# Evaluation of Physical and Health Education Online Learning in Elementary Schools: PLS-SEM Approach

Taufik Rihatno* and Sri Nuraini

***Abstract*—During the COVID-19 pandemic, online learning in physical and health education encountered multiple barriers and resistance. Barriers faced in online learning include inadequate facilities and infrastructure, mastery of technology by teachers, and limited internet networks. So, to measure the achievement of PESH learning objectives, an evaluation process is needed. The Physical Education, Sport, and Health (PESH) quantitative survey research aims to evaluate the success of PESH online learning in elementary schools. It used random sampling technique and obtained a sample of 188 respondents in Yogyakarta. In addition, students, teachers, principals, and vice-principals in five elementary schools participated in the research respondents. The second-order partial least squares structural equation modeling (PLS-SEM) technique was used to test the structural model because of the complexity of the constructs and indicators, which consisting of 5 measurements, 13 aspects, 43 constructs, and 21 hypotheses. The evaluation of the measurement and structural models has met the cut-off values in this literature. Overall, each indicator can explain the variance of the success of online learning evaluation with an average of 88.821%. Each variable has a significant influence on the average success of learning outcomes. The overall recapitulation of the online learning evaluation results obtained >80% with the input variable obtaining an average of 90.359%. Student characteristics and facilities and infrastructure learning are the most dominant in the acquisition of learning evaluation achievements. The recommendation that researchers put forward is that schools should increase the provision of facilities and infrastructure and internet networks so that the implementation of technology and mastery of the material by teachers can be carried out better.**

***Index Terms*—Online learning, physical and health education, evaluation, partial least squares structural equation modeling (PLS-SEM)**

## I. Introduction

Physical education, sport, and health (PESH) is a compulsory subject in the elementary school education curriculum. The important objectives of PESH are to encourage physical growth, psychological development, motor skills, knowledge and reasoning, appreciation of values, and habituation of healthy lifestyles for students [1–3]. The scope of PESH includes games and sports, rhythmic activities, self-test activities or gymnastics, development activities, water or aquatic activities, activities outside the classroom, and health education. So far, the implementation of learning is carried out face-to-face because children aged 7–12 years need direct assistance from the subject teacher. PESH learning that is carried out together is fun and exciting and motivating among students [4–7]. However, learning problems occurred during the COVID-19 pandemic. The central government through the Ministry of Education and Culture has established learning from home to reduce transmission due to COVID-19. During the emergency period, learning is carried out online. This situation changed new habits for teachers and students, namely the implementation of learning carried out from their respective homes.

This government policy raises major problems for teachers in elementary schools, including the lack of support from the capacity aspect in the form of accessibility and facilities and the low ability of teachers to use internet access [8]. Hamid *et al.*'s study [8] shows that seventy percent of students are less active in online learning. Online learning which is carried out regularly also has negative impacts including fatigue in the organs of the body [9], psychological disorders, especially mental and motivational [10], and internet connection stability [11]. The problems faced by teachers also include infrastructure such as internet networks which are influenced by regional demographics. In Indonesia, especially in Yogyakarta, there are some areas where internet is not available and some are experiencing network stability problems, except for urban areas [4, 6, 12]. Some students live in areas with inadequate internet coverage. The readiness of human resources from the teacher's side, especially PESH teachers who are accustomed to direct learning experience difficulties in using technology, as well as students who need assistance from their families. New problems arise when the family stutters with technology causing psychological, emotional, stress, and trauma which has an impact on student motivation to decrease.

According to the researches of Ayadat *et al.'s* [13], Guo *et al.*'s [14], Male and King [15], and Yu [16], it is not enough to evaluate the success of learning by only assessing student learning outcomes, it is necessary to reach out to program design and implementation of learning programs. It is also intended to understand, explore, and correct the learning programs that have been going on so that the gaps in their shortcomings can be identified and can be corrected, and improved [17, 18]. To correct deficiencies in online learning programs, of course, an approach with evaluation models is needed.

Learning evaluation research which includes learning planning, learning characteristics, learning implementation, learning evaluation, and learning achievement is an evaluation model that evaluates learning programs as a system based on their components [19–21]. The previous research evaluation model only evaluated four aspects up to the learning evaluation aspect of the learning

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program [22, 23], with an evaluation model consisting of adding an impact component or related competency-based learning outcomes. training programs [24, 25]. Learning Outcomes or impacts describe the real results of the learning evaluation from the PESH learning evaluation. Learning achievement is used as a benchmark for student learning achievement in achieving the goals and objectives of online learning programs [16, 26].

Based on interviews with PESH teachers, PESH learning is still carried out, but the teacher only gives assignments to perform movements or sports techniques. Students make videos and send them via cellphone to the teacher concerned. So far, PESH teachers have also had difficulty choosing and utilizing technology or online learning platforms to fulfill PESH teaching well. As a result of online learning, not all of the material in the syllabus can be implemented properly. The material that cannot be implemented is due to several reasons, such as the lack of facilities and infrastructure, so teachers can only convey material in theory. DeCoito and Estaiteyeh [27], and Howley [4] state that teacher quality can be seen from the level of success of a teacher in teaching. A teacher is required to have a goal to bring children or students in a better direction in achieving the joint effort [6]. In addition, Ihbour *et al.*'s [12], Martinkevich *et al.*'s [28] and Nurtanto *et al.*'s [29] state that a teacher does not only provide material and provides assessments to students. But the teacher must be as smart as possible in choosing the method that will be used to convey the material that students are expected to be able to understand and be able to accept the material clearly.

The pattern of learning at home certainly has its own obstacles for PESH teachers in practicing motor skills. Many teachers provide online learning that only provides theory, while PESH learning is more of practical activity [30, 31]. When online learning is carried out, the teacher becomes difficult to demonstrate the movements to students, on the other hand, not all students can understand the movements given [1, 32]. These new changes are indirectly able to affect the level of knowledge, understanding, and student learning outcomes. Based on these conditions, studies are still needed to determine the implementation of online PESH learning through an evaluation study. Evaluation research is research to reveal symptoms during the evaluation [6, 33]. These symptoms are certainly related to online learning during the spread of COVID-19. In expressing these symptoms, a good and thorough evaluation is needed to know the success of the implementation of learning. This study aims to evaluate PESH online learning at the elementary school level during the COVID-19 pandemic in Yogyakarta, Indonesia. This study answers the main question, namely, how does online PESH learning affect student achievement at the elementary school level? Through this research, it is expected to be able to measure the influence between components of online learning on PESH in elementary schools.

## II. Methods

Quantitative methods were used to test the theoretical models and hypotheses, and a quantitative analytical survey was applied in this study. The measurement items were obtained from the literature review and were representative of all aspects of the construct. Sampling using a random sampling technique obtained from five elementary schools in Sleman Regency, Yogyakarta Indonesia as the object of research. The research subjects totaled 188 respondents consisting of 94 elementary school students, 32 elementary school teachers, 28 school principals, 18 vice principals (curriculum), and 16 vice principals (facilities and infrastructure). The data collection technique used a questionnaire consisting of 5 variables (learning planning, learning characteristics, learning implementation, learning evaluation, and learning achievement) through interviews, questionnaires, and learning outcomes [21, 25]. The measurement scale used in the questionnaire is a Likert scale in the form of a checklist with four alternative answers [34], namely strongly agree, agree, moderately, and disagree. Research variables and measurement constructs are shown in Table I.

