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The impact of an online explicit lexical program on EFL vocabulary gains and listening comprehension

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The study examines the effects of an explicit vocabulary program on the gains of EFL lexical and listening abilities. Two sets of 4-week-self-learning lessons were constructed (http://formoosa.fl.nthu.edu.tw/moodle2/). The experimental group with 11 EFL college freshmen was given: a weekly listening clip, and the explicit lexical lesson targeting word sounds, meanings, and collocations. The control group with 7 freshmen was given three clips per week (2 extra clips). The results show that the experiment group performed better in the lexical and listening posttests but the control group did not. Significant correlations were found between the gains of lexical and listening abilities.

Introduction

Vocabulary ability has been recognized as one of the most powerful predictors of EFL listening comprehension (Buck, 2001; Goh, 2000; Rost, 2005). Based on EFL learners' self-reports, lack of listening vocabulary is perceived as a serious problem in EFL listening difficulties. In the real-time processing of listening input, if learners fail to efficiently link the phonological forms of words with their meanings in context, their listening comprehension will be severely broken down.

To cater to EFL learners' individual needs of lexical support in listening, CALL applications may provide a feasible solution. CALL applications can give the learners more control over speed and repetition of listening input (Robin, 2007). Through online practices, EFL learners can focus on the specific lexical gaps that they need to fill in their lexicons (Rost, 2007). Moreover, they can have extensive listening input with focal

attention to key word identification. Thus, their abilities of mapping listening vocabulary onto contextual meanings, and interpreting meanings from complex sentences can be developed. This may enhance their listening comprehension (Rost, 2005).

Despite the importance of lexical ability for listening, little research has explored the potentials of using online lexical programs to improve **EFL** learners' vocabulary and listening comprehension. The study aims to investigate the relative usefulness of an online lexical program on **EFL** learners' vocabulary gains and listening comprehension. Three research questions were raised as follows.

1. Are there any differences in the experimental and control group performances on the vocabulary test after the online lexical program?
2. Are there any differences in the experimental and control group performances on the listening comprehension test after the online lexical program?
3. What are the relations between the learners' performances in the vocabulary test and the listening comprehension test?

Inadequate vocabulary for EFL listening comprehension

Vocabulary has been identified as a crucial underlying construct for **EFL** listening comprehension (**LC**). Learners need to efficiently process listening input quickly, and to map phonological forms onto lexical meanings so that they can comprehend the listening input accurately (Flowerdew 1994; Rost, 1994). The lexical difficulties that the **EFL** learners encounter in their **LC** may reflect the nature of listening per se, as listening is characterized by fast-speed and no repetitions (Rost, 1994). There are two major constructs of **LC** commonly adopted in listening research: understanding the direct and inferred meanings of contents (Buck, 2001; Goh, 2000). The direct comprehension indicates the ability of comprehending gist, main and supporting ideas, details, and speakers' intentions. For inferred comprehension, Weir (1993 as cited in Buck, 2001) provides further classifications: inferences and deductions, relating to social and situational contexts, communicative functions, and deducing meanings of unfamiliar lexical items from context. The learners should be able to conduct fluent linguistic processing, and to activate their background knowledge, before achieving **LC**.

Moreover, Rost (2005) denotes two stages of word recognition in listening: "identification of words and immediate activation of lexical knowledge linked to words that have been recognized" (p. 507). To create "lexical effects" during listening processing, two processes need to be automated smoothly: the receptive phase of activating the potential words in the mental lexicon, and the active phase of considering contextual cues to make correct lexical choices. The listeners need to have a large vocabulary to process the dual lexical phases interactively (Goh, 2000; Rost, 1994).

Explicit vocabulary supports for listening comprehension

To enhance **EFL** learners' **LC**, offering explicit vocabulary supports is one of the most promising directions. Regarding effective lexical supports, explicitly directing learners' attention to the sound of vocabulary may be an efficient and feasible instructional approach (Rost, 2007). Explicit lexical support refers to treating vocabulary itself as the major learning target, rather than byproducts of good performances on other language tasks, such as reading or listening (Hulstijn, 2001; Hunt & Beglar, 2005). Moreover, in explicit lexical

support, key words of listening contents and critical elements of listening vocabulary need to be addressed. If the EFL listeners can comprehend the meanings of these words early in the text, the subsequent word occurrences are like the occurrences of known words, not unfamiliar words (Nation, 2006). When the semantic connections in learners' mental lexicons are more complex, the word-recognition process becomes easier; the learners can have more facility in real time listening (Rost, 2005, p 509). The critical elements for lexical learning include: sound recognition, stress, contraction, linking to meaning in isolation or in discourse (Nation, 2001). The EFL listeners often experience word-recognition problems, because they do not have clear clues to separate each word in a continuous speech (Goh, 2000; Rost, 2005).

