



Original Research Article

The influence of principal leadership, teacher learning characteristics, and utilization facilities on student thinking skill

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**Amrazi Zakso^{1*},
Iskandar Agung^{2*}
and
M. Calvin Capnary³**

¹Faculty of Teacher Training and Education, University of Tanjungpura, Pontianak, Indonesia.

²Center of Research of Education and Culture Policy, Ministry of Education and Culture Republic of Indonesia.

³Faculty of Business and Economic, Universitas Mercu Buana, Jakarta, Indonesia.

*Corresponding Author

Email: amr_zakso@yahoo.com

This paper examined the effect of principal leadership, teacher learning characteristics, and utilization of learning facilities on student thinking skill. Data collection was done by distributing questionnaires to teacher respondents, conducting interviews, and focus group discussions. The results showed that a positive relationship existed between the principal leadership variables, characteristics of teacher learning, and utilization of learning facilities in the formation of student thinking abilities. For this reason, it is recommended that: (1) Training be provided to principals to be visionary, achievement oriented, and able to realize the role of facilitator and motivator, and also monitor and supervise the learning and utilization of learning facilities by the teacher;(2) teachers should be trained on utilizing the PBL approach and learning facilities in schools and other sources;(3) regulations should be issued to involve parental participation, especially in supporting the provision of learning facilities.

Key words: Leadership, principal, teacher, facilities, utilization, thinking skill

INTRODUCTION

The School as modern educational institutions have a number of parties who have important tasks, namely the Principal and Teachers. The Principal is a person who has the duty and obligation to lead and manage the institution, so as to determine the direction and objectives of the educational institution. The teachers serve as educators; they are at the front of teaching and learning activities in transforming the values of science to their students. Furthermore, the school principal and teachers are required to have work competence and professionalism in terms of their status and roles.

From the Principal's perspective, he/she is required to support vision-missions that contain the direction and goals of the school which needs to be achieved in the future, but also need to be able to realize behavior of a coordinator in schools, act as agents of change, facilitators, building a conducive physical and social environment, and others. The Principal's leadership abilities will lead to continuous improvement and progress towards the educational institutions that are under of his/her leadership. From the teacher's perspective, the teacher must have adequate

professional competence in carrying out his/her duties. In act no 14 of 2015, Republic of Indonesia has this to say about Lecturer and Teacher, "competence is a set of knowledge, skills, and behaviors that must be possessed, internalized, mastered, and actualized. Teacher competency is not just referring to the ability to carry out administrative tasks, but also involves the reflection of behavior that must be in accordance with the norms or rules that apply to work (Manning, 2003) . Concerning learning facilities, the implementation of education in schools tends to lead to inadequate student learning outcomes if the teacher in carrying out his main tasks is not supported by the availability of learning facilities that can be utilized optimally. Learning facilities are an important element for teachers in supporting the implementation of teaching and learning activities in class and outside the classroom. For example, the teacher might find it difficult to explain the reaction that occurs from a mixture of a number of chemical elements if there are no adequate laboratory practices. The availability of laboratory chemistry experiments can assist the teacher in giving an explanation of the theory and

characteristics of the material / substance of a particular discussion to the students. However, the availability of learning facilities in schools will not function optimally if teachers are poorly trained, inactive, and are less creative in using them.

Literature review

Principal Leadership

One of the factors that influence learning facilities by teachers is principal leadership. Yukl (2006) noted the existence of a number of definitions in the meaning of the leader, namely: the behavior of an individual who leads the activities of a group to achieve a goal that is to be shared (shared goal); interpersonal influence that is carried out in a particular situation, and directed through the process of communication towards the achievement of one or several specific objectives; initial formation and maintenance of structures in hope and interaction; increasing step by step influence, on and above mechanical adherence to routine organizational directives; the process that influences the activities of a group that is organized towards achieving goals; a process of giving meaning (meaningful direction) to a collective business, and which results in a willingness to make the desired effort to achieve the goal, etc.

