire that had been given to the subject before interviewing them.

The researcher uses interactive model in analyzing the data. The data analyzing process has done almost at the time that the process of collecting the data has done too. It is conducted to make the data easily classified. According to Sutopo (1996: 88), this model uses three steps as follows: data reduction, data discussion, conclusion and verification.

3. FINDING AND DISCUSSION

Low achiever students use fewer learning strategies than the high achiever students. Some of these learning strategies are used by all of the low achiever students, and the others are used by one or two students. In Metacognitive strategy, only in self-monitoring and self-management are implemented by all students. Two of them implement similarly, but another implements differently. The others learning strategies such as advance preparation, organizational planning, selective attention, and self-evaluation are implemented by one student only. In Cognitive strategy, the students implement similarly, such as in recourcing, note taking, deduction and inferencing. Those are used by all of these students. In other learning strategies, such as summarizing and imagery, are used by two students only, and they implement similarly. Only one student uses elaboration. In Socioaffective strategy, all of them use and implement similarly.

High achiever students use almost all learning strategies. Some of these learning strategies are used by all of the high achiever students, and the others are used by one or two students. In Metacognitive strategy, only in advance organization, selective attention and self-management are implemented similarly by all students. The others learning strategies such as advance preparation and self-monitoring are used by one student only. In organizational planning and self-evaluation are implemented similarly by both students who use those strategies. In Cognitive strategy, such as recourcing, note taking, summarizing, deduction, elaboration, and transfer, which are used by all students are implemented similarly. In other learning strategies, such as imagery, auditory representation and inferencing, are used by two students only, and they implement similarly. Only one student uses grouping. In Socioaffective strategy, all of them use and implement similarly.

After analyzing the data, the researcher presents the description of learning strategies used by the chemical engineering students of Muhammadiyah University of Surakarta to learn the material in English.

The researcher found that the subjects in this research use many strategies. Based on the learning strategy classification proposed by O'Malley and Chamot, the researcher founds that the low achievers uses fewer than high achievers. The first subject of low achiever uses ten learning strategies, second subject uses twelve learning strategies and third subject uses eleven learning strategies. The first subject of high achiever uses fourteen learning strategies, second subject uses sixteen learning strategies, and third subject uses sixteen learning strategies. The researcher will resume the learning strategies used by the subjects in each strategy (Metacognitive strategy, Cognitive strategy, and Socioaffective strategy).

3.1 Metacognitive Strategy

After the researcher presented the data, the researcher found that all of the subjects in this research use some strategies in metacognitive strategy classification. The metacognitive strategy classification used by the subjects in this research can be seen as following table below.

Table 1. Metacognitive Strategy

No.	Learning Strategy	Low Achiever			High Achiever		
		ASM	RPS	EW	TK	RHW	FRZ
1	Advance Organization				√	√	√
2	Advance Preparation	√				√	
3	Organizational Planning		√		√		√
4	Selective Attention			√	√	√	√
5	Self-monitoring	√	√	√	√		
6	Self-evaluation		√			√	√
7	Self-management	√	√	√	√	√	√

From the table above, we know that the subjects have similarities and differences between one another. Even the subjects use the same learning strategies, the implementation can be different. In the finding, the researcher found that almost all of the learning strategies' implementation of each subject is similar. Only at Organizational Planning, Self-monitoring, Self-evaluation and Self-management, some of the subjects implement differently with other subject.

This research supports Oxford's theory of Metacognitive strategies. Based on Oxford in Fauziati (2010: 159), Metacognitive strategies are the strategies to manage overall the learning process which include learner's own learning style and needs, organizing materials, arranging schedule, monitoring mistakes and evaluating. The subjects in this research have their own learning style. They arrange their schedule to studying the material, as we can see in the implementation of self-management. They also monitor and/or evaluate their learning in addition to complete their learning management. All of the high achiever subjects use advance organization to organize the materials and in addition they also use organizational planning, except for RHW. Selective attention and Advance preparation are also considered as their learning strategies.

The previous studies conducted by Triana and Khasanah concluded that the different level of students, such as high, middle and low achiever, has different strategy in learning. Besides that Kusumaningtyas doesn't use the level in choosing the subject. These researches use learning strategy

classification proposed by O'Malley and Chamot namely Metacognitive strategy, Cognitive strategy, and Socioaffective strategy. All of these researches concluded that one of the subjects, the high achiever in Triana's and Khasanah's, uses the most learning strategy than the others. These researches don't compare and contrast the learning strategies used by each level, because the subjects are one of each level. Through the research done by the researcher, she finds the similarities and differences of learning strategies used by each level. The researcher found that even all subjects of a level use the same strategies, some of these strategies are implemented differently, such as in Self-monitoring and Self-management and the others are implemented similarly such as in Advance Organization and Selective Attention. Then, the researcher also found that the subjects of high achiever use more strategies than the subjects of low achiever.

