



## TRANSLATION PROCEDURES OF PHYSICS TERMS IN THE PHYSICS BILINGUAL BOOK FOR SENIOR HIGH SCHOOL YEAR XI

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### Abstract

*This study attempted to analyze the use of translation procedures and their accuracy. The objectives of the study were to describe the translation procedures used to translate the Physics terms and to identify their accuracy in Physics Bilingual Book for Senior High School Year XI. This research was conducted qualitatively. This study applied the theory proposed by Vinay and Darbelnet (in Hatim and Munday 2004:30) about translation procedures and the accuracy criteria of translation assessment by Nababan (2012:50). The results of the study showed that there were 119 data of Physics terms and three translation procedures found in this study. The three translation procedures were equivalence, calque and transposition. The translation procedure mostly used was equivalence, followed by calque and transposition. In terms of accuracy, three raters found that around 99.15% of the data were translated accurately, whereas the rest 0.84% of the data were inaccurately translated. The translation procedure with the highest accuracy was equivalence, followed by calque and transposition. Thus, the equivalence procedure was mostly used and had the highest accuracy rating in this research, followed by calque and transposition.*

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## INTRODUCTION

To begin with, the existence of RSBI (The Pioneering of International Standard School) in secondary education has piled up in Indonesia. The use of English in RSBI schools is to make students and teachers get used to English. The use of English is in line with the purpose of RSBI schools that is to be the International Standard School. RSBI schools use English in teaching learning activities. Teachers in RSBI schools are also taught English in order to enable them to teach. In order to make the teachers and students acquainted with English, they are equipped with supportive textbooks in teaching learning activities. The supportive textbooks mentioned above are bilingual books. The bilingual books are provided with two languages Indonesian and English. Regarding the use of bilingual textbooks in RSBI schools, I am interested in using Physics bilingual book for this research. According to Oxford Advanced Learners's Dictionary, term is a word or phrase used as the name of something, especially one connected with a particular type of language. However, Physics is the scientific study of matter and energy and the relationships between them, including the study of forces, heat, light, sound, electricity and the structure of atoms. In addition, Physics is one of the lessons which is full of scientific terms and complicated formulas. Besides, the studies about Physics terms are just few. Those things make Physics more interesting to be studied.

In this case, in Indonesia the use of bilingual textbook is in line with the need to acknowledge English as an International language. Automatically, the secondary education students who are acquainted with English in their bilingual textbooks will be at some advantages. First, students can obtain the knowledge from the subjects. Second, students will be familiar with the English terms related to the subjects. The last, students will be having less difficulty in learning from International journals which indeed use English as the language. The publishers of bilingual textbooks need translators who are acquainted well with English to translate foreign languages into Indonesian language. The translators, at least, should have high proficiency in English. They are demanded to have a good ability in translating English textbooks as the source of information in education into the target text in Indonesian. Besides, translation work needs translation procedures in which it is not an easy task to do. The translation procedure is needed to obtain a high quality of translation in target language or at least equal with the source language. There are some procedures of translation as the way to gain at least adequate results of translation. Vinay and Darbelnet's in Hatim and Munday (2004:30) categorization of translation procedures is very detailed. They name two 'methods' covering seven procedures including 1) Direct translation, which covers borrowing, calque and literal translation, and 2) Oblique translation, which is transposition, modulation, equivalence and adaptation. In this case, translators need to be careful to translate such difficult source texts, for example, the one which has Physics terms.

Translators should make the translation work accurate as the intended meaning in the source text. In order to know whether a translation is good or not, it would be better if a translation is evaluated by experts. The experts can evaluate the accuracy of a translation. According to Nababan (2008:86), an assessment toward the quality of a translation mainly focuses on the accuracy. Newmark (1988:173) suggested that that some kind of accuracy must be the only criterion of a good translation in the future what kind of accuracy depending first on the type and then the particular text that has been translated and that the word 'sub-text' with its Gricean implications and implicatures can be made to cover a multitude of inaccuracies. Moreover, to translate such scientific terms, it must be appropriate with the Scientist's intention. After confirming to the editor of Yudhistira, I acknowledge that the editor of the book which is used in this research uses the direction of translation from Indonesian into English. The materials in the book were extracted from the bibliography. The materials were synchronized with the curriculum for the time being. The editor uses the books reference for reference only. Hence, I intend to analyze the translation

procedure and accuracy of the translated Physics terms in Physics Bilingual Book For Senior High School Year XI published by Yudhistira. The selection of translation procedure in translating technical terms was very essential because it affected the validity and accuracy of the data. Therefore, this research will contribute to determine whether the Physics Bilingual Book for Senior High School Year XI is good enough to be studied as a guide for Physics lesson for secondary education students.