Kotter (1988) and Usman (2008) argue that leadership is a relationship that exists in a leader, an act of influencing others to work together consciously in the desired task relationship, whereas according to Thoha (2008), leadership is an ability to influence the behavior of others, or an art that influences human behavior, both individuals and groups. Moreover, leadership is the science and art of influencing others or groups to act as expected in order to achieve common goals effectively and efficiently.

Earlier studies concluded that leadership is strongly correlated to the process of social influence, namely the influence carried out by someone towards others to structure activities and relationships in groups or organizations in achieving common goals. This paper investigates the influence of principal's leadership on student learning outcomes/thinking skills. The previous literature showed that there is a significant influence between the leadership of the principal and the achievement of the quality of student learning in school. Ishaq et al. (2016) found a positive influence between the principal's leadership role on teacher performance, which then affected student learning outcomes. Mutiara et al. (2017) suggested that the Principal has a role in improving the quality of education. In line with this, Fadhli (2016) and Mbeu and Anwar (2011) concluded that the principal is one of the key factors and is important in creating an effective school. Suriansyah and Aslamiyah (2015) demonstrated the principal's leadership role in building students' character.

Characteristics of Teacher Learning

The teacher has a set of learning characteristics in

accordance with his/her status and role as educator, teacher, mentor, motivator, etc. There are various elements that characterize the teacher, including educational background, competence, creativity, sustainable self-development, and learning activity. In Indonesia, a teacher is required to have a minimum educational qualification of S-1 / D-4 (Bachelor of Arts), and must be competent and professional. Regulation mandates that a teacher must have 4 (four) competencies, namely: pedagogical, personal, social, and professional. According to the Minister of National Education Republic of Indonesia Regulation No. 16/2007, it is emphasized that pedagogic competence is related to the ability of teachers to manage learning with students' attention; personality competencies is related to the teacher's values and behavior, both for themselves, students and the community; social competence is related to the ability and skills of teacher behavior in relation to their social environment; professional competence is related to the knowledge and ability in carrying out his/her profession as a teacher professionally.

Early studies have shown that teacher competency is related to the learning outcomes of their students. Destiana et al. (2012) in their study demonstrated a relationship between ownership of competence and teacher performance. Irtanto et al. (2012) suggested that teachers 'pedagogical and professional' competencies were still poorly categorized, which had an impact on students' low learning outcomes. Accordingly, Susilowati et al. (2013) concluded that pedagogic competence and professional competence of teachers must be improved. According to Samuel et al., competence will lead to high learning outcomes, and vice versa. Barlia (2010) found that the unique characteristics of the teacher, as well as the closeness and effort to understand and appreciate the potential of students, were proven to increase children's motivation in learning of science.

Other characteristics possessed by the teacher are work experience in carrying out teaching tasks. It is indicated that differences exist between experienced teachers and inexperienced teachers, both in attitude, and behavior in carrying out teaching tasks. Experienced teachers are significantly able to reflect and develop themselves to make improvements and changes that are useful for themselves and others. Conversely, teachers who do not have experiences relatively still encounter limitations to self-reflection, change, and improve the way they carry out their duties or work. The implication is that a teacher who has relatively long teaching experience should receive better student learning outcomes, compared to inexperienced teachers.

Creativity is another characteristic that must be possessed by the teacher. A creative teacher is one who has the ability to reflect the desire to continue to find new ideas in carrying out his/her teaching duties. A creative teacher will not be satisfied with what he has received so far, on the contrary he feels challenged to make changes and continuous improvement. In the context of achieving student learning outcomes, it can be said that teacher creativity is the entry

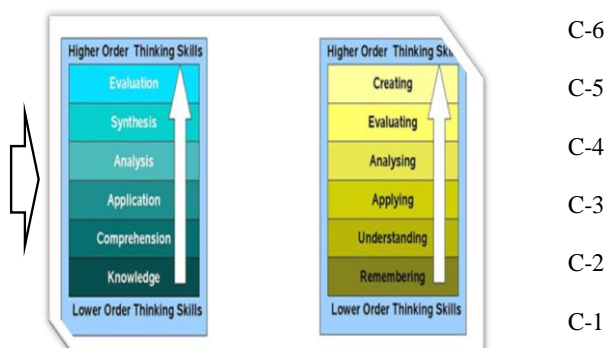


Figure 1: Bloom's Cognitive Domain

point in efforts to improve this outcome. Creativity in question is the ability to leave ideas, things that are considered established, routine, objective and move to produce new and interesting ideas, and actions, whether it is to solve problems, methods or tools, new objects or artistic forms, etc. New here does not actually refer to producing something completely new, but to use new things as a result of creation, modification, improvement, or something like that (Agung, 2010).

