INTEGRATING A MIND MAPPING TECHNIQUE AND INFORMATION GAP ACTIVITIES IN TEACHING ACADEMIC READING IN ENGLISH

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Abstract. Teachers of English, no matter in what levels they are teaching, need to create teaching and learning activities to fulfill and result in active, creative, innovative, effective and joyful learning. To achieve this, the teachers are expected to apply various techniques and media in teaching and learning process. This article tries to offer one possible solution to teaching academic English creatively, actively, and effectively, joyfully, and innovatively by integrating a Mind Mapping Technique (MMT) and Information Gap Activities (IGAs). There are five steps suggested in this integration: (a) Reading and note taking using MMT, (b) Swapping information, (c) Checking information, (d) Retelling Information, and (e) Summarizing and Translating. Gradual exercises applying this technique and activities will lead to the improvement of students' English ability not only in reading but also in other skills.

Keywords: Academic English/Reading, Mind Mapping, Information Gap Activity

A. INTRODUCTION

English at higher education institutions in Indonesia is placed as a compulsory subject with various course credits, ranging from 2-8 credits. Even, some universities have required certain scores of TOEFL test as a prerquisite for graduation. It is reasonable since English plays more and more important roles in education as a means of getting information (academic purposes) and as one requirement in job competition (occupational purposes). However, up to now, the results of Teaching English at non-English Department (TENED) at most universities in Indonesia are still disappointing. Most of students are still incapable of using English although they have passed English subjecst with excellent results.

There are many contributing factors to the failure of TENED in Indonesia. Research conducted by Sujana, Syahrial, & Fitriana (2009) at University of Mataram (henceforth UNRAM) in Lombok Indonesia, for example, conclude that the problems of TENED at UNRAM are caused by the conflics among the target needs (necessities), levels of English (lacks) and the gap between the necessities and the starting point. The difference between students' personal aims (wants) and the necessities makes the situation even worse in designing courses. Most faculties in University of Mataram put the improvement

of students' reading ability on their own fields as the target needs (necessities). However, most of the students' levels of English, except those of Faculty of Medical Science, are at Basic and Elementary and they have various personal aims (see Sujana, Syahrial, & Fitriana., 2009; Sujana, *et al*., 1998 for details).

With the situations mentioned above, it is difficult to achieve the necessities, that is, to improve students' academic reading ability. From the results of obeservation and interview with teachers, it is found that with the number of students in a class (50 – 80 students) and other factors such as materials, teachers' experience, students' motivation the easiest way to handle class is by teaching them reading. It is, *in fact*, in a line with the necessities mentioned above; however, most of the students have not achieved the target needs established. Besides the conflicts among the aspects mentioned above, another contributing factor to the failure is that the teaching and learning process is less-innovative and less-effective. In most classes observed, the teaching of reading is still dominated by traditional ways, that is, the teachers provide passage and sets of questions and students did the tasks prescribed by the teacher and then discussed the correct answers (see Sujana, 2006). Some have tried to do innovation, but no clear steps and goals. These traditional ways of teaching reading often provide "*false'* descriptions of students' ability – the students could answer the questions correctly and got good marks, but they could not understand comprehensively the entire content of the text they read. He further argues that if the teaching of reading was directed to the improvement of students' academic reading, the teaching and learning process needs to be away from busily spending time to find answers of the comprehension questions based on a passage. Academic reading needs more complex activities. Students should be trained to do more academic tasks such as note-taking, summarizing, retelling, paraphrasing, evaluating, etc. of the text they read. Besides, the other more important ability needs to be imparted in (academic) reading is *learning-how-to learn* (Sujana, 2006). It means that when students are faced with the real world (reading text books on their own field), they will read for studying their own subjects *not* for learning language. Therefore, the students need to be trained how to function reading ability in their academic setting.

This article will further be directed to provide one possible solution to improve the qulity of teaching and learning process of academic reading integrated to other academic skills by integrating mind mapping techniques and information gap activities. It is expected that the integration of those two techniques will make the learning more active, creative, effective and joyfull.