TABLE I: The Research Measurement Constructs

| Aspect | Construct | Indicator | Data Collection | Sources of Data |
|---|---|---|---|---|
| **Learning Planning** [1, 12, 31, 35] | | | | |
| Philosophy of PESH learning | CP1 | Understanding online PESH learning | Questionnaire | Teacher, Principal, Vice-Principal (Curriculum and Facilities and Infrastructure) |
| | CP2 | PESH learning prioritizes moving activities | | |
| | CP3 | Essential materials using online and or offline | | |
| Learning objectives | CL1 | Learning objectives with learning competencies | Questionnaire | |
| | CL2 | Depth of learning objectives aspects of attitude | | |
| | CL3 | Depth of skill aspect learning objectives | | |
| **Learning Characteristics** [4, 6, 12, 31] | | | | |
| Teacher professionalism | IT1 | Participation in online learning workshops | Questionnaire | Teachers, Students |
| | IT2 | Participation in implementation of learning | | |
| | IT3 | Readiness of the syllabus and learning tools | | |
| Student characteristics | IS1 | Activeness in PESH learning activities | Questionnaire | |
| | IS2 | Activeness in student life skills activities | | |
| | IS3 | Student interest in participating in PESH learning | | |
| Facilities and infrastructure learning | IF1 | Online learning tools | Questionnaire | |
| | IF2 | Internet Facilities | | |
| | IF3 | Sports equipment at home | | |
| Preparation process | IP1 | Basic competency-based modules and TPACK | Questionnaire | |
| | IP2 | Material cohesively and logically sequential | | |

| Aspect | Construct | Indicator | Data Collection | Sources of Data |
|---|---|---|---|---|
| | IP3 | Comprehensive material | | |
| **Learning Implementation** [1, 4, 12, 36, 37] | | | | |
| Learning tools | PL1 | Media and learning aids | Questionnaire | Teachers, Students |
| | PL2 | Stages of learning activities | | |
| | PL3 | Class management with learning approach | | |
| Implementation of online learning | PI1 | Enthusiasm when learning online | Questionnaire | |
| | PI2 | Understanding of subject matter | | |
| | PI3 | Understanding of assigned tasks | | |
| Material relevance | PR1 | Dissemination of vision and mission | Questionnaire | |
| | PR2 | Material based on core competence | | |
| | PR3 | Material based on basic competence | | |
| | PR4 | Inclusive materials by age and level of education | | |
| Competency materials | PM1 | Competence by online learning | | |
| | PM2 | Competence by students' physical skills | | |
| | PM3 | Competence by students' psychic skills | | |
| | PM4 | Facilitate warm-up activities | | |
| **Learning Evaluation** [3, 5, 7, 12, 36] | | | | |
| Evaluation of Learning process | PD1 | Assessment for theory ability | Questionnaire | Teachers, Students |
| | PD2 | Assessment for practical skills | | |
| | PD3 | Assessment for physical fitness | | |
| | PD4 | Motivational Assessment Questionnaire | | |
| Evaluation of learning outcomes | PC1 | Implementation of learning outcomes evaluation | Questionnaire | |
| | PC2 | Assign practice assignments | | |
| | PC3 | Assessment of online learning outcomes | | |
| **Learning Achievement** [7, 33, 37, 38] | | | | |
| Learning achievement | OL1 | Theoretical ability learning outcomes | Questionnaire | Student |
| | OL2 | Practical skills learning outcomes | | |
| | OL3 | Physical fitness learning outcomes | | |
| | OL4 | Student motivation level | | |

Structural Equation Modeling (SEM) is a multivariate statistical analysis technique that combines aspects of factor analysis and regression. PLS-SEM is a statistical method that studies complex multivariate relationships between observational variables and latent variables. The evaluation of the measurement model will test the validity and estimate the reliability of the data on each latent variable using the Smart-PLS software. The rule of thumb criteria for evaluating the measurement model are shown in Table II.

TABLE II: RULE OF THUMB CRITERIA FOR EVALUATION OF MEASUREMENT MODELS

| Measurements | Parameter | Cutt of point | References |
|---|---|---|---|
| Convergent validity | Outer loading (Factor Loading/FL) | ≥0.70 | [39–42] |
| | Average variance extrated (AVE) | ≥0.50 | |
| Discriminant validity | Fornell-Larcker | Each construct is greater than the correlation between other constructs | |
| | Heterotrait-Monotriat Ratio (HTMT) | <0.90 | |
| Consistency reliability | Cronbach's Alpha (CA) | ≥0.70 | [43–45] |
| | Rho_A | ≥0.70 | |
| | Composite Reliability (CR) | ≥0.70 | |

Evaluation of the structural model is an analysis that describes and predicts causality relationships between latent variables. The causality relationship is seen through bootstrapping and test parameters. The structural model analysis stage is by looking at the effect size value ($f^2$), $R^2$, and $Q^2$ predictive relevance. The rule of thumb criteria for evaluating structural models is shown in Table III.

TABLE III: RULE OF THUMB CRITERIA FOR EVALUATION OF STRUCTURAL MODELS

| Measurements | Parameter | Cutt of point | References |
|---|---|---|---|
| Effect Size | $f^2$ | 0.02 Small<br>0.15 Medium<br>0.35 Large | [39–42] |
| Coefficient of Determination | $R^2$ | 0.190 Weak<br>0.333 Moderate<br>0.670 Substantial | |
| Predictive Relevance | $Q^2$ | Strong predictive ≥ 0.35 | |

At the hypothesis testing stage, the significance test ($\beta$-$_{coefficient}$) is used to determine whether the direction of the relationship between variables is positive or negative. The value of $T$-$_{statistics}$ and $p$-$_{value}$ for the effect of each variable is there a significant effect. Structural model assessment criteria can be seen in Table IV.

TABLE IV: RULE OF THUMB CRITERIA FOR HYPOTHESIS TESTING

| Measurements | Parameter | Cutt of point | References |
|---|---|---|---|
| Path coefficient | $\beta$-$_{coefficient}$ | (+) / (−) | [39–42] |
| | Significance ($p$-$_{value}$) | <0.05 | |
| | $T$-$_{statistics}$ | >1.96 | |

In this study, the hypothesis formulated is that the variables of learning planning, learning characteristics, learning implementation, and learning evaluation affect the learning achievement variables positively and significantly.

In this study, the PLS-SEM technique was used to test the structural model because of its large complexity with many constructs and indicators, there are five measurements, 13 aspects, 43 constructs, and 21 relationships (hypotheses). In addition, the coefficient of determination is used to estimate the accuracy of the constructed model to measure competence according to the demands of the construction industry. So, in this study, PLS-SEM is represented by the SmartPLS 3.0 software which is used to test and evaluate the measurement and structure models. The research framework and path analysis are shown in Fig. 1.