## METHODOLOGY OF THE RESEARCH

This research includes in qualitative research method. Patton (1990) states qualitative research methodologies are designed to provide the researcher with the perspective of participants through immersion in a culture or situation and direct interaction with those under study. The object of the study is the Physics Bilingual Book for Senior High School Year XI. This book contains many Physics terms. The object of the study focused on the Physics terms in the form of Indonesian language as Source Language and the translation product in the form of English language terms as the target language. There were two aspects analyzed in this study. They were the translation procedure of the Physics terms and the accuracy of the translated Physics terms. The accuracy of the translated Physics terms was evaluated by raters who are expert in Indonesian-English language. In conducting this study, there were some stages which should be done in order to obtain the data. The stages were collecting all the data from the book, writing down all the data derived from the book in a table, identifying and classifying the data based on translation procedures proposed by Vinay and Darbelnet, calculating the frequency and percentage of translation procedures in the data in order to obtain the information related to the frequent used of translation procedure happen in the data, interpreting the result of the assessment of raters in term of accuracy of the translated Physics terms, and drawing conclusion from the outcome of the whole analysis. This research took the data from Physics bilingual book for Senior High School Year XI which was published by Yudhistira in 2009. The data are Physics terms which first being checked in some dictionaries including Oxford Advanced Learner's Dictionary and Dictionary of Physics. The translated Physics terms are identified and classified based on translation procedures proposed by Vinay and Darbelnet in tables. I calculated the frequency and percentage of translation procedures in the data. Then, I gave questionnaires to the raters. The questionnaires given contain accuracy criterion to analyze whether the translated Physics terms is good or not.

## RESULT AND DISCUSSION

In this study, there were 119 data of Physics terms contained in the book of Physics Bilingual book for Senior High School Year XI. The Physics terms were translated from Indonesian into English. There were three translation procedures found in the book. The translation procedures found in the book were equivalence, calque, and transposition. The percentages of translation procedures in the data were resumed in a table as follows:

No.	Translation Procedure	Frequency	Percentage
1.	Equivalence	100	84%
2.	Calque	17	14.28%
3.	Transposition	2	1.68%

**Table 3.1** Table of Data Tabulation

From the data tabulation table, it could be concluded that there were three translation procedures from seven translation procedures proposed by Vinay and Darbelnet used in translating

the Physics terms in the Physics Bilingual book. There were 119 data analyzed in the book. The analysis was as follows: the first translation procedure mostly used was equivalence with the frequency of 100 times (84%), followed by calque with the frequency of 17 times (14.28%), and the last translation procedure was transposition with the frequency of 2 times (1.68%).

## 1. Translation Procedures

### 1.1 Equivalence

Equivalence is where one and the same situation can be rendered by two texts using completely different stylistic and structural methods. The classical example of equivalence is given by the reaction of an amateur who accidentally hits his finger with a hammer: if he were French his cry of pain would be transcribed as 'Aie!', but if he were English this would be interpreted as 'Ouch!'. The method of creating equivalences is also frequently applied to idioms. The equivalence procedure occurred 100 times with the percentage of 84%. The data of equivalence procedure can be seen from the following datum:

A. Datum no. 1

Source Text : Sebuah pesawat dari Semarang menuju Jakarta terbang dengan **kecepatan** rata-rata 800 km/jam.

Target Text : An airplane flies Semarang to Jakarta with the average **speed** of 800 km/hour.

The translator translated the term '*kecepatan*' in Indonesian into '*speed*' in English. In the source text, the technical term '*kecepatan*' was translated by using equivalence procedure. The context of the text described an airplane flies Semarang to Jakarta with the average **speed** of 800 km/hour. The rate of an airplane movement is best described by the term '*speed*'. In the Dictionary of Physics, the technical term '*speed*' according to Pitt (1977:358) is defined as the rate of increase of distance travelled with time.