B. DISCUSSION

1. Teaching Academic Reading for University Students

The teaching of English at Non-English Department (TENED) can be directed to achieve the *short term* goal and *long term* goal. The short term goal is that the students need English to prepare themselves as **students** with their own duties or responsibilities. In long terms, the students need English in order to compete in job markets -- they need to be prepared with English for Occupational Purposes (EOP) based on their own disciplines. The consequence of the achievement of these two goals is that the department should ideally provide to types of syllabi --- English for Academic Purposes (EAP) and English for Occupational Purpose (EOP). However, at the level of applications, the TENED raises a number of issues; even often leads to conflicts among the aspects influencing the success of learning. Those aspects are, among others, the limited number of credits for English, the students' low level of English but high expectation, the number of students in a class, readiness of the instructors with teaching English using an ESP approach. As a result, the results of TENED in Indonesia are still far from expectation (i.e. capable of reading textbooks, journals, manuals, etc. in their own field).

The learning objective established in teaching English at most faculties at University of Mataram, Lombok, Indonesia is to be able to read textbooks, journal articles, manuals, etc. written in English to facilitate students learning their own subject matters (academic reading). The establishment of the objective seems reasonable since English as an international language plays central roles as the language of science, commerce, and technology and is widely used all over the world (Hutchinson & Waters, 1993; Dudley-Evans & St. Jones, 1991). It is compulsory for the students at higher education to have adequate ability in reading references written in English. Therefore, it is obvious that the teaching and learning process should be led to the mastery of academic/scientific English. Walsh (1982) warns that scientific texts written in English are complex documents intended for the **native speakers** of English. Undoubtedly, when the non-native speakers are trying to use them in learning their contents, there will be a lot of obstacles. The complexity of the scientific texts may come at least from 3 (three) main variables: (a) the linguistics; (b) the rhetoric; and (c) the conceptual. The linguistic part of scientific texts relates to the store of technical terms of each subject matter which differs from the other field, the focused syntax and special linguistic features. The rhetorical part relates to the organization of the language, the presentation of the knowledge, and the writer's assumptions about the readers. The conceptual part of scientific texts deals with the knowledge of the subject matter that the reader brings to the text (Walsh, 1982). The opinion mentioned above indicates that it takes long time and needs careful

and comprehensive skills to be fluent in reading scientific texts. It also needs the application of various techniques to impart learning.

Davies (1995) differentiates between passive reading activities and active reading activities. Passive reading activities means reading which requires the students to respond comprehension questions or other objective procedures such as multiple choice, true-false, matching and the like. It is commonly used in traditional ways of teaching reading. It is more on *Reading for Testing* rather than on *Reading for Information*. Active reading activities, on the other hand, relate to reading activities which expose students' own opinion about the texts they read. It will involve various expressive activities such as summarizing, note taking, valuing, analyzing, evaluating, and other academic reading sub-skills. Developing active reading will be time-consuming and difficult for non-native speakers of English; however, it can be achieved with continual and well-designed practices (see Kucukoglu, 2011).

In line with Davies' opinion above, some experts (for examples, Grabe, 1988; Kurland, 2000) differentiate between critical reading and non-critical reading. In non-critical thinking, the students see the texts as facts that need to be memorized and/or quoted (what the text says). In critical reading, the students' role is more active not only to identify what a text ***says*** (restatement) but also to describe what a text ***does*** (description) and to translate what a text ***means*** (interpretation) (Kurland, cited in Kucukoglu, 2011). Moreover, Grabe (1988) states that critical reading is an interactive process that goes on between the reader and the text. The result of this dialog is thorough comprehension.

Considering the fact that academic reading cannot be achieved just by practicing reading for testing, the English practitioners at higher education should provide students with the practices on more academic activities. Achieving such objectives takes times and needs intensive practices. Serious preparations on teaching will accelerate the students' achievement. The following section will discuss one possible solution to improve students' academic reading ability by combining a Mind Mapping Technique (MMT) and Information Gap Activities (IGAs).