Recently a number of researchers have devoted their efforts to examining the effects of lexical support on listening comprehension. Chang and Read (2006) provided a list of words that were related to listening texts for EFL learners who aimed to prepare for a standardized English test of listening (Test of English for International Communication, TOEIC). However, the researchers did not assess the learners' lexical ability in advance; thus they suspected that the learners might have known the words provided as the lexical supports. Likewise, Chang (2007) investigates how the preparation time of explicit vocabulary support will influence EFL college learners' LC in the TOEIC test. The learners were given a vocabulary list for the listening text a week, a day, or thirty-minutes prior to the test. The results show that the lexical preparation time positively contributes to the learners' vocabulary gains but not to their LC. However, to what extent the "vocabulary support" is effective remains questionable in the study, because whether the words are the key words for interpreting the aural texts and how the learners manage to link word meanings with sounds are understated. Although a positive correlation between the EFL lexical and listening abilities is found, the relationships between the contents of lexical support and the improvements of LC are not fully clarified. In these two studies, the causal relations between the lexical support and the learners' LC seem not to be fully clarified. The relative usefulness of lexical support on the EFL learners' LC remains unknown.

CALL applications on lexical learning for listening comprehension

The advantages of Computer Assisted Language Learning (CALL) for lexical and listening learning have been extensively documented (Rost, 2007; Zapata & Sagarra, 2007). Thanks to the prevalent access to the Internet and digital technology, L2 learners can have instant and direct access to lexical learning at their own pace (Robin, 2007). Zapata and Sagarra (2007) compared the effects of completing a paper workbook and an online workbook as homework on word learning for English-Spanish college learners. After an eight-month longitudinal observation, the learners using the online workbook outperformed their counterparts. Apparently, the Internet-mediated lexical program allows the learners to go beyond the constraints of classroom-oriented learning, and to continue polishing their lexical and listening skills during the off-class time. With the instant access to digital technology, Rost (2007) maintains that the learners can have more control of input speed, pause, and relay function, making lexical pushdown available.

Selecting appropriate listening materials for direct lexical support has been a thorny issue for language teachers to address, because sequencing the materials by difficulty levels can be a daunting task. With the attempt to tackle this problem, Lo (2007) proposes a formula with three major elements: *speech rate, readability,* and the *Academic Word List*

ratio, and constructed an online listening program for EFL college students. But she found her formula was not particularly useful for her EFL college learners, as the learners' performances or their perceptions did not correspond to the proposed difficulties levels. She then suggests that future studies should treat each element as a highlighted factor in sequencing listening materials, yet the two other elements should be taken into sensitive consideration to control the difficulty levels of materials. Specifically dealing with word distributions in listening texts may be a feasible start. However, this can never be easy, as the teachers need to examine whether a set of target words frequently recur in a series of materials. To tackle this problem, Cobb (2007) developed a series of online analysis programs. For example, *TextLex Compare* is for calculating repeated words in two or more texts. The output data consists of a "recycling index" that displays repeated tokens of the first and second entered texts (See Appendix A). Despite the great efficiency of these lexis-analysis programs, few studies have applied the programs to sequence the listening materials. With the help of these lexical computation programs, the present study attempts to investigate the effects of an online explicit lexical program on the EFL learners' lexical abilities and listening comprehension.

Method

Context of the study

Sixty freshmen from two intact classes in two universities in Northern Taiwan taught by the same instructor were recruited. By a quasi-experimental design, one class was assigned as the experimental group, and the other as the control group. The participants had learned English for at least six years. They received the English class for two hours a week with the learning goal of improving their general English proficiency. The online lexical programs served as supplementary materials for improving LC. Although the learners were encouraged to participate in the online lessons, their online participation eventually presented a large discrepancy ranging from diligent involvement to distant apathy. To establish the causal relationships between the use of online lessons and the learners' learning progress, the learners' online participation was carefully reviewed by tracking their user logs. The learners would be eventually counted as the participants for this study only when they completed every online task with a score. The number of participants turned out to be few with 11 people in the experimental group and 7 people in the control group.