### 1.2 Calque

A calque is a special kind of borrowing whereby a language borrows an expression form of another, and each of its elements is translated literally. Calque is literal translation of a foreign word or phrase lexically as well as structurally. The calque technique occurred 4 times with the frequency of 3%. The calque procedure can be seen from the following datum:

A. Datum no. 4

ST : **Vektor satuan** adalah suatu vektor yang besarnya satu, tanpa satuan, serta arahnya sepanjang sumbu koordinat.

TT : A **unit vector** is a vector, which magnitude is one. It has no unit and its direction is along the axes of the coordinate.

The translator translated the term '*vektor satuan*' in Indonesian into '*unit vector*' in English. In the source text, the technical term '*vektor satuan*' was translated by using calque procedure. In the source language, the first term 'vektor' became the second term in the target language and the second term became the first term. The term 'vektor' was translated into 'vector' in the target language. The consonant 'k' was substituted with the consonant 'c' in the target language. The term 'satuan' in the source language was translated into 'unit' in the target language.

### 1.3 Transposition

The method called transposition involves replacing one word class with another without changing the meaning of the message. Besides, being a special translation procedure, transposition can also be applied within a language. The transposition technique occurred 51 times with the frequency of 43%. The data of transposition procedure was shown by the following examples:

A. Datum no. 44

ST : Sebuah partikel **bergerak harmonik sederhana**. Persamaan simpangannya dinyatakan dengan  $y = 10 \sin 0,5t$  dengan  $t$  dalam sekon dan  $y$  dalam cm. Tentukan percepatan partikel pada  $t = 2,5\pi$  sekon!

TT : A particle undergoes **simple harmonic motion**. Its vertical displacement is stated as  $y = 10 \sin 0.5t$ , where  $t$  is in second and  $y$  in cm. Calculate the particle's acceleration at  $t = 2,5\pi$  seconds.

The translator translated the term '*bergerak harmonik sederhana*' in Indonesian into '*simple harmonic motion*' in English. In the source text, the technical term '*bergerak harmonik sederhana*' was translated by using transposition procedure. The words '*bergerak harmonik sederhana*' in the source language which was a Verb turned into '*simple harmonic motion*' in the target language which was a Noun.

2. Accuracy Score of the Translated Physics Terms

No	Rate of Accuracy	Criteria of Accuracy	Score	Data Number	Total	Percentage
1	Unanimously Rated	1.Accurate 2. Not Quite Accurate 3.Inaccurate	3,3,3	005, 006, 011, 012, 015, 016, 017, 018, 019, 020, 021, 023, 026, 028, 029, 031, 032, 034, 037, 038, 039, 040, 041, 042, 044, 049, 050, 051, 052, 053, 055, 056, 057, 058, 061, 063, 065, 068, 069, 070, 073, 074, 075, 076, 077, 078, 079, 081, 082, 083, 084, 085, 086, 089, 090, 091, 092, 093, 094, 095, 099, 102, 104, 105, 106, 108, 110, 112, 113, 114,	73	61%
			2,2,2	115, 118, 119	-	-
			1,1,1	-	-	-
			3,3,2	59	1	0.84%
			3,2,3	07, 33, 46, 67, 100	5	4.2%
			2,3,3	02, 03, 04,08, 09, 10, 13, 24, 25, 30, 35, 43, 60, 64, 66, 80, 87, 88, 96, 97, 98, 101, 109, 111, 116,	26	21.8%
			117	-	-	-
2.	Not Unanimously Rated	1.Accurate	2,2,3	01, 22, 47, 48, 71, 107	6	5%
			2,3,2	54, 72	2	1.68%
			1,3,3	14, 45, 62, 103	4	3.36%
			2,3,1	36	1	0.84%
			2.Inaccurate	1,2,2	27	1

