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# Quality Assessment of Badminton Skills Training (BST) Module: Aspects of Validity and Reliability among Secondary School Students

Nguang Ung Siong[1,*] & Syed Kamaruzaman Bin Syed Ali[1]

[1]Faculty of Education, University of Malaya, 50603 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia

*Correspondence: Faculty of Education, University of Malaya, Jalan Profesor Diraja Ungku Aziz, Seksyen 13, 50603 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia. Tel: 60-16-522-6728. E-mail: 17058685@siswa.um.edu.my

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**Abstract**

The objective of this research is to study the validity and reliability of Badminton Skills Training (BST) Module for secondary school students. The content of BST Module includes high serve skill, low backhand serve and Badminton lob shots which are the basic skills need to be mastered by secondary school students. To determine the validity of the module through the method of calculating the percentage of consent, the constructed module was submitted to seven panels expert in the field of Physical Education and Sport Science for evaluation. Improvements have been implemented on this module based on reviews and feedbacks from expert panels. The result of the validity assessment of the entire module content was 0.919. A total of 31 secondary school students from a school in Kuching were involved in a pilot study to measure the reliability of the module after the validity assessment of the module. The reliability of the Cronbach's alpha value of the BST Module was 0.956. The results of the study prove that this module has high content validity and reliability and it can be accepted. Thus, this module is suitable to achieve the objectives of the module that had been set. This module has a high potential to help improve the achievement of learning outcomes in Badminton skills among secondary school students. This module is recommended to test its effectiveness and to be used as references for secondary school teachers during then implementation of Badminton skills learning sessions in schools.

**Keywords:** module, badminton skills training, quality assessment, secondary school students, validity, reliability

## 1. Introduction

Modules are one of the reference materials that can be used to conduct learning sessions in a systematic and planned manner (Noah & Ahmad, 2005). Modules are capable to provide a meaningful learning experience and they are designed to help students in mastering specific intended learning goals (Rusdinala, Rukun, Hudac & Ansharid, 2020). Thus, the modules should contain learning objectives, teaching aids and tests that can help all the students with different abilities to master well the topic of learning. Furthermore, the modules constructed should also be appropriate for the targeted group and are easy to be used in the learning sessions (Sarina et al, 2019).

In secondary schools, although there is Badminton training module developed by the Ministry of Education Malaysia in 2010, but it is used to guide teachers who are the Badminton coaches in district level training centres that focus on Badminton coaching (KPM, 2010). Meanwhile, the Badminton training module developed in 2011 is for the use of teachers who are appointed as Badminton sports club advisor teacher in secondary schools that focus on development of Badminton sport at school level (KPM, 2011). Therefore, the activities in the Badminton coaching module are more focused on fitness, Badminton skills and Badminton game strategy (KPM, 2010) while the activities in Badminton sports training module for secondary schools' club advisor teachers are more focused on Badminton skills and Badminton club management in secondary school (KPM, 2011).

This situation causes theories and instructional models in the teaching and learning of Badminton skills are not given focus and emphasis in the development of both Badminton sport training modules that have been developed because the development goal of both modules is not for the use of Physical Education teachers to help them implement the teaching and learning of Badminton skills in Physical Education classes. The absence of Badminton Skills Training (BST) Module developed based on theories and instructional models to be used in the teaching and learning of Badminton skills results in the often use of traditional teacher-centred teaching by Physical Education teachers in secondary schools to train and teach students sport skills (Nguang, Ali & Hutkemri, 2020; Wee, 2016). Traditional teaching that provides comfort to Physical Education teachers is still their preferences in the implementation of teaching and learning sessions of Physical Education classes because the modules are not able to help in improving the teaching and learning practices of physical Education teachers. This situation causes the achievement of learning outcomes of secondary school students in Badminton skills to be affected as they are found to have difficulties in mastering Badminton learning outcomes well through traditional teaching (Clarasasti & Jatmika, 2017; Nguang et al., 2020; Satriya & Jannah, 2017). Thus, students' involvement in Badminton skills training sessions was affected when students lost initiatives to attend Badminton training during Physical Education class.