2. Mind Mapping and Information Gap as Techniques in Teaching Academic Reading

A Mind Mapping technique is a technique using a diagram to represent words, ideas, tasks, or other information connected to and arranged radially around a central key word or idea. The Mind Mapping concept was popularized widely by Tony Buzan (Buzan & Buzan, 2004). It is based on the theory of

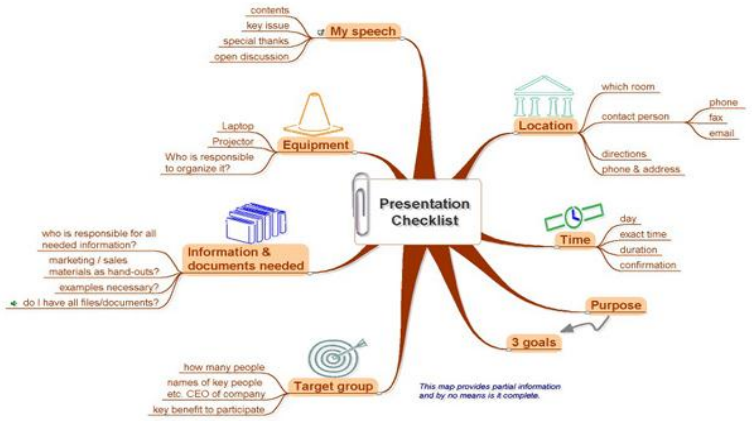
Radiant Thinking – each bit of information entering your brain (sensation, memory, thought) can be represented as central sphere which radiates tens, hundreds, thousands, millions of hooks, each of which represents an association and each association has its own infinite arrays of links and connections (Buzan & Buzan, 2004). Buzan & Busan further argue that human's brain already contains maps of information, which has an ability to make patterns using data it already possesses and ability to process vast amount of information using radiant instead of linear structures. Using mind map means employing or functioning our brain naturally in receiving, processing information, and enhancing memory, concentration, and creativity. Now, it has been widely used as a learning technique in various disciplines to generate, structure, visualize, and classify ideas.

It is, therefore, important to train students to take notes or learn using a mind mapping technique. Through mind mapping they will be able to take notes the important points, classify or summarize them, and link relationships among the points. If it is practiced continually in teaching and learning reading, it can improve students' ability in comprehending texts quickly and comprehensively. Mind Mapping avoids students from just copying the information from the text, improves their creativity in expressing ideas, makes them get used to summarizing as needed in reading academic textbooks. Having just the key words rather than sentences in the mind mapping notes will make learning more internalized and more creative; therefore, the learning will be more effective, meaningful and well-organized.

To be able to produce comprehensive and meaningful mind map, the students should be trained continuously to do step by step procedures. Here are the suggested steps in using a Mind Mapping technique:

1. In the center of the page, write the title of the passage/article.
2. On the first layer, write the key words of subdivisions/subheadings which show parallel ideas.
3. On the next layer, write the key words on each subheading.
4. Draw lines to see the relationship among the ideas.

Sample of Mind Mapping



Source: http://www.let2see.com/mindmap/samples.html

After completing the Mind Map, the students should be trained again to re-express the content of the passage based on the result of Mind Map. They are not allowed to look back to the passage. It is important to check whether they understand what they take notes or not. They will try to use their own word to re-express – this will make the learning more challenging for them. This practice will also train students' memory for retaining important information. [For class equipped with computers for each student, they can use mind mapping software available in the market. They can be used for other subject matters].

One way of retelling information from the result of note taking is by working in pairs. Each student reads different texts and retells their own part (e.g. Text A) to the other student with the other text. This activity is called Information Gap Activities (IGAs).

An Information Gap Activity is an activity where the learners are missing the information they need to complete a task and need to talk to each other to find the missing information (Son, 2009). This activity involves transferring information assigned from one student to the other student – it may also happen by transferring one form of communication to another form. In Information Gap Activities (IGAs), the students are required to use English to share information in order to complete the task. They also keep exchanging information for a real purpose as needed in real-life communication. In the end of the IGAs, the students can also be asked to extend the activities in various ways – reflecting, retelling, rewriting, summarizing, etc. Therefore, the application of IGAs leads to authentic, meaningful and successful speaking (and other skill) activities in that the students talk a lot, their participation is even, their

motivation is high, they feel confident to talk in pairs rather than to speak in front of the class alone (*cf.* Ur' (1996) characteristics of successful speaking activity).

Furthermore, Son (2009) emphasize that the IGAs are beneficial in learning in that they are capable of (a) generating more communication since the students try to extend their speaking practice, to make them concentrate on the communication to find information and produce more expression, and help another student to talk. (b) building students' confidence because the IGAs do not intimidate students if compared to presenting alone in front of the class; the IGAs make them comfortable, casual, and be in non-threatened atmosphere; (c) increasing motivation because the IGAs give them a reason to talk, make them think, represent real communication and factual learning, and provide them equal opportunities to learn, even with mixed ability students, and (d) developing other subskills since the IGAs demand students to clarify and negotiate meaning, rephrase, solve problems, gather information and make decisions.