Research procedure

The research procedure included 3 phases: developments of the online lessons, experimental procedure, and data collection (See Table 1). First, the online lessons were developed on Moodle (freeware for course management system). The online lessons and the subsequent tests were delivered. Finally, the performances of LC and vocabulary tests were computed.

Developments of the online lessons. In phase 1, most efforts were devoted to designing online lessons, particularly for selecting the listening materials and searching the key words for the subsequent lexical lessons. A set of LC testing items was found from a mock TOEIC test. The last twenty items as the most challenging parts in the test were used (with a listening clip followed by two to three LC questions). Based on the contents of LC test, two

Table 1: Research Procedure

Phases	Procedure
Phase1	*Development of the online lessons:* Find listening clips by the criteria of theme, word coverage (words anchored the **LC** test as key words in selecting listening materials), readability (Grade 2–12), and speech rate (160–130, and below 130 words per minute). Record the lexical lessons from the Longman dictionary, and create online lexical exercises.
Phase 2	*Experimental Procedure:* Pretest was given, followed by four-week online self-learning lessons, and then a posttest.
Phase 3	*Data Collection:* Rate lexical and **LC** tests. Perform statistical procedures. a. Mann-Whitney U Tests (a non-parametric) on two tests of the control and experimental groups b. Spearman Rank Order Correlation matrices (nonparametric correlation)

more listening materials were found by the criteria of speech rate, readability, and word coverage. The range of speech rate covers 160–130 word per minute (moderately slow) to below 130 (slow) according to Pimsleur, Hancock and Furey's (1977) criteria. The readability was calculated by Flesch Grade Level that is widely used to show the difficulty level of reading texts for **US** students (e.g., the Flesch Grade Level 2 is suitable for grade 2 students). The readability of our listening clips ranged from 2 to 15. Finally, the word coverage of the listening materials and the **LC** test was computed by Cobb's (2007) TextLex-Compare tool. The listening materials can serve as the basis for comparison, and the transcripts of the **LC** test as new texts. Table 2 displays the recycle index of shared words between the listening materials and **LC** tests. For four clips used in both groups, the recycle index ranges from 33.96% to 63.41%. For four extra clips used only in the control group, the recycle index ranges from 22.64% to 54.05%. The recycle index indicates a ratio of word repetitions between the listening materials and the **LC** test.

Table 2: Recycle index of shared words between the old the new texts across listening clips

Listening clips	Recycle Index
Four clips for both groups/ **LC** test	Clip1 = 48.65%, Clip2 = 34.74%, Clip3 = 63.41%, Clip4 = 33.96%
Extra clips for the control group/ **LC** test	Clip1 = 54.05%, Clip2 = 47.37%, Clip3 = 31.25%, Clip4 = 22.64%

Second, key words in the **LC** test were selected from the transcripts of **LC** tests. The words that anchored the **LC** questions were selected as the target words for the explicit lexical program. Regarding the contents of the explicit lexical program, the definition, pronunciation, and example sentences of the target words were retrieved from the Longman dictionary,

and transformed into the online weekly materials. The corresponding lexical exercises were also developed.

With the listening and lexical materials, two sets of 4-week online programs were created on Moodle platform. Both audio (mp3 files) and transcript files were uploaded. Table 3 presents the detailed contents of two online lexical programs. Generally, the themes of the online listening materials were related to the LC test, taken from VOA and Breakingnews. The online program for the control group contains one VOA listening clip with LC questions and one extra narrow listening clip taken from Breakingnews. The program for the experimental group contained the VOA listening set and the explicit lexical learning tasks. The direct lexical support was given by a list of target words, so that the learners' attention was directed to the lexical elements explicitly. A series of subsequent lexical tasks were then given: dictation (linking word sounds with meanings), fill-in-blank collocation exercises (locating words and their collocation in sentences), meaning matching (matching words with L1 translation). These online tasks aimed to strengthen the links of sounds, meaning, and uses of the target words.