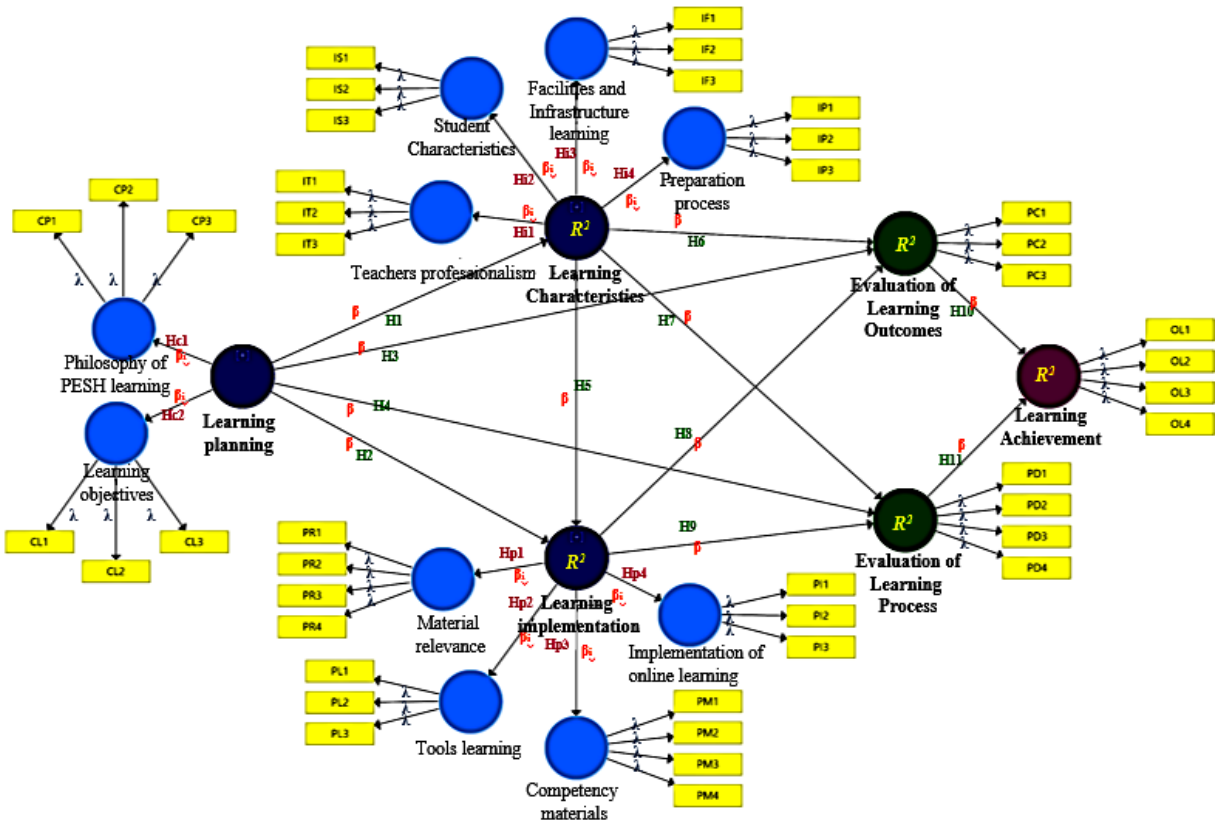


Fig. 1. The research framework.

## III. Results

### A. Evaluation of Measurement Model

Evaluation of the measurement model was carried out to test the validity and estimated reliability of the data on each variable, namely learning planning, learning characteristics, learning implementation, learning evaluation, and learning achievement using Smart-PLS. In the evaluation of the measurement model, the convergent validity was evaluated first, which included the measurement of the loading factor and the AVE value. The construct can have a good validity value when the loading factor value is 0.70 and the AVE value is 0.50 [44, 46, 47]. The measurement of the path coefficients of the PLS-SEM model is shown in Fig. 2.

The results of the convergent validity and internal consistency reliability test are shown in the Table V.

TABLE V: The Results of the Evaluation of Measurement Models

| No | Variable | Aspects | Constructs | FL (>0.70) | CA (>0.70) | Rho_A (>0.70) | CR (>0.70) | AVE (>0.50) |
|---|---|---|---|---|---|---|---|---|
| 1 | Learning Planning | Philosophy of PESH learning | CP1 | 0.910 | 0.837 | 0.858 | 0.878 | 0.729 |
| 2 | | | CP2 | 0.949 | | | | |
| 3 | | | CP3 | 0.896 | | | | |
| 4 | | Learning objectives | CL1 | 0.955 | 0.875 | 0.877 | 0.915 | 0.808 |
| 5 | | | CL2 | 0.880 | | | | |
| 6 | | | CL3 | 0.945 | | | | |
| 7 | Learning Characteristics | Teacher professionalism | IT1 | 0.950 | 0.881 | 0.883 | 0.927 | 0.883 |
| 8 | | | IT2 | 0.689 | | | | |
| 9 | | | IT3 | 0.950 | | | | |
| 10 | | Student characteristics | IS1 | 0.843 | 0.841 | 0.871 | 0.871 | 0.860 |
| 11 | | | IS2 | 0.878 | | | | |
| 12 | | | IS3 | 0.865 | | | | |
| 13 | | Facilities and infrastructure learning | IF1 | 0.883 | 0.934 | 0.938 | 0.958 | 0.655 |
| 14 | | | IF2 | 0.888 | | | | |
| 15 | | | IF3 | 0.926 | | | | |
| 16 | | Preparation Learning Implementation | IP1 | 0.975 | 0.918 | 0.921 | 0.948 | 0.779 |
| 17 | | | IP2 | 0.931 | | | | |

| No | Variable | Aspects | Constructs | FL (>0.70) | CA (>0.70) | Rho_A (>0.70) | CR (>0.70) | AVE (>0.50) |
|---|---|---|---|---|---|---|---|---|
| 18 | | | IP3 | 0.955 | | | | |
| 19 | Learning Implementation | Learning tools | PL1 | 0.822 | 0.738 | 0.738 | 0.851 | 0.854 |
| 20 | | | PL2 | 0.907 | | | | |
| 21 | | | PL3 | 0.793 | | | | |
| 22 | | Implementation of online learning | PI1 | 0.955 | 0.905 | 0.916 | 0.934 | 0.600 |
| 23 | | | PI2 | 0.945 | | | | |
| 24 | | | PI3 | 0.910 | | | | |
| 25 | | Material relevance | PR1 | 0.884 | 0.808 | 0.956 | 0.959 | 0.719 |
| 26 | | | PR2 | 0.910 | | | | |
| 27 | | | PR3 | 0.826 | | | | |
| 28 | | | PR4 | 0.907 | | | | |
| 29 | | Competency materials | PM1 | 0.836 | 0.721 | 0.823 | 0.840 | 0.844 |
| 30 | | | PM2 | 0.902 | | | | |
| 31 | | | PM3 | 0.812 | | | | |
| 32 | | | PM4 | 0.862 | | | | |
| 33 | Learning Evaluation | Evaluation of Learning Process | PD1 | 0.844 | 0.805 | 0.766 | 0.840 | 0.913 |
| 34 | | | PD2 | 0.883 | | | | |
| 35 | | | PD3 | 0.900 | | | | |
| 36 | | | PD4 | 0.816 | | | | |
| 37 | | Evaluation of Learning Outcomes | PC1 | 0.833 | 0.910 | 0.807 | 0.844 | 0.743 |
| 38 | | | PC2 | 0.837 | | | | |
| 39 | | | PC3 | 0.874 | | | | |
| 40 | Learning Achievement | Learning achievement | OL1 | 0.937 | 0.827 | 0.953 | 0.942 | 0.760 |
| 41 | | | OL2 | 0.845 | | | | |
| 42 | | | OL3 | 0.947 | | | | |
| 43 | | | OL4 | 0.961 | | | | |