Therefore, there is a need to develop BST Module as a guide for Physical Education teachers in secondary schools for the implementation of teaching and learning to master Badminton skills in Malaysia. This is because the development of module as an intervention is important to overcome the problem of mastery of learning outcomes faced by secondary school students and continue to bring positive impacts in improving the learning outcomes achievement of

targeted students in Physical Education class (Ali, Amat, & Kari, 2019; Noah & Ahmad, 2005). Therefore, construction of BST Module is a necessity to overcome the issue of learning outcome achievement in Badminton skills for secondary school students in addition being able to develop Badminton skills learning sessions so that the learning outcomes achievement in the Physical Education class can be improved. Considering the importance of this BST Module in helping to overcome students' learning outcome achievement problems in Badminton skills, assessment on this module should be conducted in this study. It is hoped that the Badminton skills learning outcome issue of secondary school students affected by the frequent use of traditional teaching can be overcome and their learning outcome can be improved with the use of this module by Physical Education teachers as a guide in the implementation of Badminton skills learning sessions in secondary schools in Malaysia. Therefore, the purpose of this study is to ensure that the module constructed has quality and is suitable for secondary school students through the assessment of the validity and reliability of the module content. To ensure that this module is suitable for secondary school students, this study is conducted to test the validity and reliability of the content of this module.

### *1.1 Research Objectives*

In line with the aim of the study, the research objectives outlined are as follows:

1. To assess the validity of the entire content of the Badminton Skills Training (BST) Module and the topics in the learning units of the BST Module by experts.

2. To study the reliability value of the BST Module as a whole and the topics in the learning units of the BST Module.

### *1.2 Theoretical Framework for the Development of Badminton Skills Training (BST) Module*

BST Module developed is based on three main theories, namely social interdependence theory (Johnson & Johnson, 1989), Skinner's operant conditioning theory (Skinner, 1953) and Thorndike's theory (Thorndike, 1932). This module is also based on STAD cooperative learning instructional model (Metzler, 2011). Therefore, the integration of theories along with the instructional model has become the solid foundation and guide in constructing the BST Module that is appropriate to the level and development of the secondary school students in Form One. The learning processes in the BST Module developed can provide new learning experiences through teaching and facilitation activities to encourage the improvement of Badminton skills learning outcome in Physical Education classes.

### *1.3 Badminton Skills Training (BST) Module Development Process Based On Sidek Module Development Model*

Sidek Module Development Model is a development model introduced by Sidek Mohd Noah from Malaysia (Noah & Ahmad, 2005). Sidek Module Development Model is a suitable model in module development because the development of quality training module must be based on appropriate module development model (Ali, Amat & Kari, 2019; Mahmud, Noah, Ahmad & Ahmad, 2016; Noah & Ahmad, 2005). Sidek Model used in this study is a more comprehensive module development model and is suitable to be used as reference to develop module in various

field based on cultural norms in Malaysia (Ali et al., 2019; Osman, 2017; Rasik & Ismail, 2019). Furthermore, the module development model also has systematic and structured steps in the development of quality modules through a clear and thorough guide of module development steps (Noah & Ahmad, 2005; Idris & Shaari, 2017; Saper, Daud & Ahmad, 2016). Therefore, the Sidek Module Development Model is selected by the researcher and used as a guide in the process of developing the BST Module and also to evaluate the validity and determine the reliability of the module. This can ensure the quality of the module is maintained and is suitable for students in secondary schools in Malaysia through a systematic module development process and more comprehensive development steps in module development. By following all the procedures set while constructing the module, the researcher is confident that this module is able to provide optimal impact to secondary school students aged 13 to 14 years to improve learning outcomes during teaching and learning sessions of Badminton skills in Physical Education classes.

There are two preparation phases of BST Module, which include producing a module draft and followed by trying and evaluating the module based on guidelines to Sidek Module Development Model (Mahmud et al., 2016; Noah & Ahmad, 2005). The first phase one is to construct a module draft which consists of nine steps as proposed by the Sidek Model. The development process of BST Module begins with goal setting, identifying theory, rationale, philosophy, concept, target and timeline, research needs, setting objectives, content selection, strategy selection, logistics selection, media selection and module draft consolidation. The BST Module draft has applied the integration of social interdependence theory, Skinner's operant conditioning theory and Thorndike's theory along with STAD cooperative learning instructional model that emphasizes collaboration in small groups, mutual assistance in learning sessions to support Badminton skills learning to meet the needs of students with different abilities so that they are better prepared in Badminton skills learning activities to improve learning outcomes of students in terms of skill achievement, motivation and self-confidence. In general, the draft content of the BST Module consists of 3 learning units and 6 learning sessions for Badminton skills, namely high serve skills, low backhand serve and Badminton lob shots. Thus, each Badminton skills learning unit consists of 2 learning topics for each type of Badminton skills starting with the topic of high serve skills to Badminton lob shots skills. The second phase in the Sidek Module Development Model is testing and evaluating the module draft. In testing and evaluating the BST Module at the second stage, the constructed module went through a pilot study for evaluation and followed by process of determining its validity and reliability. If high validity and reliability obtained, this training module can be implemented in an actual study to evaluate the effectiveness of the module.