Table 3: The contents of online listening programs for the experimental and control groups

	Lexical supports	**Listening input**
Experimental	*Explicit lexical Exercises* 1. Sound and meaning (L1 translation) matching and dictation 2. Spelling and meaning (L1 translation) matching 3. Fill-in-the-blank collocation exercises	1. Four clips relate to the theme of the listening test, taken from VOA 2. The subsequent LC questions
Control	*Implicit lexical Exercises* 1. Narrow listening: Four more clips with the relevant theme and vocabulary, taken from Breakingnews	1. Four clips related to the theme of the listening test, taken from VOA 2. The subsequent LC questions

Experimental procedure. In phase 2, a pretest was first administered. Then, four-week online self-learning programs were offered a week later followed by a posttest. In the pretest and posttest, both a LC test and a lexical test were employed.

Instruments. Two types of instruments were used in the study. One self-designed vocabulary test contains 29 words, and 100 items were designed in the format of *dictation, filling-in-the-blank,* and *meaning matching* (see Appendix B for an example item). The lexical test was counted for 100 points (an item counts for one point, with the total score of 100 points). An LC test contains 20 items with 6 listening clips (a clip has two to three testing items). An LC test taken from a mock test of TOEIC, was counted for 100 points (an item counts for five points, with the total score of 100 points). For the difficulty level of LC test, its readability and speech rate were controlled within the range of that of the instructional materials (readability: grade 2–15; speech rate: 160–130, and below 130 words per minute). The readability for the test was at the range of Grade 2–12, and the speech rate is at the range

of 76–135 words per minute. The same lexical and listening tests were used in pretest and posttest, but the item orders were shuffled to minimize the testing effects.

Data Collection. The LC and vocabulary tests were rated by the researchers, and some statistical procedures were undertaken by non-parametric measures. Given the small number of the participants (18 people in total), the Mann-Whitney U Test, also called the Wilcoxon rank-sum test, was performed on the lexical and LC tests respectively. To reveal the relations between the lexical and listening abilities, Spearman Rank Order correlation matrices were computed on the gains of two language abilities. All learners' posttest scores were subtracted by the pretest. Two types of language gains of vocabulary and LC were then correlated to see to what extent these two abilities interrelated to each other.

Results and discussion

Results of the vocabulary tests

Comparing the vocabulary pretests, the experimental group achieved marked improvements in the posttests, while the control did not (See Table 4). In the experimental group, the statistical significance (p = 0.000082< 0.01) was found between the pretest and posttest, suggesting the substantial improvements of the learners' vocabulary abilities. In the control group, the score differences did not reach the statistical significant level (p = 0.225 > 0.05). As the explicit lexical support was provided to the experimental group exclusively, it is not surprising that the experimental group would demonstrate more improvements on the lexical items compared to the control group.

Table 4: Results of Mann-Whitney U Test on Vocabulary Test

	Valid N	Rank Sum Pretest	Rank Sum Posttest	U	Z	p-level	Z adjusted	p-level
Control	7	43.00	62.00	15.00	−1.21387	0.225	−1.21387	0.224800
Experimental	11	66.50	186.50	0.50	−3.93990	***0.000082	−3.94101	***0.000081

Note: p < 0.01

As the results indicate, the experimental group performed better in the vocabulary posttest compared with their pretest, while the control group did not. The results are similar to Chang's (2007) findings that the experimental group receiving explicit lexical support did perform better in the lexical posttest. In the present study, directing the learners' focal attention to learning listening vocabulary enables the learners in the experimental group to process the listening words more efficiently, and to link the word sounds with meanings faster compared to their entry level (Rost, 2005). The experimental group received the intervention that focused on deepening their lexical knowledge, such as developing the form (spelling and sounds), meaning (L1 translation, L2 definitions), and usage (collocates) of the target words. Therefore, the learners had more opportunities to familiarize themselves with the sound patterns of the target words. This enables them to spontaneously map their knowledge of lexical meanings onto the word sounds in a continuous speech stream (Goh, 2000; Schmitt, 2000). On the other hand, the learners in the control group appear to be

less capable of swiftly linking the sound and meaning of the input words, because their attention was not overtly directly to word sounds and meanings in the online program intervention. This lends some support to Hulstijn's (2001) claim that the explicit lexical learning can bring better learning rewards, as learners' attention is deliberately attracted to the intentional vocabulary learning in language input.