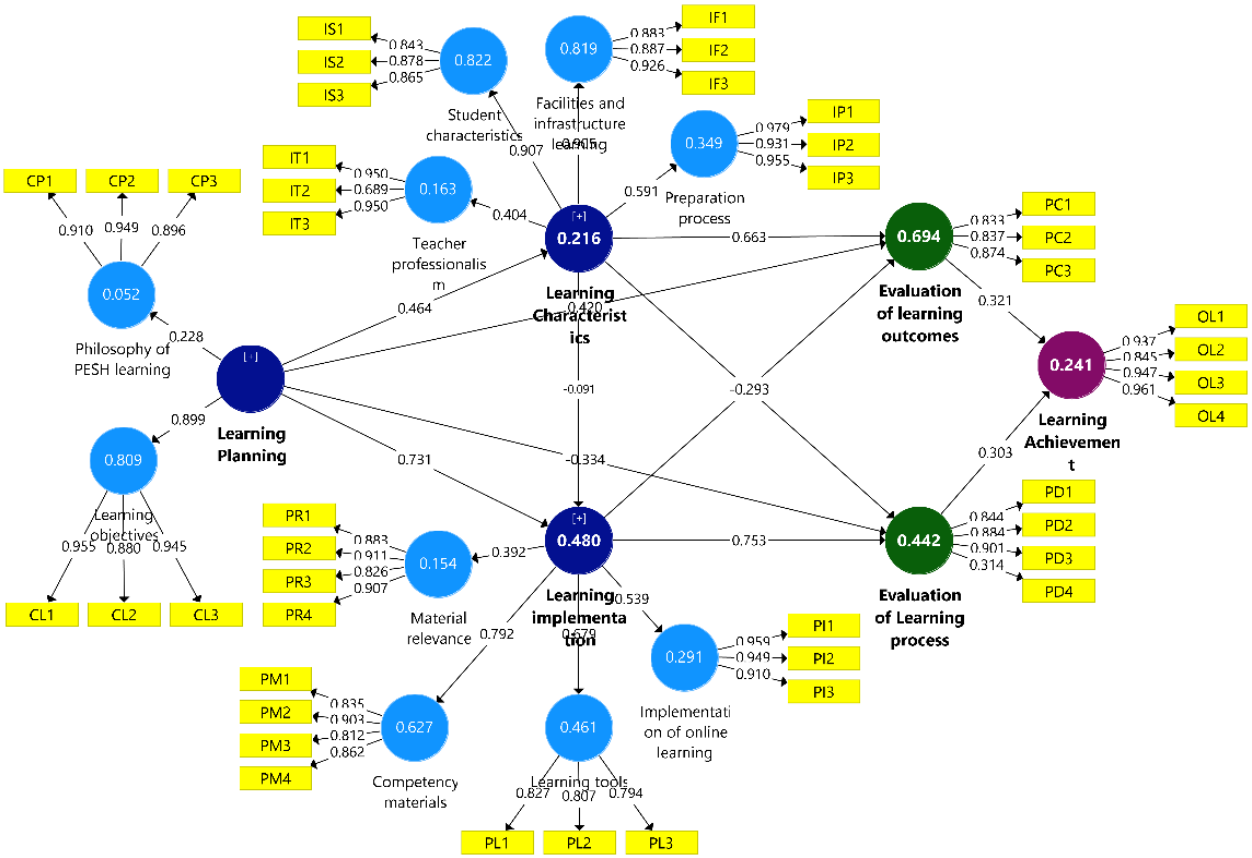


Fig. 2. Evaluation of the measurement model (outer model).

Based on Table V, the loading factor (*factor loading/FL*) value for all constructs is already 0.70. Based on the factor loading value, the philosophy of PESH learning (CP) And learning objectives (CL) indicators can explain the variance of the context variable with an average of 92.250%. So, overall, each latent variable has been able to explain the variance of each indicator whose measurement is for the evaluation of physical and health education online learning in elementary schools with an average of 88.821%. Based on Table V, it shows that the five latent variables have *CA*, *CR*, and *Rho_A* values is >0.70. That is, the indicators that have been set have been able to measure each latent variable (learning planning, learning characteristics, learning implementation, and learning evaluation) properly. The indicator measurement of each variable has met the convergent validity criteria. Furthermore, the evaluation of

discriminant validity is estimated based on the presented Fornell larcker value (Table VI). Based on Table VI, the correlation values of all latent variables obtained higher values than other variables. So, it can be explained that the Fornell larcker in this study has met the criteria of discriminant validity.

TABLE VI: RESULTS OF FORNELL-LARCKER

| | C | PM | IF | I | PI | CL1 | PL | PR | OL | P | PD | PC | CP | IP | IS | IT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C** | 0.898 | | | | | | | | | | | | | | | |
| **PM** | 0.862 | 0.854 | | | | | | | | | | | | | | |
| **IF** | 0.486 | 0.118 | 0.930 | | | | | | | | | | | | | |
| **I** | 0.468 | 0.145 | 0.909 | 0.910 | | | | | | | | | | | | |
| **PI** | 0.135 | 0.223 | 0.078 | 0.201 | 0.940 | | | | | | | | | | | |
| **CL1** | 0.678 | 0.799 | 0.224 | 0.241 | 0.065 | 0.927 | | | | | | | | | | |
| **PL** | 0.296 | 0.315 | 0.166 | 0.184 | 0.191 | 0.213 | 0.869 | | | | | | | | | |
| **PR** | 0.052 | 0.022 | 0.096 | 0.092 | 0.148 | 0.065 | 0.809 | 0.882 | | | | | | | | |
| **OL** | 0.248 | 0.103 | 0.334 | 0.405 | 0.127 | 0.118 | 0.175 | 0.132 | 0.924 | | | | | | | |
| **P** | 0.682 | 0.784 | 0.187 | 0.248 | 0.544 | 0.598 | 0.313 | 0.400 | 0.261 | 0.600 | | | | | | |
| **PD** | 0.325 | 0.268 | 0.263 | 0.333 | 0.094 | 0.247 | 0.681 | 0.249 | 0.381 | 0.533 | 0.776 | | | | | |
| **PC** | 0.529 | 0.118 | 0.880 | 0.789 | 0.051 | 0.220 | 0.150 | 0.051 | 0.394 | 0.161 | 0.242 | 0.855 | | | | |
| **CP** | 0.228 | 0.163 | 0.276 | 0.331 | 0.101 | 0.076 | 0.304 | 0.096 | 0.853 | 0.273 | 0.348 | 0.848 | 0.919 | | | |
| **IP** | 0.160 | 0.122 | 0.236 | 0.583 | 0.350 | 0.129 | 0.083 | 0.068 | 0.137 | 0.234 | 0.208 | 0.326 | 0.075 | 0.955 | | |
| **IS** | 0.472 | 0.112 | 0.899 | 0.707 | 0.089 | 0.222 | 0.177 | 0.052 | 0.447 | 0.179 | 0.307 | 0.141 | 0.387 | 0.235 | 0.862 | |
| **IT** | 0.245 | 0.206 | 0.285 | 0.402 | 0.136 | 0.104 | 0.344 | 0.208 | 0.370 | 0.355 | 0.407 | 0.264 | 0.357 | 0.356 | 0.322 | 0.872 |

### B. *Evaluation of the Structural Model*

Structural model evaluation (SEM) is an analysis that describes and predicts causality relationships between latent variables. Causality relationship is seen through bootstrapping. The initial stage of structural model analysis is to look at the values of $f^2$, $R^2$, and $Q^2$. The magnitude of the influence between variables with *f*-square. The recommended *q*-square value is >0.00. Structural model assessment criteria are shown in Table VII and VIII.