## 2. Method

A survey study is used in this study to test the validity and reliability of the draft of Badminton Skills Training (BST) Module constructed. In content validity, at least two experts (Chai, Siew & Lee, 2021), three experts (Rahim & Lee, 2021) or six experts (Ali et al., 2019; Nawi et al., 2015) should be referred to measure the content validity of the module developed. Thus, the

content validity of the module constructed is evaluated by seven panels expert in the fields of Physical Education, Sports Science, curriculum and teaching methodology from universities, Institute of Teacher Education and secondary schools by filling out module expert validity questionnaires distributed to experts in the evaluation process. Table 1 below shows the summary of the backgrounds of the experts appointed to validate the content of the BST Module draft.

**Table 1.** Background Summary of Experts in Content Validity of Badminton Skills Training (BST) Module

| No. | Position | Institution | Expertise | Duration of Service |
|---|---|---|---|---|
| 1 | Professor Dr. | Tunku Abdul Rahman University College (has been upgraded to Tunku Abdul Rahman University of Management and Technology) | Physical Education | 11 years |
| 2 | Associate Professor Dr. | Sultan Idris Education University | Curriculum and Teaching Methodology | 10 years |
| 3 | Associate Professor Dr. | University of Science Malaysia | Sports Science | 7 years |
| 4 | Dr. (Senior Lecturer) | IPG Batu Lintang Campus | Physical Education and Sports Science | 30 years |
| 5 | Head of Physical Education Department | IPG Rajang Campus | Physical Education | 22 years |
| 6 | Excellent Lecturer of Physical Education | IPG Rajang Campus | Physical Education | 36 years |
| 7 | Excellent Teacher of Physical Education | Chung Hua Government Secondary School | Physical Education | 17 years |

In this study, measurement of content validity of BST Module is done by obtaining feedbacks and evaluation through expert panels to ensure the quality of the module and effective implementation of training module (Ali et al., 2019; Noah & Ahmad, 2005; Pukdeewut, Chantarasombat, & Satapornwong, 2013). The appointed experts need to evaluate and validate the overall content of the BST Module as recommended by Noah and Ahmad (2005), the content validity of the training module units as recommended by Arip (2010) and subsequently obtain expert views and comments in content validation form. Thus, the content validity questionnaire form in this study is modified from Noah and Ahmad (2005) and Arip (2010). Later, the researcher gained approved from 7 expert panels to evaluate and measure content validity of the module. This module can be considered as a good, quality, complete and suitable

module for the target group if the content validity of the module is above 0.70 (Nawi et al., 2015; Rahim & Lee, 2021; Ali et al., 2019).

After evaluation of the content validity from experts, a pilot study should be conducted to test the reliability value of the BST Module (Rasik & Ismail, 2019; Idris & Shaari, 2017). This pilot study is important to ensure that the reliability value of the module draft is at an acceptable level, suitable for secondary school students and also used by the researcher for the process of refining the module draft before conducting the study on the actual subject. 31 secondary school students aged 13 to 14 years in a secondary school in Kuching district were involved in a pilot study to determine the reliability value of the BST Module. The selection of the students is suitable according to the needs of the pilot study. They went through all the activities in the module and answered all the module reliability items in the questionnaire assessing the module reliability when completing all the activities in the module. Official approval from the Planning and Research Division (Ministry of Education, Malaysia), Sarawak State Education Department, Kuching District Education Office and school administrators was obtained before the pilot study was conducted on the targeted population group in determining the reliability of the module.