Therefore, the application of IGAs will capable of facilitating communication in authentic and fun ways. The students actively work together and share opinion with his/her partner, help each other during the communication process, creatively produce their own utterances.

From the discussion above, it seems that both Mind Mapping and IGAs have advantages in improving students' English ability. Combining these technique and activity in teaching English could be one of the solutions for the improvement of the quality of teaching English. The following are the stages and description of how the combination of MM technique and IGAs is applied and how this combination is capable of generating active, creative, effective (meaningful), and joyful learning.

3. Steps in Integrating Mind Mapping Technique and Information Gap Activities in Teaching Academic Reading

The following section will present the integration of Mind Mapping Techniques (MMT) and Information Gap Activities (IGAs) in teaching academic English by starting from reading as a trigger to the rest skills.

Learning Objectives	Improve students' ability in academic reading.
Topic	Spread of Diseases
Skills	Reading (integrated to Speaking, Listening dan Writing)

Sub-Skills	Finding out parallel ideas Summarizing Listening to important points Note-taking Organizing ideas
Techniques/Activities	Mind Mapping Information Gap Retelling Information/Summarizing
Time	150 minutes

STEPS IN TEACHING AND LEARNING PROCESS

STEPS	EXPLANATION AND COMMENTS
Step 1: **Reading and Taking Notes**	Students are divided into two groups (Group A and B). Each student in each group is given a different text (Text A and Text B). Each student should read his/her own parts and take notes using a mind mapping technique. Students should use one side of mind map (Group A to the top and B to the bottom). (see Appendix)

This step aims at training students' ability to find main and parallel ideas in a text and to differentiate between the main ideas and the supporting ideas. These abilities are needed by students in reading textbooks or juournals on their own field. By using the Mind Mapping Technique, the students are active and creative in taking notes and in giving meaning to the lines they produce. Gradual training on using Mind Mapping Technique makes the students get used to grasp the meaning as a whole not partially. as often experienced in reading for testing.

Step 2: **Swapping Information**	Having finished Step 1, each student just completed his/her own part. To complete the other side of the mind map, each student should find a student from the opposite group. He/She take turns listening to his/her friend information and taking notes on the other side of his/her map (swapping infromation). Information gap is applied here.

To avoid boredom finding information by reading, the students are directed to get the other part of information by listening to the other student. Students are not allowed to look at the passage again [to check the completeness and readability of the notes]. The Information Gap technique is applied here. Student A doesn't have information to complete his/her mind map, so he/she has to ask Student B, and

vice versa. They swap information. Using the results of the Mind Mapping, the student tries to rephrase orally what he/she has written; therefore, the learning will involve high internalisation on the student's part by creating words/phrases and symbols into narrative. If the students keep practising this activity, they can gradually improve their speaking, listening, and creativity in organizing ideas.

Step 3: **Checking Information**	The next step is checking the information. It can be done in two ways: (a) Having finished swapping the information, the students are allowed to check the passage together and complete the mind-map if necessary; (b) the teacher and students check the mind-map to see each student is on the right track in note-taking the information especially in differentiating the main and supporting ideas.

The main objective of every learning is to achieve established competencies. It is, then, necessary to consider the effectivity of learning toward the achievement of the objectives established in the curriculum. After considering students' activity and creativity in teaching and learning process, the teacher must check students' understanding toward the texts analyzed. There are two things that need to be considered from the result of Mind Mapping: the speed of reading and the accuracy of the information obtained. From this activity, the students are constantly motivated and pushed ahead to achieve those two mentioned above (speed and comprehension).

Steps 4: **Retelling Information**	By making use of the results of mind mapping only, the students in group retell the complete information in their own words in English systematically. It can be done by assigning students to work in group of four/two groups merged to provide more chance o speak.

This activity aims at training students' ability in reorganizing ideas which have summarized through mind-mapping. Academinc reading demand students' ability to communicate ideas in organized ways. After reading and summarizing, the students are expected to be able to reword or rephrase the summary into understanble 'presentation'. Constant practices to this activity will lead students to achieving the ultimate goal of learning receptive skills such as reading and listening is to be able to retell comprehensively and acurately the content of the text being read or heard.