TABLE VII: RESULTS OF EFFECT SIZE ($f^2$) AND COEFFICIENT OF DETERMINATION ($R^2$)

| Aspects/Variable | | | $f^2$ | | $R^2$ | |
|---|---|---|---|---|---|---|
| | | | **Value** | **Effects** | **Value** | **Effects** |
| Philosophy of PESH learning | → | Learning Planning | 1.600 | Large | 0.052 | Weak |
| Learning objectives | → | Learning Planning | 1.136 | Large | 0.807 | Substantial |
| Teacher professionalism | → | Learning Characteristics | 0.421 | Large | 0.162 | Weak |
| Student characteristics | → | Learning Characteristics | 0.281 | Medium | 0.829 | Substantial |
| Facilities and infrastructure learning | → | Learning Characteristics | 0.867 | Large | 0.826 | Substantial |
| Preparation Learning Implementation | → | Learning Characteristics | 0.190 | Medium | 0.340 | Moderate |
| Learning tools | → | Learning Implementation | 0.528 | Large | 0.463 | Moderate |
| Implementation of online learning | → | Learning Implementation | 0.246 | Medium | 0.296 | Weak |
| Material relevance | → | Learning Implementation | 0.515 | Large | 0.160 | Weak |
| Competency materials | → | Learning Implementation | 0.863 | Large | 0.615 | Moderate |
| Evaluation of Learning Process | → | Learning Evaluation | 4.733 | Large | 0.442 | Moderate |
| Evaluation of learning Outcomes | → | Learning Evaluation | 4.835 | Large | 0.689 | Substantial |
| Learning achievement | → | Learning Achievement | 4.179 | Large | 0.242 | Weak |

TABLE VIII: RESULTS OF PREDICTIVE RELEVANCE ($Q^2$)

| Aspects/Variable | | | $Q^2$ Construct Crossvalidated Communality | | $Q^2$ Construct Crossvalidated Redundancy | |
|---|---|---|---|---|---|---|
| | | | **Value** | **Predictive Power** | **Value** | **Predictive Power** |
| Philosophy of PESH learning | → | Learning Planning | 0.329 | Moderate | 0.659 | Strong |
| Learning objectives | → | Learning Planning | 0.534 | Strong | - | - |
| Teacher professionalism | → | Learning Characteristics | 0.582 | Strong | 0.433 | Strong |
| Student characteristics | → | Learning Characteristics | 0.179 | Moderate | - | - |
| Facilities and infrastructure learning | → | Learning Characteristics | 0.714 | Strong | - | - |
| Preparation Learning Implementation | → | Learning Characteristics | 0.671 | Strong | - | - |
| Learning tools | → | Learning Implementation | 0.311 | Moderate | 0.487 | Strong |
| Implementation of online learning | → | Learning Implementation | 0.614 | Strong | - | - |
| Material relevance | → | Learning Implementation | 0.736 | Strong | - | - |
| Competency materials | → | Learning Implementation | 0.614 | Strong | - | - |
| Evaluation of Learning Process | → | Learning Evaluation | 0.736 | Strong | 0.609 | Strong |
| Evaluation of Learning Outcomes | → | Learning Evaluation | 0.632 | Strong | - | - |
| Learning achievement | → | Learning Achievement | 0.765 | Strong | 0.657 | Strong |

Overall, in every aspect and variable, the value of effect size ($f^2$) is >0.150. So that the influence of each aspect on the variables in the large category. Four aspects have a weak coefficient of determination (<0.333), namely teacher professionalism, implementation of online learning, material relevance, and learning achievement. However, overall, all aspects make a moderate contribution to the evaluation of the success of online learning. The next test is to see the predictive relevance of *Q-square* ($Q^2$) which aims to validate the predictive ability of the influence of the variable. The

results of the predictive calculation of the relevance of $Q^2$ on all variables obtained a value of 0.179 to 0.765 which explains the results of the model analysis that can explain 17.90% to 76.50% of the evaluation of the success of online learning.

### C. Hypothesis Testing

Hypothesis testing in this study was indicated by the significance value ($T$-statistics) above the $T$-table value with ($\alpha$ = 0.05; $t$-table 1.96). The results of the significance values can be seen in Fig. 3. Table IX shows that the relationship between all variables has a positive effect indicated by the $\beta$-coefficient value with a positive value acquisition. The $T$-statistic and $p$-value which shows the significance level of the influence of each variable are compared with the $T$-statistic value >1.96 and $p$-value < 0.05. In Table IX the relationship between learning planning and evaluation of the learning process, learning characteristics to learning implementation, and learning characteristics to the evaluation of the learning process, all three have a positive but not significant effect ($T$-statistic < 1.96 and $p$-value > 0.05). Thus, hypothesis $H_4$, $H_5$, and $H_7$ in this study which states that it has a "positive and significant effect" is rejected. In addition, the other hypotheses stated that Ha was accepted.

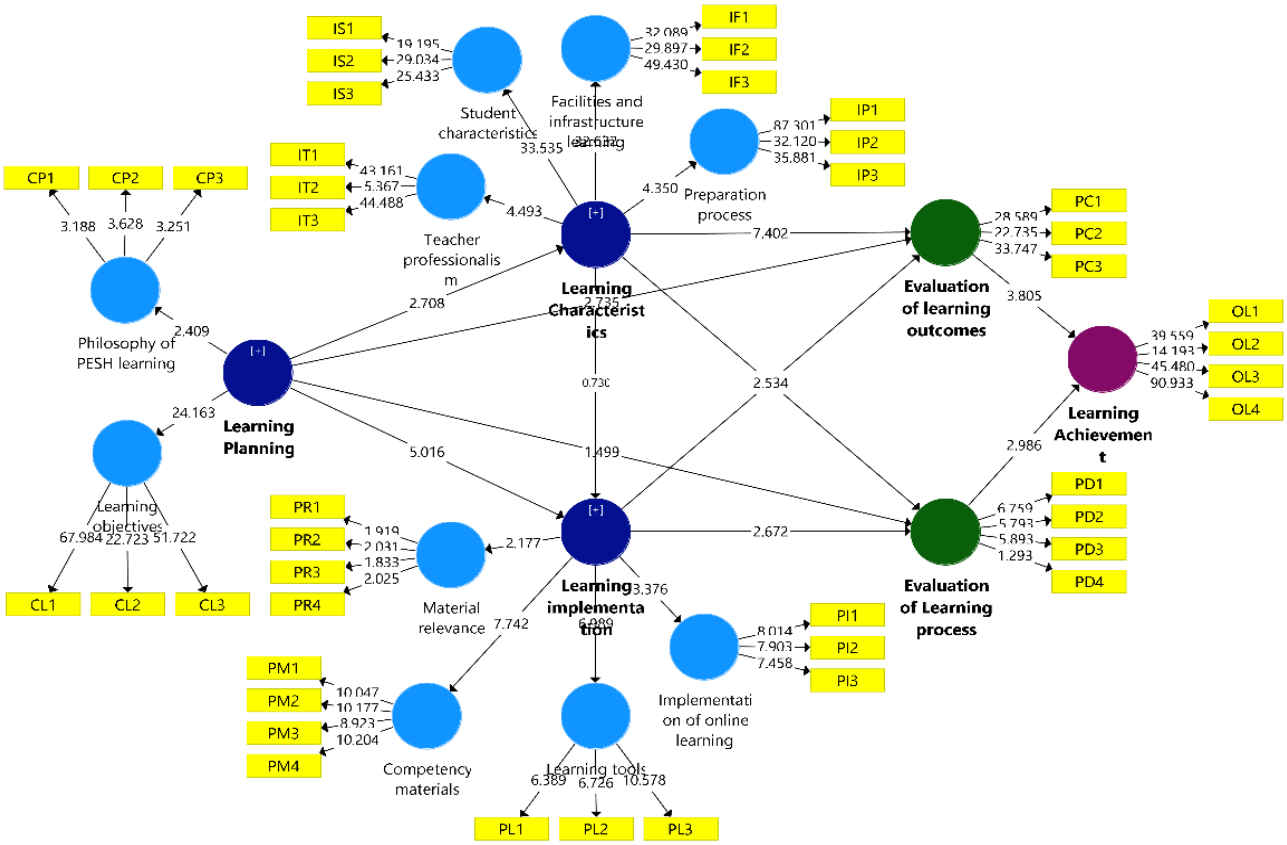


Fig. 3. Evaluation of the structural model (inner model).