3.2 Cognitive Strategy

After the researcher presented the data, the researcher found that all of the subjects in this research use some strategies in cognitive strategy classification. The cognitive strategy classification used by the subjects in this research can be seen as following table below.

Table 2. Cognitive Strategy

No.	Learning Strategy	Low Achiever			High Achiever		
		ASM	RPS	EW	TK	RHW	FRZ
1	Resourcing	√	√	√	√	√	√
2	Grouping				√		
3	Note Taking	√	√	√	√	√	√
4	Summarizing		√	√	√	√	√
5	Deduction	√	√	√	√	√	√
6	Imagery	√		√		√	√
7	Auditory Representation					√	√
8	Elaboration		√		√	√	√
9	Transfer				√	√	√
10	Inferencing	√	√	√		√	√

From the table above, we know that the subjects have similarities and differences between one another. The learning strategies used by all of the subjects are Resourcing, Note Taking, and Deduction. The strategy used by all of the low achiever subjects and only some high achiever subjects is Inferencing. The strategies used by all of the high achiever subjects and some low achiever subjects are Summarizing and Elaboration. Then the learning strategy used by the high achiever subjects only is Transfer.

This research supports Rubin's theory of Cognitive strategies. Based on Rubin in Fauziati (2010, 152), Cognitive strategies are the strategies that refer to the steps or operation used by the learner in learning. The steps can require direct analysis, transformation, or synthesis of learning materials. The

subjects of this research know and understand the steps that they have to do to make the materials easier to be understood, such as resourcing, note taking, summarizing, deduction, and inferencing. They use resourcing, such as dictionary, to get the meaning of the materials. They also transform the material into more simple by using note taking, and summarizing. They use note taking to write the important things while they read or listening the lecturer explanation. All of the high achievers can synthesis the material by applying elaboration and transfer to elaborate the materials from many sources and transfer their knowledge to been applied in the exercises. Grouping, Imagery, and Auditory representation are also considered as their learning strategies that help them while learn the materials.

The previous studies conducted by Triana and Khasanah concluded that the different level of students, such as high, middle and low achiever, has different strategy in learning. Besides that Kusumaningtyas doesn't use the level in choosing the subject. These researches use learning strategy classification proposed by O'Malley and Chamot namely Metacognitive strategy, Cognitive strategy, and Socioaffective strategy. All of these researches stated that one of the subjects, the high achiever in Triana's and Khasanah's, uses the most learning strategy than the other. They just compare three students with different level. They don't search for the similarities of the same level. Through the research done by the researcher, she finds the similarities and differences of learning strategies used by each level. The researcher found that almost all of the learning strategies in Cognitive strategy are implemented similarly by the subjects who use those. Only in Resourcing and Elaboration are implemented differently by the subjects who use those. The researcher also found that all of high achievers use almost all of the learning strategy in Cognitive strategy.

3.3 Socioaffective Strategy

After the researcher presented the data, the researcher found that all of the subjects in this research use some strategies in socioaffective strategy classification. The socioaffective strategy classification used by the subjects in this research can be seen as following table below.

Table 3. Socioaffective Strategy

No.	Learning Strategy	Low Achiever			High Achiever		
		ASM	RPS	EW	TK	RHW	FRZ
1	Questioning for Clarification	√	√	√	√	√	√
2	Cooperation	√	√	√	√	√	√

As we can see from the table above, all of the subjects in this research use both strategies in socioaffective strategy. The implementation of these strategies from each subject is almost similar. They use the questioning for clarification to ask the lecturer or friends about the material. The researcher found that the main factor why they use cooperation is because of the lecture include the presentation, the class divides into several groups which consist of two or three students. The presentation is one of the important assignments. Here, they implement the cooperative strategy. They will work with their peers to prepare and do the presentation. Some subjects, such as RHW, think that it is impossible to do the group assignment such as presentation by own, so they need to do it together.

This research supports Rubin's theory of Communication strategies. Based on Rubin in Fauziati (2010, 152), communication strategies are the strategies which are less directly related to language learning, and focus on the process of participating in conversation. In these strategies the learners will communicate with other people when they faced the difficulties. The subjects of this research implement the communication in learning. They ask others about the material they don't understand yet. Usually they like to discuss the material with their friends. All of the subjects of this research use this communication,

such as studying with friends, as the good option. Some of them also ask the lecturer for addition explanation. It is needed for them to make them easier to clarify the knowledge in learning the material. They also discuss the material to share the difficulties and solve the problems.