**Table 3.2** Table of Data Tabulation

From the data tabulation table, it could be concluded that there were two rate of accuracy. The first rate of accuracy was unanimously rated and not unanimously rated. Based on the Oxford Advanced Learner's Dictionary, unanimously rated is defined as 'if a decision or an opinion is unanimous, it is agreed or shared by everyone in a group. In unanimously rated data, the raters rated the data similarly. The raters rated the data by giving similar score. In unanimously rated data, there were three criteria of accuracy. They are accurate, not quite accurate and inaccurate. The accurate data were given score 3 by the three raters. The not quite accurate data were given score 2 by the three raters. Then, inaccurate data were given score 1 by the three raters. However, in this research, I only found the accurate data for unanimously rated data. There were 73 data were found 'accurate' from 119 data with the percentage of 61.34%. The 73 data were accurate because the three raters gave the score 3. The 73 data included in 'unanimously rated' data.

The second rate of accuracy was not unanimously rated. It was the reverse of unanimously rated. The data became not unanimously rated because the raters were not unanimous in giving score for the data. It means that there were differences on assessment of raters who rated the accuracy of the data. There were data which assessed differently. In not unanimously rated data, there were also three criteria of accuracy. They are accurate, not quite accurate and inaccurate. The accurate data was suitable based on the dictionary of Physics and the raters's perspectives on their assessment. The not quite accurate data was suitable based on the dictionary of Physics, but they were rather differently with the raters' assessment. Then, the inaccurate data was not suitable based on the dictionary of Physics. However, in this research, I found the various score forms included in 'not unanimously rated' data. The difference score forms happened because the three raters gave different score for each Physics term. The data which included in accurate data was the first score variant 3,3,2 with the frequency of 1 time (0.84%). The second score variant was 3,2,3 with the frequency of 5 times (4.2%). The third score variant was 2,3,3 with the frequency of 26 times (21.8%). The fourth score variant was 2,2,3 with the frequency of 6 times (5%). The fifth score variant was 2,3,2 with the frequency of 2 times (1.68%). The sixth score variant was 1,3,3 with the frequency of 4 times (3.36%). The seventh score variant was 2,3,1 with the frequency of 1 time (0.84%). 'Then, the last data was 'inaccurate' data with the frequency of 1 time (0.84%). There were 45 data were found 'accurate' from 119 data with the percentage of 37.81%. The 45 data included in 'not unanimously rated' data. The inaccurate datum score was 1,2,2 given by the three raters.

Based on the analysis above, there were two criteria of accuracy found in this study. They were accurate and inaccurate criteria. The accurate data was gained by calculating the accurate data from 'unanimously rated' data and 'not unanimously rated' data. The accurate data from 'unanimously rated' data was 73 data with the percentage of 61.34%. The accurate data from 'not unanimously rated' data was 45 data with the percentage of 37.81%. Thus, the total of accurate data was 118 data with the percentage of 99.15%. However, the 'inaccurate' data was 1 datum with the percentage of 0.84%. The analysis showed that around 99.15% of the data were translated accurately, whereas the rest 0.84% of the data was inaccurately translated.

## 2.1 Unanimously Rated

### 2.1.1 Accurate Criteria

The data became unanimously rated because the raters were unanimous in giving score for the data. It means that there was similarity on assessment of raters who rated the accuracy of the data. There were data which assessed similarly. The accurate data was suitable based on the dictionary of Physics and the raters's perspectives on their assessment. The criteria of accurate translation were given the score of 3 by the three raters. There were 73 data from 119 data or 61% in this research. The data of accurate data can be seen from the following datum:

A. Datum no. 6

ST : Perubahan kecepatan tiap satuan waktu disebut sebagai **percepatan**.

TT : The change of velocity per unit of time is called **acceleration**.

The score given by each rater was 3. Each rater gave score 3 toward the translated Physics term above. In the Dictionary of Physics, the technical term '*acceleration*' according to Pitt (1977:12) is defined as the rate of increase of velocity with time expressed in metres per second ( $m s^{-2}$ ) or other similar units. Thus, the meaning of '*acceleration*' described the same situation as '*percepatan*'. It indicated that the translated Physics term of '*percepatan*' from Indonesian (source language) into '*acceleration*' in English (target language) was accurate without distortion of meaning. The three raters also thought that the term '*percepatan*' should be translated into term '*acceleration*' in the target text.