Results of the listening comprehension tests

Table 5 shows that the experimental group demonstrated some improvements in the **LC** posttest, while the control group did not. In the control group, there was no significant increase of the learners' **LC** ($p = 0.443 > 0.05$). In the experimental group, sharp increases of the learners' **LC** abilities were found at the significant level ($p = 0.01 < 0.05$). The learners' improvements of **LC** indicate their relative mastery of a two-stage process of **LC**: linguistic processing and applying the results of linguistic processing to background knowledge and context (Flowerdew, 1994). That is, the learners seem to be more competent in accurately linking phonological and lexical-grammatical features and achieving effective real-time processing after the intervention of the online lexical and listening program (Flowerdew 1994; Rost, 1994).

Table 5: Results of Mann-Whitney U Test on Listening Comprehension Test

	Valid N	Rank Sum Pretest	Rank Sum Posttest	U	Z	p-level	Z adjusted	p-level
Control	7	46.50	58.50	18.50	−0.766652	0.443289	−0.776966	0.224800
Experimental	11	87.50	165.50	21.50	−2.56094	***0.010	−2.57699	***0.009

Note: p < 0.01

As the only difference between the control and experimental groups lies in the explicit lexical support in the online program, the learners' improvements on **LC** may be attributed to their increased listening vocabulary. With the direct intervention on listening vocabulary, the learners seem to be able to conduct lexical processing in listening more promptly and precisely. They can swiftly map the input word sounds onto their meanings within discourse. This may contribute to the advance of their abilities in conducting "automatic processing" in real-time **L2** listening. With the mastery of listening vocabulary, the learners can quickly grasp the gist of the listening texts, and interpret textual meanings appropriately (Flowerdew, 1994; Buck, 2001). In other words, **L2** learners' listening vocabulary can be a significant predictor of their **LC**. Also, the process of achieving **LC** may reflect two underlying constructs of **LC**: comprehending the direct and inferred meanings of the contents (Buck, 2001; Goh, 2000). The direct meanings refer to the literal textual understanding that is more related to linguistic processing. The inferred meanings are more complex; it requires **EFL** listeners to activate their social and situational knowledge for better comprehension. These two types of comprehension are interactive and dual, rather than a one-way interaction. If the learners can conduct bottom-up and top-down processing swiftly, they may reach better **LC**. In sum, the present study seems to provide some empirical support to the importance of vocabulary in helping or hindering the **EFL** learners' **LC** (Buck, 2001; Goh, 2000).

Relations between vocabulary ability and listening comprehension

With the Spearman Rank Order matrix, Table 6 reports the positive correlations between the gains of the EFL learners' lexical and listening abilities in two groups. The gains of the lexical and listening abilities were calculated by subtracting the pretest score from the posttest. Positive correlations were found between the two abilities. This indicates that the more listening vocabulary the learners have, the better LC they can achieve, and vice versa. In other words, to enhance L2 LC, expanding the learners' listening vocabulary may be one of the most promising directions.

Table 6: Spearman Rank Order Correlations of lexical and listening abilities in two groups

N=18	V(posttest-pretest)	L(posttest-pretest)
V(posttest-pretest)	1	.6024(**)
L(posttest-pretest)	.6024(**)	1

Note: $p < 0.01$

The present study also shows the feasibility of providing lexical supports to enhance LC, rather than treating lexical gains as the results of good LC. Instead of treating lexical learning as the by-product of good LC, more support for listening vocabulary is needed for the EFL learners in learning how to achieve better LC. With more support for listening vocabulary, the learners can process the EFL listening more accurately and appropriately, and their LC may be improved. On the other hand, the results provide some counter-evidence to Chang's (2007) findings of the importance of lexical support. Chang manipulated time duration of the explicit lexical support to see if it would be helpful to EFL college learners' LC, yet no significant difference was found. She then contends that the explicit lexical support cannot enhance the EFL learners' LC.