Step 5: **Summarizing & Translating**	Using the result of the complete Mind Mapping again, the students are assigned to summarize the content of text either in Indonesian Language or in English in not more than 15 sentences.

For most students at higher education in Indonesia, the purpose of reading text is to get information. Furthermore, the information is needed to be expressed in Indonesian language. Thus, it is necessary to train them to transfer from English into Indonesian. There are two goals to be achieved in this activity: improving ability to summarize and to translate. The limitation to 15 sentences is intended to provide practices to students to produce short and wrapped sumamry as expected in academic texts.

4. Reflection and Development

In order to improve students' ability in academic reading (academic English), the teaching and learning process need to be revised by providing activities that lead to the improvement of skills needed in academic context. In teaching, for examples, the teacher needs to reduce or even leave the tradition of "*Reading for testing*" to "*Reading for information*". The students should step-by-step directed to how to understand the text holistically, represented by their ability at least to retell the content of the text. The intergration proposed above (MMT and IGAs) is one of many possible solutions in teaching academic English.

In teaching and learning process involving adult learners, the teacher is also necessary to create situations which lead to students' ***active, creative, effective***, and ***joyful*** learning, with much emphasis on the ***effectiveness*** of the program (i.e. achievement of the curriculum target). In learning steps mentioned above, the application of Mind Mapping leads students to being ***active*** and ***creative*** in reading and producing mind map of the text. Students' *activity* and *creativity* can also be seen in "*swapping activity*" and "*retelling activity*" as well as in "*summarizing*" and "*translating*" activities. *Effectiveness* of the learning can be shown in the product of Mind Mapping, which is reflected in checking information, retelling, summarizing and translating. Repetition of these activities will accelerate students' learning achievement. *Joyful* learning in the application of the MMT and IGAs is reflected in multiple-fresh-start activities. These multiple-fresh-start activities can avoid boredom on the part of students.

The integration of both MMT and IGAs will lead the achievement of dual targets of learning English, that is, to improve students' English and at the same time to impart earning strategy for higher education – learning how to learn (see Sujana, 2006). It is the job of language teachers to improve students' leaning how to learn.

The Mind Mapping technique, Information Gap Activities and/or the integration of the both can be extended to the teaching English at various education levels. Innovation of learning will much depend on teachers' creativity and dedication to the job.

C. CONCLUDING REMARKS

Teaching English at every level education should be directed to the improvement of students' English achievement; however, the way to achieve learning objectives must be 'packed' in active, creative, and joyful learning. To achieve all this, the teacher is demanded to apply multi-methods/techniques/strategies and multi-media in teaching and learning process.

In teaching Academic English at the university level, the teacher can combine the use Mind Mapping and Information Gap Activities to make learning meaningful to the students. The Mind Mapping Technique can be used to train students' ability in finding out accurate information (main and supporting information), note taking and organizing ideas, etc.; while the IGAs enable students to generate more communication, build students' confidence, improve motivation and develop other sub-skills in learning language. The integration of Mind Mapping Technique and Information Gap Activities (IGAs) is one way to achieve the requirement above --- active, creative, effective, and joyful learning. The teaching and learning process can start from (a) Reading the passage and note-taking, (b) Swapping information from the result of mind map, (c) Checking information, (d) Retelling Information, and (e) Summarizing and Translating.

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Source of mind map picture http://www.let2see.com/mindmap/samples.html

Appendix: Material & Tasks

NOTE-TAKING TECHNIQUES:
FINDING PARALLEL IDEAS
(Main & Supporting Ideas)

TEXT A

Task 1. Read and transfer the information to the Mind Mapping below. Make sure you find parallel ideas. Just spend 15 minites to do this exercise.

DISEASES 1: Spread of Diseases

Diseases are spread from one person to another in some ways, depending on kinds of and causes of the disease. Here are some of the ways they are transmitted:

- Ways in Which Diseases are Spread Indirectly

Some diseases are not transmitted directly to the other humans by the infected persons. One method of indirect transmission is the spread of infecting agents by an animal or insect that has been in contact with the diseased person. In a second method of indirect transmission, a parasite lays eggs in the body of the diseased person. These eggs are passed out of the body through vomit or feces. The eggs develop into the infective stage outside the patient's body and spread the disease to other people.