## 2.2 Not Unanimously Rated

### 2.2.1 Accurate Criteria

#### 2.2.1.1 Accurate data (Score 3, 3, and 2 by the three raters)

The example data for 'accurate' data with the score 3 by the first rater, score 3 by the second rater, and score 2 by the third rater can be seen from the following datum:

A. Datum no. 59

ST : **Hukum kekekalan momentum** menyatakan bahwa jumlah momentum sebelum tumbukan sama dengan jumlah momentum setelah tumbukan.

TT : **The law of momentum conservation** states that the sum of momentum before collision equals to the sum of momentum after collision.

In the Dictionary of Physics, the technical term '*the law of momentum conservation*' according to Pitt (1977:80) is defined as 'in any system of mutually interacting or impinging particles, the linear momentum in any fixed direction remains unaltered unless there is an external force acting in that direction. Besides, I also confirmed to the first, second and the third rater about their perspectives on the '*the law of momentum conservation*' term. The first rater thought that '*the law of momentum conservation*' term was accurate without distortion of meaning. The second rater also thought that '*the law of momentum conservation*' term was accurate without distortion of meaning. The third rater which gave score 2 in the first time changed her perspective on the technical term after realizing her mistake in giving assessment. The third rater then said that the term of '*the law of momentum conservation*' was accurate.

#### 2.2.1.2 Accurate data (Score 3, 2, and 3 by three raters)

The example data for 'accurate' data with the score 3 by the first rater, score 2 by the second rater, and score 3 by the third rater can be seen from the following data:

A. Datum no. 33

ST : **Energi potensial** pegas ( $E_p$ ) dapat diperoleh dengan menghitung luas daerah di bawah kurva.

TT : The area in the graph indicates the **potential energy** of the spring ( $E_p$ ).

In the Dictionary of Physics, the technical term '*potential energy*' according to Pitt (1977:171) is defined as 'the energy possessed by a body or system by virtue of position,

equal to the work done in changing the system from some standard configuration to its existing state'. The first and third rater gave score 3 to the technical term. It means they agreed that the term of '*potential energy*' was accurate. Meanwhile, the second rater gave score 2 to the technical term. Then, I confirmed to the second rater about her perspective on the '*potential energy*' term. The second rater had doubts about the technical term. The second rater thought that the term '*potential energy*' was a little less accurate but did not change the original meaning. However, in the dictionary of Physics, the term of '*potential energy*' existed. Thus, the term of '*potential energy*' included in accurate data.

#### 2.2.1.3 Accurate data (Score 2, 3, and 3 by the three raters)

The example data for 'accurate' data with the score 2 by the first rater, score 3 by the second rater, and score 3 by the third rater can be seen from the following data:

A. Datum no. 4

ST : **Vektor satuan** adalah suatu vektor yang besarnya satu, tanpa satuan, serta arahnya sepanjang sumbu koordinat.

TT : A **unit vector** is a vector, which magnitude is one. It has no unit and its direction is along the axes of the coordinate.

In the Dictionary of Physics, the technical term '*unit vector*' according to Pitt (1977:402) is defined as 'vectors, usually written  $i$ ,  $j$ , and  $k$ , that have unit length and lie along the  $x$ -,  $y$ -, and  $z$ -axes respectively'. The second and third rater gave score 3 to the technical term. It means they agreed that the term of '*unit vector*' was accurate. Meanwhile, the first rater gave score 2 to the technical term. The first rater which gave score 2 in the first time changed his perspective on the technical term after realizing his mistake in giving assessment. The first rater then said that the term of '*unit vector*' was accurate. Meanwhile, in the dictionary of Physics, the term of '*unit vector*' existed. I also thought that the term of '*unit vector*' was accurate based on the dictionary of Physics and the dominant score by the second and third rater.

#### 2.2.1.4 Accurate data (Score 2, 2, and 3 by the three raters)

The example data for 'accurate' data with the score 2 by the first rater, score 2 by the second rater, and score 3 by the third rater can be seen from the following data:

A. Datum no. 22

ST : **Medan gravitasi** didefinisikan sebagai daerah yang masih mendapat pengaruh gaya gravitasi.

TT : **Gravitational field** is defined as the region that is still affected by gravity.