TABLE IX: RESULTS OF DIRECT HYPOTHESIS TESTING ON EACH VARIABLE

| H | Path Coefficients | $\beta$-coefficient | SDV | $T$-statistics | $P$-values | Decision |
|---|---|---|---|---|---|---|
| 1 | Learning Planning → Learning Characteristics | 0.464 | 0.159 | 2.917 | 0.004* | Accepted |
| 2 | Learning Planning → Learning Implementation | 0.731 | 0.164 | 4.447 | 0.000** | Accepted |
| 3 | Learning Planning → Evaluation of Learning Outcomes | 0.42 | 0.151 | 2.776 | 0.006* | Accepted |
| 4 | Learning Planning → Evaluation of Learning Process | −0.334 | 0.217 | 1.538 | **0.125** | Rejected |
| 5 | Learning Characteristics → Learning Implementation | −0.091 | 0.135 | 0.678 | **0.498** | Rejected |
| 6 | Learning Characteristics → Evaluation of Learning Outcomes | 0.663 | 0.09 | 7.34 | 0.000** | Accepted |
| 7 | Learning Characteristics → Evaluation of Learning Process | 0.301 | 0.177 | 1.7 | **0.090** | Rejected |
| 8 | Learning Implementation → Evaluation of Learning Outcomes | −0.293 | 0.119 | 2.466 | 0.014* | Accepted |
| 9 | Learning Implementation → Evaluation of Learning Process | 0.753 | 0.283 | 2.659 | 0.008* | Accepted |
| 10 | Evaluation of Learning Outcomes → Learning Achievement | 0.321 | 0.088 | 3.647 | 0.000** | Accepted |
| 11 | Evaluation of Learning Process → Learning Achievement | 0.303 | 0.103 | 2.945 | 0.003* | Accepted |

Note: *$p$ < 0.05 and **$p$ < 0.00.

Table X shows that all relationships between latent variables and indicators have a positive and significant effect. Thus, the hypothesis $Hc_1$ to $Hp_4$ in this study which states that it has a "positive and significant effect" is accepted. Based on the $T$-statistic value, it is obtained that the highest value for each latent variable that affects the learning achievement is learning characteristics → evaluation of learning outcomes ($\beta$-coefficient = 0.663; SDV = 0.094; $T$-statistic = 7.029; $p$-value = 0.000). This shows that learning planning has a higher influence on the evaluation of learning outcomes than the influence of other latent variables on learning achievement. Furthermore, of the eight indicators (constructs) in each

variable, the student characteristics and Facilities and infrastructure learning indicators in the learning characteristics variable have the greatest influence on learning achievement because they have the highest $T_{statistic}$ values, namely 36.008 and 35.644. Thus, Student characteristics and facilities, and infrastructure learning are the most dominant variables in influencing learning achievement of PESH online learning in elementary schools. While the variables that are not dominant are the philosophy of PESH learning and material relevance, with the smallest $T_{statistics}$ of 0.034 and 0.026.

TABLE X: RESULTS OF DIRECT HYPOTHESIS TESTING ON EACH ASPECTS

| H | Path Coefficients | $\beta_{coefficient}$ | SDV | $T_{statistic}$ | $p_{value}$ | Decision |
|---|---|---|---|---|---|---|
| $Hc_1$ | Learning Planning → Philosophy of PESH learning | 0.228 | 0.101 | 2.256 | 0.024* | Accepted |
| $Hc_2$ | Learning Planning → Learning objectives | 0.899 | 0.041 | 21.747 | 0.000** | Accepted |
| $Hi_1$ | Learning Characteristics → Teacher professionalism | 0.404 | 0.093 | 4.348 | 0.000** | Accepted |
| $Hi_2$ | Learning Characteristics → Student characteristics | 0.907 | 0.027 | 33.124 | 0.000** | Accepted |
| $Hi_3$ | Learning Characteristics → Facilities and infrastructure learning | 0.905 | 0.028 | 32.123 | 0.000** | Accepted |
| $Hi_4$ | Learning Characteristics → Preparation Learning Implementation | 0.591 | 0.139 | 4.237 | 0.000** | Accepted |
| $Hp_1$ | Learning Implementation → Learning tools | 0.679 | 0.096 | 7.057 | 0.000** | Accepted |
| $Hp_2$ | Learning Implementation → Implementation of online learning | 0.539 | 0.173 | 3.119 | 0.002* | Accepted |
| $Hp_3$ | Learning Implementation → Material relevance | 0.392 | 0.199 | 1.972 | 0.049* | Accepted |
| $Hp_4$ | Learning Implementation → Competency materials | 0.792 | 0.106 | 7.465 | 0.000** | Accepted |

Note: *$p < 0.05$ and ** $p < 0.00$.

### D. Recapitulation of Online Learning Evaluation Results

The results of the online learning evaluation were analyzed using descriptive statistics from respondent data in the form of percentages. Data from research on online learning evaluation for teachers, principals, vice-principals (curriculum), vice-principals (facilities and infrastructure), and students. Questionnaire data were analyzed using the formula $P = f/n \times 100\%$. Furthermore, to answer the description of the online learning evaluation, categorized acquisition scores are made. The criteria for the success of the online learning evaluation are if the percentage obtained is >75% in each aspect, then the online learning evaluation is declared successful. Fig. 4 shows a comparison of the achievement of evaluation results for each indicator on each variable. The summary of the results of the online learning evaluation is shown in Table XI.