Teacher's creativity is related to continuous self-development. A teacher is required to develop themselves continuously to improve their teaching skills. Leithwood et al. (1998) showed that the development of sustainable professionalism leads to situations that are active, anticipatory, responsive, dynamic and adaptive to realize self-development efforts to achieve better results over time. A teacher who is quickly satisfied with student learning outcomes, tends to be passive, less creative, and does not try to improve their teaching skills.

Furthermore, the learning patterns provided by the teacher must produce students' abilities, not only remember, understand, or apply theories / concepts obtained to solve test / test questions, but also use them as analytical tools to solve problems. Teacher learning patterns must be supported by the ability to develop problem-based learning & project-based learning (PBL) approaches that contain skills in analyzing, evaluating, and creating factual problems. PBL is considered relevant in responding to the challenges of development and changes in the environment, as a basis for forming students who are creative, able to think critically, able to communicate and convey their thoughts / ideas, and collaborate to solve increasingly complex problems.

Lambros (2004) defined PBL as a learning method that uses the principle of problems and tries to produce a new knowledge, and can be used for all types of curriculum. Rhem (1998) suggests that PBL is a learning model based on work processes solving problems. Barge (2010) redefined PBL regarding the important role of teachers in the learning process. The teacher has more functions as an initiator and facilitator than communicating knowledge. This model starts with looking at the existing problems, then develops

them into question. Problems that have been formulated with these questions are the beginning of learning. After knowing the formula for the problem, the students analyze problems based on interdisciplinary or predetermined subjects. The students work in a group that is supervised, then they plan, manage, and solve problems and form a project-based model that is not only through a pedagogical approach, but also by organizing learning and research.

Explicitly, learning patterns through the application of PBL will develop high-level thinking skills, as well as serve as basis for transforming these skills into students. The application of the approach will motivate the teacher to always improve his knowledge and profession, be more active, dynamic, and creative.

Utilization of Learning Facilities

Usman (2008) argues that schools are a system consisting of sub-subsystems that are interconnected, integrative, and synergistic to achieve effective and efficient goals and outcomes. The subsystem in the school system consists of input, process, output, and results. Especially the input subsystem consists of student input (raw input); instrumental input consisting of school management, curriculum, learning facilities, budget, and so on; and environmental input consisting of families and communities. Implicitly, the facility element is an important factor in school institutions to support teaching and learning activities.

Various types of facilities are needed by school education institutions to support learning. Learning facilities can facilitate students' acceptance and understanding of the values of science and technology. Some examples of learning facilities are laboratories (physics / chemistry / biology / language / computers, etc.); school library; textbooks, learning media and others.

The availability of learning facilities needs to be supported by optimal utilization. Various research results show the effect of using learning facilities on student learning outcomes. Kurnia et al. (2015) in their research produced a significant influence between learning facilities on learning interest and student learning outcomes. In a research in Majalengka district, Puspitasari (2016) found an relationship to exist between learning facilities and student outcomes.

Student Thinking Skill

Schools are producers of academic and non-academic outputs. As an educational institution, schools are expected to produce output that masters science and technology, but also thinking skills. Krulik and Rudnick (1999) divided thinking skills into four levels, namely: recall thinking, basic thinking, critical thinking, and creative thinking. Bloom et al (1956) divided the cognitive domain into 6 (six) dimensions (Figure 1). Initially, Bloom's cognitive domain refers to the notion of knowledge (C-1), Comprehension (C-2), Application (C-3), Analysis (C-4), Synthesis (C-5), and