*2.1 Determining Content Validity of the Module*

In this study, measurement of content validity of BST Module is done by obtaining feedbacks and evaluation through expert panels to ensure the quality of the module and effective implementation of training module (Ali et al., 2019; Noah & Ahmad, 2005; Pukdeewut et al., 2013). The appointed experts need to evaluate and validate the overall content of the BST Module as recommended by Noah and Ahmad (2005), the content validity of the training module units as recommended by Arip (2010) and subsequently obtain expert views and comments in content validation form. Thus, the content validity questionnaire form in this study is modified from Noah and Ahmad (2005) and Arip (2010). Later, the researcher gained approved from 7 expert panels to evaluate and measure content validity of the module. This module can be considered as a good, quality, complete and suitable module for the target group if the content validity of the module is above 0.70 (Nawi et al., 2015; Rahim & Lee, 2021; Ali et al., 2019).

The achievement level of module content validity is set at 70 percent and above so that this training module can be verified having high content validity (Tuckman & Waheed, 1981; Tuckman, 1988; Zahir et al., 2019). Furthermore, expert panels are also requested to provide views and comments as well as suggestions and improvements in the spaces provided in the questionnaires. Views and comments as well as suggestions and improvements from experts were used by the researcher for improvement of the module. After the module was improved and refined, a pilot study to measure the module reliability was conducted on the target group consisting of secondary school students.

*2.2 Determining Module Reliability*

To determine the overall reliability value of the module and the learning units of the module by using Cronbach's Alpha method, the construction of the statements in the questionnaire can

be done based on the objectives of the module (Ali et al., 2019; Arip, 2010, Noah & Ahmad, 2005). Thus, the construction of the statements in the reliability questionnaire in this study is based on the objectives of the learning units in the module which have been evaluated and agreed by the experts in the module validation process. This questionnaire consists of 18 statements based on 6 learning topics in the learning units of the Badminton Skillls Training Module to assess the reliability of the module. All secondary school students who attended the learning sessions in the Badminton Skills Training (BST) Module also answered the questionnaire to assess the reliability of the module after completing the pilot study of the module. A pilot study was conducted on 31 secondary school students aged 13 to 14 years in a school in Kuching, Sarawak. The selection of the respondents in this pilot study is appropriate because it has characteristics that are similar to the actual study subject and the number of participants is suitable to assist the researcher to obtain the overall reliability value of the module and the learning units in the BST Module required by using Cronbach's Alpha method (Ali et al., 2019; Nawi et al., 2015; Saper et al., 2016; Zahir et al., 2019). In terms of reliability value, at least a minimum reliability value of 0.60 should be achieved to indicate that the module has a good, acceptable and consistent level of reliability (Ali et al., 2019; Pallant, 2013; Sekaran & Bougie, 2016). Thus, Cronbach's Alpha value of 0.6 and above should be achieved in determining the reliability for each topic in the BST Module. However, module reliability value that reaches 0.70 and above or nearer to Cronbach's Alpha by 1.0 are better (Fraenkel, Wallen & Hyun, 2012; Kerlinger, 1986; Noah & Ahmad, 2005; Idris & Shaari 2017; Nawi et al., 2015). After the repondents answered the module reliability questionnaire, Cronbach's Alpha values were analysed using Statistical Package for Social Sciences (SPSS) version 24.

## 3. Results and Discussion

### *3.1 Module Validity Findings*

The findings of the content validity of this Badminton Skills Training (BST) Module involved 7 experts who were appointed to evaluate the validity of the module as a whole and the learning units based on the content validity questionnaire distributed. The selected experts are academics with expertise in the fields of Physical Education, Sports Science, curriculum and teaching methodology, with more than 5 years of experience in their respective fields and also comprised of different backgrounds. The appointed panel of experts serve in universities, Institutes of Teacher Education, Malaysia and also in secondary schools. The results of the expert validity assessment for the overall content of the BST Module are as shown in Table 2. Table 2 shows that the overall content validity value of the BST Module is 91.9% or 0.919 based on the experts' feedback on the items in the content validity questionnaire. The content validity for the statements in Table 2 ranges from 90% to 94.3%. Minimum achievement percentage of 90% for content statement in BST Module indicates that this module meets its target population, can be implemented perfectly, is appropriate to the time allocated, can increase motivation level during the learning of Badminton skills, can increase self-confidence level in the implementation of Badminton skills. While the maximum percentage is 94.3%, that is, the content of this module can increase the motivation level during the learning of

Badminton skills as well. Overall content validity is good as it has reached 0.7 and above. Thus, the BST Module is a module that meets the target population, can be implemented perfectly, is appropriate to the time allocated and achieve the objectives set in the BST Module. Findings of expert validity based on learning units are shown in Table 2.