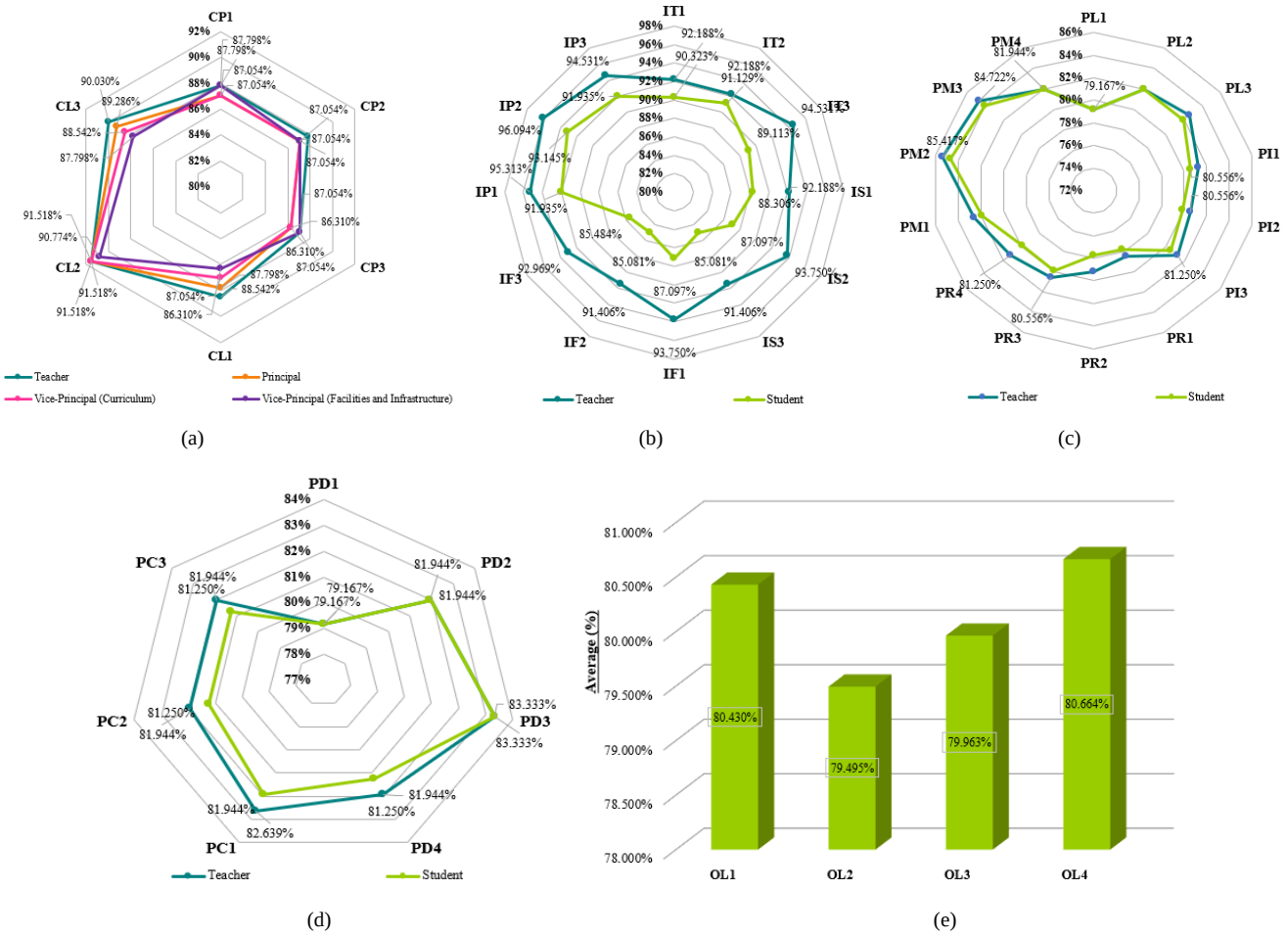


Fig. 4. Comparison of achievement indicators in online learning evaluation on aspects: (a) Learning planning; (b) Learning characteristics; (c) Learning implementation; (d) Learning evaluation; and (e) Learning achievement.

TABLE XI: RECAPITULATION OF ONLINE LEARNING EVALUATION RESULTS

| Variable/Aspects | Teacher | Principal | VP (Curriculum) | VP (Facilities and Infrastructure) | Students | Overall |
|---|---|---|---|---|---|---|
| **Learning Planning** | - | | | | | **86.331%** |
| Philosophy of PESH learning | 87.550% | 87.302% | 80.247% | 80.853% | - | 84.938% |
| Learning objectives | 90.030% | 84.184% | 91.270% | 85.317% | - | 87.724% |
| **Learning Characteristics** | | | | | | **90.359%** |
| Teacher professionalism | 92.969% | - | - | - | 90.188% | 88.741% |
| Student characteristics | 92.448% | - | - | - | 86.828% | 93.351% |
| Facilities and infrastructure learning | 92.708% | - | - | - | 85.887% | 91.135% |
| Preparation process | 95.313% | - | - | - | 92.339% | 88.209% |
| **Learning Implementation** | | | | | | **80.986%** |
| Learning tools | 81.250% | - | - | - | 80.048% | 80.457% |
| Implementation of online learning | 81.019% | - | - | - | 83.751% | 82.821% |
| Material relevance | 79.861% | - | - | - | 80.645% | 80.378% |
| Competency materials | 83.681% | - | - | - | 79.032% | 80.615% |
| **Learning Evaluation** | | | | | | **80.243%** |
| Evaluation of learning outcomes | 82.176% | - | - | - | 78.973% | 80.063% |
| Evaluation of Learning process | 81.597% | - | - | - | 79.749% | 80.378% |
| **Learning Achievement** | | | | | | **86.816%** |
| Learning achievement | - | - | - | - | 86.816% | 86.816% |

Based on the data presented in Table XI, the learning planning aspect gets an average of 86.331% in the successful category, the learning characteristics aspect gets an average of 90.359% in the successful category, the learning implementation aspect gets an average of 80.986% in the successful category, the learning evaluation aspect gets an index value. 80.243% in the successful category, and the learning achievement aspect gets an index value of 86.816% in the successful category. The biggest contribution to the evaluation of online learning in PESH subjects is the aspect of student characteristics (93.351%) and facilities and infrastructure learning (91.135%) on the Input variable. Thus, the overall evaluation of online learning gets an index value of 84.947% % with a successful category.

## IV. DISCUSSION

The hypothesis of the $H_1$ (learning planning → learning characteristics) is accepted. Evaluation of online learning on the learning planning aspect obtained an overall index value of 86.331%, so it was included in the successful category. The results of this study confirm that in the implementation of PESH online learning, schools are encouraged to plan at least 2 aspects that must be written, namely aspects of the philosophy of PESH learning and learning objectives implemented by teachers in schools. $Hc_1$ (philosophy of PESH learning) and $Hc_2$ (learning objectives) are accepted. This confirms that the Learning Planning of the PESH online learning evaluation is the student's understanding of the PESH learning implementation. Indicators are used to measure the learning planning aspect in the PESH online learning evaluation. A similar insignificant relationship was found in [1, 48], which reveals learning planning in a formal school has the same vision, mission, goals, targets, and education. Furthermore, this research proves that the two schools sampled in the study, both of which have a vision, mission, goals as well as an educational learning implementation, shows a good category that would have an impact on the successful implementation of online learning in public and private schools. In general, students' understanding of learning plannings evaluation of PESH's online learning is categorized as good [2, 35]. With the achievement of a good percentage, it means that teachers and principals, and vice principals are able to carry out the learning implementation in accordance with the vision and mission carried by the school as well as the goals, targets, and objectives and the same education to be achieved.

The hypothesis of the $H_2$ (learning planning → learning implementation) is accepted. The results of the study revealed that learning planning variables in supporting the achievement of evaluation of learning outcomes would be better to apply Learning Implementation variables to improve online learning. So, Hypothesis $H_3$ (learning planning → evaluation of learning outcomes) is accepted. However, on $H_4$ (learning planning → evaluation of learning process) it was rejected. This result is inconsistent with the result obtained which confirms that good learning characteristics will produce good results [6, 31]. Based on descriptive statistical tests from the learning characteristics aspect, PESH's online learning evaluation obtained an average score of 37.52 and was included in the good category. In this study, although Hypothesis $H_4$ is rejected, it recommends that the evaluation of learning achievement in online learning must go through and carry out first the aspects that exist in the learning characteristics variable and after that the learning evaluation variable. So that the achievement of the learning achievement will be maximized. This statement is supported by Howley [4], which can be compared with the results of this study.

The hypothesis of the $H_5$ (learning characteristics → learning implementation) and $H_7$ (learning characteristics → evaluation of learning process) were rejected. The results of this study confirm that in achieving the success of online learning the learning implementation and learning characteristics variables stand-alone independently in influencing the learning achievement. It is proven that hypotheses $H_6$, $H_8$, and $H_9$ are accepted. In addition, in supporting the learning characteristics and learning implementation influencing the learning evaluation variable, the learning planning variable supports both variables, so the $H_1$ and $H_2$ hypotheses are accepted. A similar insignificant relationship was found in Kane *et al.'s* research [37], confirming that the learning characteristics aspect for the

evaluation of PESH online learning is in the very good category. This means that there is continuity between students and the school. This research is supported by Ihbour *et al.'s* [12] and F. Berrigan *et al.'s* [36], which state that both students and schools together support the realization of the goal of quality graduates supported by teacher professionalism and student characteristics. This is expressed in the indicators and aspects of the learning characteristics variables in this study. The percentage results obtained the highest value in the descriptive statistical results in the evaluation of PESH learning, namely 88.741% and 93.351%, respectively.

$H_6$ (learning characteristics → evaluation of learning outcomes) is accepted. The results of this study confirm that the learning characteristics from PESH's online learning evaluation that produces quality graduates do not only come from students, but also from the school as a facilitator. This result is consistent with the result obtained by O'Donnell *et al.* [3] and Kane *et al.'s* [37], which confirms that the indicators for the background of the PESH teacher and student involvement are very good dominant scores. In addition, Rugh *et al.'s* [7] recommend that the results of the evaluation of the online-based PESH learning program arrangement, indicators of PESH teacher background, and student involvement are very good. The second learning characteristics evaluation indicator is the facilities and infrastructure learning and preparation Learning Implementation disclosed in the results of this study in supporting the evaluation of PESH online learning. These results reached the highest percentage in this study, namely 91.135% and 88.209% in the successful category.