1. Transmission by Parasites

Ascaris (roundworm) eggs develop into the infective stage outside the human body and transmit disease when they are swallowed. Hookworm eggs become free-living larvae in the eath. The larvae transmit infection by entering a person's body through the skin.

2. Transmission by Insect

Some diseases transmitted indirectly from person to peson by insect carriers are malaria, by the anopheline mosquito; onchocerciasis (river blindness), by the simulium (black fly); and thypus, by the body louse.

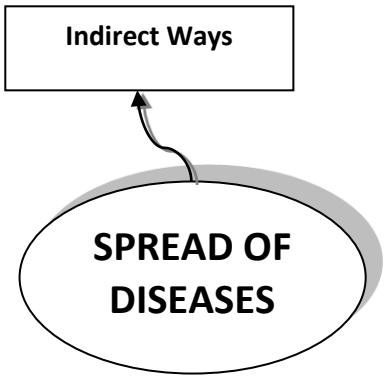
Other diseases are tarnsmitted indirectly from animals to human by insect carriers. For example, yellow fever is transmitted from monkeys to humans by mosquitoes. Bubonic plague is transmitted from rats to people by fleas.

3. Transmission by Animals that Pass a Stage in Another Animal

Schistosome worms must live in fresh water snails before reaching the free-living stage of larvae development. The free-living larvae become inective and are capable of transmitting schistosomiasis when they penetrate a person's skin. The Guinea worm larvae must reach a level of dvelopment in Cyclops before they are capable of infecting the person who swallows them. The beef tapeworm develops in the cow and infects the person who eats uncooked beef.

Source of the Text:
L. Beitler & B. McDonald, 1982. *English for the Medical Professions*. New York: McGraw-Hill

Mind Mapping



Task 2. **Swapping Information**. By using your notes in the Mind Mapping, exchange your information to a friend next to you to complete your and your friend's Mind Mapping. (You are NOT allowed to go to the reading passage. Use the results of Mind Mapping)

Task 3. **Checking Information**. To check whether you have got correct and complete information, compare your notes with your friend or read the complete text.

Task 4. **Retelling Information**. To check whether you understand the oveall information, using Mind Mapping on your notes, retell the information of the passage orally in English.

Task 5. **Summary and Translation**. Using the notes, summarize the content of the reading in Bahasa Indonesia (max. 15 sentences). (Remember! You are NOT allowed to go to the reading passage. Use the results of Mind Mapping).

NOTE-TAKING TECHNIQUES:
FINDING PARALLEL IDEAS
(Main & Supporting Ideas)

TEXT B

Task 1. Read and transfer the information to the Mind Mapping below. Make sure you find parallel ideas. Just spend 15 minites to do this exercise.

DISEASES 2: Spread of Diseases

Diseases are spread from one person to another in some ways, depending on kinds of and causes of the disease. Here are some of the ways they are transmitted:

- Ways in Which Diseases are Spread Directly

Infectious diseases are passed directly from one person to another without any intermediate stage. Diseases are transmitted from one human to another in the following ways:

1. Transmission by Droplets

Large number of organisms that case disease are released when patients exhale. Coughing, Sneezing, and spitting also spread the disease. Epidemics can occur when people are crowded together. Some examples diseases spread by droplets are measles, smallpox, the common cold, streptococcal tonsillitis, diphteria, whooping cough, tubercoloses, and meningitis.

2. Transmission by Direct Skin Contact

Disease-causing organisms are found on the surface of the skin. Many diseases are spread through direct contact with the skin of the patient, including yaws and scabies, leprosy, and venereal diseases. Two venereal diseases, syphylis and gonorrhea are transmitted by skin contact during sexual intercourse.

3. Transmission by the Fecal-Mouth Route

Large numbers of infectious agents are found in feces or vomit of sick people. Diseases of the digestive tract are spread by the fecal-mouth route. The germs are transmitted to healthy people either directly to the mouth by the finger or indirectly by infecting food and water. Flies also spread diseases of the digestive tract because they feed on feces and then transmit the disease-causing organisms to unprotected food. Some of examples of diseases spread by the fecal-mouth route are cholera, bacterial and amebic dysentery, typhoid, poliomyelitis (infantile paralysis), and bacterial food poisoning. Epidemics of digestive tract diseases occur when the water supply of a community is infected.