**Table 2.** Overall Assessment of Module Content Validity From Experts for the Badminton Skills Training (BST) Module

| No. | Statement | Percentage (%) | Expert Opinion |
|---|---|---|---|
| 1. | The content of this module meets its target population. | 90.0 | Accepted |
| 2. | The content of this module can be implemented perfectly. | 90.0 | Accepted |
| 3. | The content of this module is appropriate to the time allocated. | 92.8 | Accepted |
| 4. | The content of this module can improve the performance of Badminton skills achievement. | 91.4 | Accepted |
| 5. | The content of this module can increase the motivation level during the learning of Badminton skills. | 94.3 | Accepted |
| 6. | The content of this module can increase self-confidence level in the implementation of Badminton skills. | 92.8 | Accepted |
| | Total score obtain from expert x 100% | 91.9 | Accepted |
| | Total overall score | | |
| | Overall content validity Value | 0.919 | Accepted |

From Table 3, the results of expert validity based on the topics in the learning unit of the BST Module are 94.3%. The percentage are 94.3 for Topic 1 Let's Play High Serve in the Badminton high serve skill unit, Topic 2 Let's Serve High and Far as well as Topic 3 Let's Learn Low Serve and Topic 4 Let's Play Over-the-Net Serve in the low backhand serve skill unit. Furthermore, Topic 5 Let's Play Shots and Topic 6 Let's Hit Far and High in the Badminton lob shot skill unit also achieved 94.3% based on the expert validity. Thus, the overall average value of the learning units in the BST Module is 94.3% or 0.943. This means that the level of validity of the training module is good as it exceeds 0.7 through expert assessment based on the learning units. Experts also provide written reviews and suggestions for researchers to make improvements on the content or learning units of the BST Module. Experts have suggested improvements by adding photos to illustrate each skill, diversifying warm-up activities by using rhythmic movements and creative movements in groups, adding pictures of Badminton skills behaviour (as an additional guide) to teachers' descriptions and adding follow through pictures as well as implementation photos of each activity. In addition, experts also commented that diagrams and photos should be added for clearer and better understanding, quantity of teaching aids used should be stated and to include diagrams to show class organisation in the learning sessions. Researcher has made improvements based on reviews, recommendations and evaluations by expert panels in each topic in the learning units of the BST Module.

**Table 3.** Expert Validity Assessment for Topics in the Learning Unit of the Badminton Skills Training (BST) Module

| Unit | Topic | Percentage (%) | Expert Opinion |
|---|---|---|---|
| Badminton High Serve Skill | Topic 1: Let's Play High Serve | 94.3 | Accepted |
| | Topic 2: Let's Serve High and Far | 94.3 | Accepted |
| Badminton Low Backhand Serve Skill | Topic 3: Let's Learn Low Serve | 94.3 | Accepted |
| | Topic 4: Let's Play Over-the-Net Serve | 94.3 | Accepted |
| Badminton Lob Shots Skill | Topic 5: Let's Play Shots | 94.3 | Accepted |
| | Topic 6: Let's Hit Far and High | 94.3 | Accepted |
| Overall Average Score | | 94.3 | Accepted |
| Overall Score Value | | 0.943 | Accepted |

### *3.2 Module Reliability Findings*

Based on the topics in the learning unit of the Badminton Skills Training (BST) Module conducted on secondary school students, the overall Cronbach's alpha (α) reliability of the 6 module learning topics is 0.956. This result indicates that the overall reliability of the BST Module is high. The overall reliability value of the BST Module and the learning topics in the learning unit of the module are shown in the Table 4. Table 4 shows reliability values of 6 learning topics in the BST Module. The highest Cronbach's alpha value is 0.802 for Topic 3 Let's Learn Low Serve. Meanwhile, the lowest Cronbach's alpha is 0.708, which is Topic 2 Let's Serve High and Far. The overall Cronbach's alpha reliability for the BST Module is 0.956. This indicates that the reliability value of the BST Module is high, acceptable and reliable for the targeted group. Meanwhile, the Cronbach's alpha reliability value for each topic in the learning unit ranges from 0.708 to 0.802 while the overall module reliability value is 0.956. Thus, the reliability value of the BST Module is greater than the value of 0.70. This situation indicates that the module has a good and acceptable consistency value (Fraenkel, Wallen & Hyun, 2012).