In the Dictionary of Physics, the technical term '*gravitational field*' according to Pitt (1977:171) is defined as 'the space surrounding a massive body in which another massive body experiences a force of attraction'. The third rater gave score 3 to the technical term. It means the third rater agreed that the term of '*gravitational field*' was accurate. Meanwhile, the first and second rater gave score 2 to the technical term. The first and second rater had doubts about the technical term. The first rater thought that the term was not far from the translation target. The second rater thought that the technical term was a little less accurate. Meanwhile, in the dictionary of Physics, the term of '*gravitational field*' existed. Then, I confirmed to a Physics lecturer in Semarang State University

about the '*gravitational field*' term. She thought that the term of '*gravitational field*' was accurate. Thus, the term of '*gravitational field*' included in accurate data.

#### 2.2.1.5 Accurate data (Score 2, 3, and 2 by the three raters)

The example data for 'accurate' data with the score 2 by the first rater, score 3 by the second rater, and score 2 by the third rater can be seen from the following data:

A. Datum no. 72

ST : Resultan semua gaya gravitasi (gaya berat) partikel-partikel penyusun benda berada pada titik tertentu. Titik itu merupakan titik tangkap gaya berat atau sering disebut sebagai titik berat atau **titik pusat massa**.

TT : The resultant of all gravitational forces (weight forces) of the particles that make up an object is located at a certain point. The capture point of the gravitational force is called the center of gravity or **the center of mass of an object**.

In the Dictionary of Physics, the technical term '*center of mass*' according to Pitt (1977:62) is defined as 'a point such that if any plane passes through it, the sum of the products of the masses of the constituent particles by their perpendicular distances from the plane (the sum of the mass moments) is zero'. The second rater gave score 3 to the technical term. It means the second rater agreed that the term of '*center of mass*' was accurate. Meanwhile, the first and third rater gave score 2 to the technical term. The first and third rater had doubts about the technical term. The first rater thought that the term was not far from the translation target. The third rater which gave score 2 in the first time changed her perspective on the technical term after realizing her mistake in giving assessment. The third rater then said that the term of '*center of mass*' was accurate. Meanwhile, in the dictionary of Physics, the term of '*center of mass*' existed. Then, I confirmed to a Physics lecturer in Semarang State University about the '*center of mass*' term. She thought that the term of '*center of mass*' was accurate.

#### 2.2.1.6 Accurate data (Score 1, 3, and 3 by the three raters)

The example data for 'accurate' data with the score 1 by the first rater, score 3 by the second rater, and score 3 by the third rater can be seen from the following data:

A Datum no. 45

ST : Dua buah partikel melakukan gerakan harmonik pada saat garis lurus. Keduanya berangkat dari titik kesetimbangan pada saat dan arah yang sama. Periodenya masing-masing  $1/4$  s dan  $1/7$  s. Berapa **beda fasenya** setelah kedua partikel itu bergerak selama 0,1 s?

TT : Two particles are undergoing harmonic motion in the same straight line. Both of them start from the equilibrium at the same time and direction. The periods are  $1/4$  s and  $1/7$  s respectively. What much is the **phase difference** between the two particles after 0.1 s?

In the Dictionary of Physics, the technical term '*phase difference*' according to Pitt (1977:278) is defined as 'the difference of phase between two sinusoidal quantities that have the same frequency'. The second and third rater gave score 3 to the technical term. It means they agreed that the term of '*phase difference*' was accurate. Meanwhile, the first rater gave score 1 to the technical term. The first rater had doubts about the technical term. The first rater then changed his perspective and said that the term of '*phase difference*' was a little less accurate but did not change the original meaning. The technical term still delivered the meaning well. Meanwhile, in the dictionary of Physics, the term of

'*phase difference*' existed. Then, I confirmed to a Physics lecturer in Semarang State University about the '*phase difference*' term. She thought that the term of '*phase difference*' was accurate. Thus, the term of '*phase difference*' included in accurate data.

#### 2.2.1.7 Accurate data (Score 2, 3, and 1 by the three raters)

The example data for 'accurate' data with the score 2 by the first rater, score 3 by the second rater, and score 1 by the third rater can be seen from the following data:

A. Datum no. 36

ST : **Simpangan** adalah jarak antara posisi beban terhadap titik kesetimbangan.