To provide better quality lexical support for LC, the present study emphasizes the importance of linking sounds, meanings, and usage of the target words. In the explicit lexical support program, the learners were trained to process the sounds of target words, to map the sounds with the L1 translation or L2 dictionary-based definitions, and to swiftly recognize the collocation of the target words in listening input. Moreover, the repeated exposures and retrieval of the target words were given in listening input with the facility of the online lexical program (Coxhead, 2006; Schmitt, 2000). Consequently, the learners could easily recognize the words in isolation or in discourse, and they could process the listening input with fewer barriers (Goh, 2000; Rost, 2005). By use of CALL applications, the self-paced learning of listening vocabulary becomes easily accessible. Namely, the learner can fill in their own lexical gaps at their own pace. This makes the individualized lexical pushdown possible (Rost, 2007; Zapata & Sagarra, 2007). With the rich input of listening, the learners appear to improve their listening vocabulary and LC after the four-week online lexical program. This complex word knowledge apparently helps them recognize the key words in listening more efficiently, and to activate the word knowledge immediately (Goh, 2000; Rost, 2005). With the encyclopedic lexical knowledge, the learners are able to exert their own "lexical effects" in listening: recognizing potential words by activating the mental lexicons and making accurate lexical decisions by contextual cues (Rost, 2005, p. 507). In this way, the learners can easily process the continuous speech string and achieve better LC.

Conclusion

The study aims to examine the effects of an explicit listening vocabulary program on the gains of EFL lexical and listening abilities. After four-week self-learning lexical program, the learners in the experimental group performed well in the vocabulary and LC posttest, while the control group did not. Moreover, significant correlations are found between two language abilities. This corroborates the claim that providing lexical support is effective in enhancing the EFL learners' LC. With the advance of listening vocabulary, the learners may make progress on their LC subsequently. Strengthening the links between the lexical sounds and meaning may help learners gradually enhance their LC, because they will be able to process key words more efficiently and interpret word meanings more promptly.

Yet, some of the limitations in the present study prevent the results from being widely generalized. First, the scale of the present study is too small; only a short treatment period and a small number of participants were involved. Second, a LC test was repeatedly used throughout pretest and posttest, although the item orders were shuffled. Developing two comparable LC tests to have a counter-balanced design will be able to better exclude the guessing effects for the testing results. More research should be conducted on the issue of how listening vocabulary can enhance LC, as vocabulary ability seems to be under-investigated in the listening and speaking skills, unlike in the literacy skills that have been extensively investigated. Thus, how vocabulary as an integral part of language relates to the development of the four language skills can be better unveiled.

Listening resources

Breaking News: http://www.breakingnewsenglish.com/
TextLex Compare: http://www.lextutor.ca/vp/eng/
VOA News: http://www.voanews.com/english/portal.cfm

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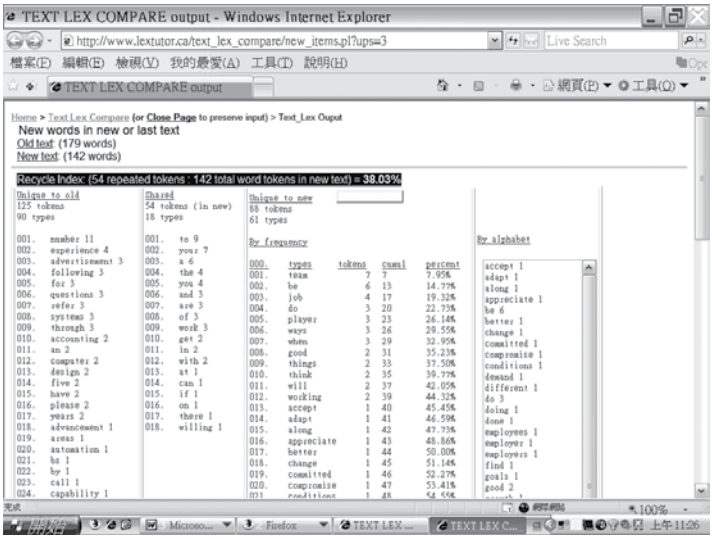
Appendix A

Analyses of the transcript by the TextLex Compare program



Appendix B

Example items of lexical test

B. Vocabulary Test

The test contains two parts: dictation of words and their collocations (firstly delivered), and matching their definitions with the given choices.

EX: Vocabulary item collocations Definitions

communism c_____ _____ socialism *θ*

θ [a political system that the government controls the goods production with no private own property]

Vocabulary Items (dictation)	Fill-in-blank	Definitions
1.	a f_____ _____ Who can _____ f_____?	

Biodata

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