Source of the Text:
L. Beitler & B. McDonald, 1982. *English for the Medical Professions*. New York: McGraw-Hill

Mind Mapping

Task 2. **Swapping Information**. By using your notes in the Mind Mapping, exchange your information to a friend next to you to complete your and your friend's Mind Mapping. (You are NOT allowed to go to the reading passage. Use the results of Mind Mapping)

Task 3. **Checking Information**. To check whether you have got correct and complete information, compare your notes with your friend or read the complete text.

Task 4. **Retelling Information**. To check whether you understand the oveall information, using Mind Mapping on your notes, retell the information of the passage orally in English.

Task 5. **Summary and Translation**. Using the notes, summarize the content of the reading in Bahasa Indonesia (max. 15 sentences). (Remember! You are NOT allowed to go to the reading passage. Use the results of Mind Mapping).

Complete Text

NOTE-TAKING TECHNIQUES: FINDING PARALLEL IDEAS
(Main & Supporting Ideas)

Task 1. Read and transfer the information to the Mind Mapping below. Make sure you find parallel ideas. Just spend 15 minites to do this exercise.

DISEASES: Spread of Diseases

Diseases are spread from one person to another in some ways, depending on kinds of and causes of the disease. Here are some of the ways they are transmitted:

- Ways in Which Diseases are Spread Directly

Infectious diseases are passed directly from one person to another without any intermediate stage. Diseases are transmitted from one human to another in the following ways:

1. Transmission by Droplets

Large number of organisms that case disease are released when patients exhale. Coughing, Sneezing, and spitting also spread the disease. Epidemics can occur when people are crowded together. Some examples diseases spread by droplets are measles, smallpox, the common cold, streptococcal tonsillitis, diphteria, whooping cough, tubercoloses, and meningitis.

2. Transmission by Direct Skin Contact

Disease-causing organisms are found on the surface of the skin. Many diseases are spread through direct contact with the skin of the patient, including yaws and scabies, leprosy, and venereal diseases. Two venereal diseases, syphylis and gonorrhea are transmitted by skin contact during sexual intercourse.

3. Transmission by the Fecal-Mouth Route

Large numbers of infectious agents are found in feces or vomit of sick people. Diseases of the digestive tract are spread by the fecal-mouth route. The germs are transmitted to healthy people either directly to the mouth by the finger or indirectly by infecting food and water. Flies also spread diseases of the digestive tract because they feed on feces and then transmit the disease-causing organisms to unprotected food. Some of examples of diseases spread by the fecal-mouth route are cholera, bacterial and amebic dysentery, typhoid, poliomyelitis (infantile paralysis), and bacterial food poisoning. Epidemics of digestive tract diseases occur when the water supply of a community is infected.

- Ways in Which Diseases are Spread Indirectly

Some diseases are not transmitted directly to the other humans by the infected persons. One method of indirect transmission is the spread of infecting agents by an animal or insect that has been in contact with the diseased person. In a second method of indirect transmission, a parasite lays eggs in the body of the diseased person. These eggs are passed out of the body through vomit or feces. The eggs develop into the infective stage outside the patient's body and spread the disease to other people.

1. Transmission by Parasites

Ascaris (roundworm) eggs develop into the infective stage outside the human body and transmit disease when they are swallowed. Hookworm eggs become free-living larvae in the eath. The larvae transmit infection by entering a person's body through the skin.

2. Transmission by Insect

Some diseases transmitted indirectly from person to peson by insect carriers are malaria, by the anopheline mosquito; onchocerciasis (river blindness), by the simulium (black fly); and thypus, by the body louse.

Other diseases are tarnsmitted indirectly from animals to human by insect carriers. For example, yellow fever is transmitted from monkeys to humans by mosquitoes. Bubonic plague is transmitted from rats to people by fleas.

3. Transmission by Animals that Pass a Stage in Another Animal

Schistosome worms must live in fresh water snails before reaching the free-living stage of larvae development. The free-living larvae become inective and are capable of transmitting schistosomiasis when they penetrate a person's skin. The Guinea worm larvae must reach a level of dvelopment in Cyclops before they are capable of infecting the person who swallows them. The beef tapeworm develops in the cow and infects the person who eats uncooked beef.

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Source of the Text:
L. Beitler & B. McDonald, 1982. *English for the Medical Professions*. New York: McGraw-Hill