TT : **Displacement** is the distance between the position of the weight and the equilibrium point.

In the Dictionary of Physics, the technical term '*displacement*' according to Pitt (1977:110) is defined as 'a change in position; the distance moved by a given particle of a system from its position of rest when acted upon by a disturbing force'. The second rater gave score 3 to the technical term. It means the second rater agreed that the term of '*displacement*' was accurate. Meanwhile, the first rater gave score 2 to the technical term and the third rater gave score 1 to the technical term. The first rater thought that the technical term was not quite accurate. However, the first rater also thought that the technical term still delivered the meaning well. The third rater thought that the term of '*displacement*' was not too good translation of 'simpangan'. The third rater thought that the translation of 'simpangan' was 'deviation'. However, based on the dictionary of Physics, the term 'deviation' according to Pitt (1977:100) is defined as 'the difference between an observation and its true value'. The meaning of the '*deviation*' term was not suitable with the term referred in the target text. The third rater suggested me to ask the Physics lecturer. Then, I confirmed to a Physics lecturer in Semarang State University about the '*displacement*' term. She thought that the term of '*displacement*' was accurate. Then, in the dictionary of Physics, the term of '*displacement*' existed. Thus, the term of '*displacement*' included in accurate data.

#### 2.2.2 Inaccurate Criteria

The inaccurate data was not suitable based on the dictionary of Physics. The term which I found in the data was different from the term in the dictionary of Physics. The datum of 'inaccurate' data was given the score 1 by the first rater, score 2 by the second rater, and score 2 by the third rater. The datum of inaccurate data can be seen from the following datum:

A. Datum no. 27

ST : Hukum **kekakalan energi** mekanik dapat digunakan untuk menentukan kecepatan lepas (escape velocity) suatu benda.

TT : The law of mechanical **energy conservation** can be used to determine the escape velocity of an object.

In the target text I found the term '*energy conservation*'. However, in the Dictionary of Physics, the technical term should be '*conservation of energy*'. The term 'conservation of energy' according to Pitt (1977:80) is defined as 'the principle of the total energy in any system is constant'. Besides, I also confirmed to the first, second and the third rater about their perspectives on the '*energy conservation*' term. The first rater thought that the term of '*energy conservation*' was inaccurate or the translation of technical term is inaccurate (or deleted). The second rater thought that the '*energy conservation*' term changed the original meaning of the technical term. Then, the second rater thought

that the term should not be '*energy conservation*' but '*conservation of energy*' because there were differences on cultural background between people who are mastering in Physics and English lecturers. The second rater thought that sometimes the use of '*energy conservation*' term was not a problem for English lecturers or English students. However, it might cost difference for people who are studying Physics. The third rater had the same perspective as the second rater. The third rater also thought that the term '*energy conservation*' should be '*conservation of energy*'. The third rater thought that the term '*conservation of energy*' was the term which usually being used by people who are studying Physics. I also thought that the term '*conservation of energy*' was the most suitable term to replace the '*energy conservation*' term. Thus, the term of '*displacement*' in the target text included in inaccurate data.

### 3. The relation between Accuracy Rating and Translation Procedures

No	Translation Procedure	Level of Accuracy	Rating					
			Rater 1		Rater 2		Rater 3	
			Frequency	Data Number	Frequency	Data Number	Frequency	Data Number
1.	Equivalence	a.Accurate (score 3)	66	6, 7, 11, 12, 15, 16, 17, 18, 19, 20, 21, 23, 26, 28, 29, 31, 32, 33, 34, 37, 38, 39, 40, 46, 49, 50, 51, 55, 56, 57, 59, 61, 65, 67, 68, 69, 70, 73, 74, 75, 76, 77, 78, 79, 81, 82, 83, 84, 85, 86, 89, 90, 91, 92, 93, 94, 100, 104, 105, 106, 108, 112, 113, 114, 115	91	2, 3, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 26, 28, 29, 31, 32, 34, 35, 36, 37, 38, 39, 40, 43, 49, 50, 51, 54, 55, 56, 57, 59, 60, 61, 62, 64, 65, 66, 68, 69, 70, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 96, 97, 98, 99, 101, 103, 104, 105, 106, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119	96	1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 28, 29, 31, 32, 33, 34, 35, 37, 38, 39, 40, 43, 46, 47, 48, 49, 50, 51, 55, 56, 57, 60, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 96, 97, 98, 100, 101, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 116, 117
		b.Not quite	31	1, 2, 3,	11	1, 7, 22, 33,	3	54, 59, 72