**Table 4.** Module Reliability Assessment for Topics in the Learning Unit of the Badminton Skills Training (BST) Module

| Unit | Topic | α Value |
|---|---|---|
| Badminton High Serve Skill | Topic 1: Let's Play High Serve | 0.718 |
| | Topic 2: Let's Serve High and Far | 0.708 |
| Badminton Low Backhand Serve Skill | Topic 3: Let's Learn Low Serve | 0.802 |
| | Topic 4: Let's Play Over-the-Net Serve | 0.717 |
| Badminton Lob Shots Skill | Topic 5: Let's Play Shots | 0.734 |
| | Topic 6: Let's Hit Far and High | 0.792 |
| Overall α Value | | 0.956 |

*3.3 Discussion*

The high content validity of the Badminton Skills Training Module from experts' assessment and the feedback as well as comments given by experts show that the content and activities in each unit and topic are in line with the objectives of the module. Thus, the main objective of the Badminton Skills Training Module which aims to improve the learning outcomes of Badminton skills can be achieved based on the integration of social interdependence theory (Johnson & Johnson, 1989), Skinner's operant conditioning theory (Skinner, 1953) and Thorndike's theory (Thorndike, 1932) with the STAD cooperative teaching and learning model (Metzler, 2011) in the process of module construction through the Sidek Module Development Model.

Good reliability of the Badminton Skills Training Module has also shown that secondary students can achieve the objectives of the module and follow every learning activity implemented in this module successfully. The reliability values obtained in the pilot study have indicated that the content of this module is reliable and suitable to be used in experimental studies. In addition, the smooth implementation of the Badminton Skills Training Module on the target group, namely secondary school students in following each activity during the pilot study has also shown that the module produced is of high quality and suitable to be used to improve the learning outcomes of Badminton skills. Thus, secondary school students who follow the Badminton skills learning activities in the module constructed can provide a positive impact to improve the learning outcomes of Badminton skills. The results obtained have shown that the construction of BST Module is in line with the module development process based on the Sidek Module Development Model (Saper et al., 2016; Rasik & Ismail, 2019; Noah & Ali, 2005). The development of this training module can be considered as a quality and complete module after going through a process of expert content validation and pilot study to assess the module reliability (Ali et al, 2019; Zahir, et al., 2019; Noah & Ali, 2005).

Overall, the use of a more comprehensive Sidek Module Development Model in the construction of the Badminton Skills Training Module has helped the researcher obtain high content validity and reliability results of the Badminton Skills Training Module by following all the systematic steps in the process of module construction. This is because the module construction process implemented by the researcher is parallel to the process proposed by the Sidek Module Development Model (Noah & Ahmad, 2005). Furthermore, the integration of social interdependence theory (Johnson & Johnson, 1989), Skinner's operant conditioning theory (Skinner, 1953) and Thorndike's theory (Thorndike, 1932) together with the STAD cooperative teaching and learning model (Metzler, 2011) also played an important role and contributed to the construction of Badminton Skills Training Module that meets the level of Form One secondary school students. The integration of theory along with the teaching model has proved that this Badminton Skills Training Module is able to provide meaningful learning experiences to the students based on the content validity and reliability results of the Badminton Skills Training Module obtained in this study.

## 4. Conclusion

This study has proved that this training module has good validity and meets the objectives of the module through assessments, comments and suggestions from the content validity of the Badminton Skills Training (BST) Module with improvements suggested by experts. The suggestions and feedbacks provided have contributed to the development of a good and quality module. Assessments and reviews of objectives as well as learning activities in the module have reflected that each topic in the learning unit is appropriate to the target group. The good reliability of the BST Module in the pilot study has also shown that this module can be used in experimental study to improve the learning outcomes of Badminton skills for secondary school students. In order to extend the use of this training module to students in secondary schools, training sessions should be given to Physical Education teachers to help them understand and use this module accurately and effectively. The findings of this study also suggest the implementation of a study in the future to test the effects of BST Module on secondary school students aged between 13 and 14 years in secondary schools. The use of this training module is expected to provide knowledge to Physical Education teachers in dealing with problems and further improve the learning outcomes of Badminton skills of students in secondary schools in an integrated and effective manner.

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