The previous studies conducted by Triana and Khasanah concluded that the different level of students, such as high, middle and low achiever, has different strategy in learning. Besides that Kusumaningtyas doesn't use the level in choosing the subject. These researches use learning strategy classification proposed by O'Malley and Chamot namely Metacognitive strategy, Cognitive strategy, and Socioaffective strategy. All of these researches stated that one of the subjects, the high achiever in Triana's and Khasanah's, uses the most learning strategy than the other. Through the research done by the researcher, all of the subjects in this research use all of the Socioaffective strategy, even in the different level. They use the cooperative, because there is the presentation assignment. The main factor that they use Cooperative is that they belief they have to prepare and do it together with their peers. Then, the main factor to the subjects to use the Question for Clarification is that they need to understand the material being taught. For better understanding, they need more explanation.

4. CONCLUSION

After analyzing and discussing the data which are obtained from the case study about learning strategies used by chemical engineering students of UMS to learn material in English, the researcher draws the conclusion. The subjects of this research are divided into two, low achiever students and high achiever students which consist of three students of each classification. They use various learning strategies. Based on the result of this research, some of those learning strategies used by the subjects are similar and the others are not. Even they use same strategies, some of those strategies are implemented differently.

The learning strategies used by all students of the low achiever are metacognitive strategy (self-monitoring and self-management), cognitive strategy (resourcing, note taking, deduction and inferencing), and both socioaffective strategy. Summarizing and imagery are implemented by two students. For advance preparation, organizational planning, selective attention, self-evaluation, and elaboration are implemented by one student. They do not implement advance organization, grouping, auditory representation, and transfer.

The learning strategies used by all students of the high achiever are metacognitive strategy (advance organization, selective attention and self-management), cognitive strategy (resourcing, note taking, summarizing, deduction, elaboration, and transfer), and both socioaffective strategy. Organizational planning, self-evaluation, imagery, auditory representation and inferencing are implemented by two students. For advance preparation, self-monitoring, and grouping are implemented by one student.

There are differences in learning strategies used by the subjects. The learning strategies that only used by high achiever students are: advance organization (metacognitive strategies), grouping, auditory representation, and transfer (cognitive strategies). The other learning strategies are used by both high achiever and low achiever students.

Beside the differences in learning strategies used by high achiever and low achiever students above, there are some strategies that are implemented differently by those subjects. The differences in implementation can be seen in metacognitive strategies (organizational planning, self-monitoring, self-evaluation, and self-management), in cognitive strategies (resourcing and elaboration), and both of the socioaffective strategies.

REFERENCE

Azwar, Saifuddin. 2007. *Metode Penelitian*. Yogyakarta: Pustaka Pelajar.

Cohen, A. D. 1998. *Strategies in Learning and Using a Second Language*. New York: Longman.

- Etika K., Dewi. 2014. *Learning Strategies Used by Eleventh Grade Students of Senior High School Batik 2 Surakarta in Developing Reading Skill*. Unpublished Thesis. Surakarta: Muhammadiyah University of Surakarta.
- Fauziati, E. 2002. *Reading on Applied Linguistic*. Surakarta: Muhammadiyah University Press.
- Fauziati, Endang. 2010. *Teaching English as a Foreign Language*. Surakarta: Era PustakaUtama.
- Kennedy, Eddie C. 1981. *Methods in Teaching Developmental Reading*. Illinois: F.E. Peacock Pub.
- Khasanah, Nur. 2014. *Learning Strategy Used by High, Mid and Low Achievers of English to Develop Reading Skill: a Case Study at Muhammadiyah University of Surakarta*. Unpublished Research Paper. Surakarta: Muhammadiyah University of Surakarta.
- Moleong. 2006. *Metodologi Penelitian Kualitatif*. Bandung: PT Rosdakarya.
- O'Malley, J. M., Anna U. Chamot. 1990. *Learning Strategies in Second Language Acquisition*. New York: Cambridge University Press.
- Riding, Richard; Rayner, Stephen. 2002. *Cognitive Styles and Learning Strategies: Understanding Style Differences in Learning Behavior*. London: David Fulton.
- Sugiyono. 2011. *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta.
- Sutarsyah, Cucu. 2014. *Understanding English Texts: Some Strategies for Effective Reading for Non-English Students*. Jakarta: PT RajaGrafindo Persada.
- Sutopo, H. B. 2002. *Metodologi Penelitian Kualitatif*. Surakarta: Sebelas Maret University Press.
- Triana, Septi. 2012. *Learning Strategies in Reading Used by the Second Year Students of SMA Muhammadiyah 1 Surakarta*. Unpublished Research Paper. Surakarta: Muhammadiyah University of Surakarta.