$Hi_1$ (teacher professionalism) is accepted. This confirms that in supporting the learning characteristics variable, it makes a good contribution to evaluating online learning for physical education and health by paying attention to the readiness of teachers to take part in online learning seminars and workshops, participation in training and implementation, prepares the syllabus and online learning tools. These results support O'Brien *et al.'s* [6] on implications for European physical education teacher education during the COVID-19 pandemic. The important role of teacher professionalism facilitators is designed with an emphasis on the quality of learning characteristics. The goal is that teacher competency improvement is able to create an educational ecosystem that is committed to improving the quality of student learning implementations and learning achievement [27]. $Hi_2$ (student characteristics) is accepted. This is in line with the research of Howley [4] and Kane *et al.'s* [37] regarding the development of media to promote physical activity in children during the COVID-19 pandemic in the learning planning of pedagogical, organizational, and health education challenges during COVID-19. That the characteristics of students in online learning to evaluate the success of the learning achievement consider activeness in PESH learning activities, students' life skills, and students' interest in participating in PESH learning which is supported by the results of this study.

The hypothesis of the $Hi_3$ (facilities and infrastructure learning) and $Hi_4$ (preparation learning implementation) are accepted. This confirms that online learning is considered to have fulfilled the right of students to get educational services. However, some students think that the quality of online learning does not match their learning needs, this of course should be the focus of the school or related institution. This is in line with the research of Setyadi *et al.'s* [34], regarding the evaluation of the implementation of an online learning system that obtained good results. This means that in this aspect educators realize that the need for online learning is needed as an alternative to offline learning. This result supports other researchers, for example, Barik *et al.'s* [49], Kundu and Bej [50]. Mardhatillah [51] states that to improve the quality of learning, in-depth ICT socialization and training for teachers and students are needed. Another improvement that can be done is that schools provide education to students so that online learning can run effectively without any misuse of technology. So that the learning needs of students are expected to be met.

The hypothesis of the H8 (learning implementation → evaluation of learning outcomes) and $H_9$ (learning implementation → evaluation of learning process) were accepted. The evaluation of online learning in the Learning Implementation aspect obtained an overall index value of 80.986%, so it was included in the successful category. This supports the research of Rugh *et al.'s* [7], which obtained a percentage value of >75%, and also very good in the use of technology so that the value obtained from the Learning Characteristics aspect is included in the good category. The $Hp_1$ (learning tools) and $Hp_2$ (implementation of online learning) hypotheses were accepted. The results of this study confirm that in the implementation and Learning Implementation of online learning in PESH subjects, it is very important to implement learning tools and implementation of online learning. According to the research of O'Donnell *et al.'s* [3], DeCoito and Estaiteyeh [27], teachers have a big role in increasing online learning knowledge, if teachers routinely give assignments in e-learning, students will automatically be more proficient in using online learning features [49, 52]. This study confirms that students must also increase their enthusiasm for learning so that teacher-student relationships run well. Schools are expected to be able to contribute. One thing that schools can do is by conducting further training on the use of technology in the form of using applications and others as well as training on interesting features to be presented to students.

The hypothesis of the $Hp_3$ (material relevance) and $Hp_4$ (competency materials) are accepted. The results of this study confirm that achieving success in a learning implementation in online learning requires material relevance and competency of good materials. This means that educators prepare to learn methods and models that are following the needs of competencies and materials during online learning. So that students will understand and understand the material presented. This will increase students' motivation and discipline in the learning implementation. However, in the online learning implementation, there are still some students who are less disciplined so it would be better to improve this aspect. Lack of discipline certainly occurs due to several factors. A similar significant relationship was found [12], in which Ihbour *et al.'s* state that students' indiscipline in learning is caused by the learning model applied by the

teacher does not attract students' attention. This means that the learning model is very important so that the learning implementation can run well, it is also the responsibility of the school to find the latest models or media that can be applied to online learning. Nazaruk *et al.'s* state that learning media are everything that is used to channel messages and can stimulate the thoughts, feelings, and abilities of students so that they can encourage the achievement of the learning implementation in students [5].

The hypothesis of the $H_{10}$ (evaluation of learning outcomes) on learning achievement is accepted. The evaluation of online learning in the learning evaluation aspect obtained an average index value of 80.063%, so it was included in the successful category. This supports research of Howley [4] and Berrigan *et al.'s* [36] on teaching and learning experiences in K-12 physical education during COVID-19 in an international comparative case study and on measuring the mental health effects of online dancing during the COVID-19 pandemic [7]. The results of online learning make students understand the material well, but some teachers think that learning achievement and student motivation decrease. Brewer *et al.'s* [1] support this research which states that the factors that influence learning achievement are divided into two, namely internal factors and external factors.

The hypothesis of the $H_{11}$ (evaluation of the learning implementation) on learning achievement is accepted. The evaluation of online learning in the Learning Evaluation aspect obtained an average index value of 80.378% so it was included in the successful category. This study confirms that in evaluating the success of health and contemporary learning in elementary schools, priority is given to the learning implementation in determining the learning model used during the pandemic. This result supports other researchers, for example, Nazaruk *et al.'s* [5] on physical activity of elementary school-age children during class during the COVID-19 pandemic and Phelps *et al.'s* [31] on practical strategies for school, distance, and hybrid learning in physical education during COVID-19. The use of various models in learning will motivate students to learn physical education. For this reason, teachers can provide models or methods that are not unusual from previous methods such as giving group assignments in the form of making videos through applications available on students' smartphones, and feedback can be done to be able to see the video together [37]. Then for student learning achievement, the school can review the value standards commonly used in offline learning. Improvements that can be made by teachers are by modifying methods and learning materials so that the enthusiasm for learning and student motivation increases which is expected to improve student learning achievement.

## V. Conclusion

The success of the evaluation of online learning for physical education and health in elementary schools with the application of learning planning, learning characteristics, learning implementation, learning evaluation, and learning achievement variables was obtained in the successful category. Overall, each variable has been able to explain the variance of each indicator of the success of online learning evaluation with an average of 88.821%. Each variable has a significant average influence on the success of learning outcomes. The overall recapitulation of the online learning evaluation results obtained a percentage of >80% with the input variable obtaining an average of 90.359%. Student characteristics and facilities and infrastructure learning are the most dominant in the acquisition of learning evaluation achievements. However, from the five variables consisting of 11 hypotheses, three hypotheses were rejected. The influence of learning planning on the evaluation of the learning implementation and learning characteristics on the learning implementation and evaluation of the learning implementation. Therefore, this aspect requires more serious improvement so that online learning programs can be carried out better. The recommendation that researchers put forward is that schools are advised to increase the provision of facilities and infrastructure and internet networks so that the implementation of technology and mastery of the material by teachers can be carried out optimally. Most elementary school students are already good at learning implementation, but students are advised to be more serious in participating in learning so that learning achievement, skills, and motivation in the online learning implementation can improve. This study recommends that online PESH learning can be carried out effectively if the teacher understands student characteristics, learning tools are available, the teacher involves students in active learning by utilizing surrounding facilities, and evaluates student progress. However, more extensive studies are needed to evaluate the success of online learning and how to implement effective blended learning in the future.

## Conflict of Interest

The authors declare that no competing interests exist.

## Author Contributions

T. Rihatno has done the study framework development, instrument development; manuscript writing, data analysis, visualization/presentation of data in text, manuscript writing, and manuscript submitting.

S. Nuraini has done the data input, and correction, typing, correction, and editing

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