	accurate (Score 2)		8, 9, 10, 13, 22, 24, 35, 36, 43, 47, 48, 54, 60, 64, 66, 71, 72, 80, 87, 88, 96, 97, 98, 101, 107, 109, 111, 117		46, 47, 48, 67, 71, 100, 107		
	c.Inaccurate (score 1)	3	14, 62, 103	-	-	1	36
	a.Accurate (score 3)	13	5, 41, 42, 52, 53, 58, 63, 95, 99, 102, 110, 118, 119	14	4, 5, 25, 30, 41, 42, 52, 53, 58, 63, 95, 99, 102, 110	16	4, 5, 25, 30, 41, 42, 52, 53, 58, 63, 95, 99, 102, 110, 118, 119
2.	Calque						
	b.Not quite accurate (Score 2)	3	4, 25, 30	1	27	1	27
	c.Inaccurate (score 1)	1	27	-	-	-	-
	a.Accurate (score 3)	1	44	2	44, 45	2	44, 45
	b.Not quite accurate (Score 2)	-	-	-	-	-	-
	c.Inaccurate (score 1)	1	45	-	-	-	-
3.	Transpo sition						
	Total	119		119		119	

**Table 3.3** Recapitulation of Accuracy Rating

Based on the table above, there were three translation procedures applied in the data by the translator. The three translation procedures were equivalence procedure, calque procedure and transposition procedure. The table showed that the number of accurate data was dominated by equivalence procedure, followed by calque procedure and transposition procedure. Even though some of the accuracy data of each rater were different, but mostly the accurate data were dominated by equivalence procedure in each rater's assessment as shown in the table.

## CONCLUSIONS

Based on the thorough analysis, I found that in translating Physics term from Indonesian into English need to apply equivalence procedure. The reason was because in translating technical terms such as Physics terms, the translator found the equivalence in the source language and in the target language. The data in this research showed the Physics terms in Indonesian as the source language were translated into English as the target language. Even though in this research Indonesian as the source language, but many Physics terms in Indonesian borrowed the Physics terms from foreign language especially English and not the reverse. The importance in using equivalence in this research was to respect the origin of the Physics terms. Based on the reason mentioned beforehand, the equivalence procedure was the most accurate procedure to be applied in this research. The other translation procedures which were found in translating Physics terms in this research were calque procedure and transposition procedure. Each technical term was translated differently based on translation procedures proposed by Vinay and Darbelnet. There were 119 data were analyzed in the book. The translation procedure mostly used was equivalence procedure with the frequency of 100 times (84%), followed by calque procedure with the frequency of 17 times (14.28%) and transposition procedure with the frequency of 2 times (1.68%). The application of equivalence procedure in the data was appropriate. It made the translation of Physics terms was accurate without distortion of meaning.

Beside the translation procedures, the technical term was assessed for its accuracy. The assessment of accuracy itself was done by three raters. The three raters found that around 99.15% of the data were translated accurately, whereas the rest 0.84% of the data were inaccurately translated. The data was gained by the following description; the accuracy of the equivalence procedure was 84.03%, followed by calque procedure with the accuracy 13.44%, and transposition procedure with the accuracy 1.68%. Thus, the equivalence procedure was mostly used and had the highest accuracy rating in this research. As overall, the Physics terms were translated accurately. The accuracy of the translation was 99.15% from 118 data. It means that almost all the data was accurate. In this case, the translator applied the proper translation procedures in the data so the translation of Physics term in Physics Bilingual Book for Senior High School Year XI was accurate without distortion of meaning. The application of translation procedures was very important because it affected the result of the translation. The selection of translation procedure in translating technical terms was very essential because it affected the validity of the data. Therefore, translator's competence and cautious work were really needed. Besides, the outcome of the data in this research was considered good enough.

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