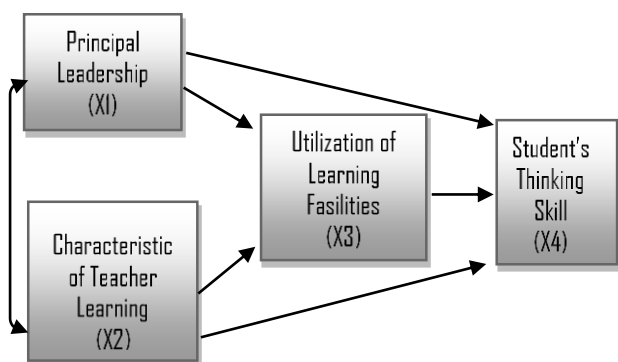


Figure 2:Theoretical Model of Research

Evaluation (C-6). Then Bloom's cognitive domain changes to remembering / C-1, understanding / C-2, applying / C-3, Analyzing / C-4, Evaluating / C-5, and Creating / C-6.

The cognitive domain is often used to measure a person's / group's thinking skills. An individual manifests low-level thinking skills, if they are in the cognitive remembering (C-1), understanding, and applying. Instead they have high-level thinking skills (Higher Order Thinking Skill) if they enter the realm of analyzing (C-4), evaluating (C-5), and Creating (C-6).

The results of the TIMMS study in 2011 showed that almost 90% of Indonesian students still have low ability to think (LOTS). From the TIMMS study (2016), Indonesia is under all types of competencies where adults need to work as community members. In one problem solving skill, the score of Indonesian language was the lowest position in almost all age categories. This is one reason why teacher learning patterns are less able to transform students to be trained in solving factual problems.

METHODOLOGY

This study was conducted in 2017 on senior secondary schools in DKI Jakarta Province - Indonesia. School samples were taken purposively from 10 schools whose students had high scores in national exams, especially tests that were categorized as HOTS. All educators in the sample schools were selected as the study population, then sampled through proportional random sampling techniques. Data collection techniques were carried out by distributing questionnaires to teacher respondent samples, conducting interviews, and focus group discussions.

Particularly, before distributing the questionnaire to respondents, the validity and reliability of questions / statements regarding the leadership of the principal, characteristics of teacher learning, utilization of learning facilities, and student thinking skill were tested. This was done using Pearson and Alpha Cronbach's product moment. The influence relationship analysis between variables studied was carried out using SPSS 24.0.

Many factors influence learning outcomes, especially building students' thinking skills. In this study the influence factor was only limited to 3 (three) aspects, first, leadership of the principal (PL), second, teacher learning characteristics (TLC), and third, Utilization of Learning Facilities (ULF)). How do these aspects affect student learning outcomes, especially thinking skills? This article intends to examine and present the relationship of the influence of these variables. Research questions contained the relationship between Principal Leadership factors (X1), Characteristics of Teacher Learning (X2), and Utilization of Learning Facilities (X3), and Student Learning Outcomes / Thinking Skills (X4). The three aspects mentioned (X1 - X3) are independent variables, fourth aspect (X4) is the dependent variable. The dependent variable is the response that is influenced by the independent variable. From the presentation of this article, it is expected that a complete understanding of the variables can be obtained, so that this will lead to further analysis, especially in providing input to improve the quality of education in Indonesia. The conceptual model for testing the relationship of influence is described in Figure 2 as follows.

This study will answer three hypotheses:

1. There is an influence of Principal Leadership (X1) on Student Thinking Skill (X4).
2. There is an influence of Characteristics of Teacher Learning (X2) on Student Thinking Skill (X4).
3. There is an influence of the Utilization of Learning Facilities (X3) on Student Thinking Skill (X4).

RESEARCH RESULTS

The data obtained underwent testing to determine normality, homogeneity, and linearity. In the normality test carried out with the provisions, the results refer to the comparison of the Skewness and Kurtosis ratios. See the sig (p) values of Kolmogorov-Smirnov and Shapiro-Wilk. Based on the test results concluded, the variables studied have normal data distribution (Table 1).

Homogeneity testing is done to determine the variance between the data groups tested, whether the variance is homogeneous or heterogeneous. The test is done by looking at the prices of Levene Statistics and sig (p). If both prices are > 0.05 , then the data is declared homogeneous. On the contrary price < 0.05 is declared not homogeneous. Based on the results of the homogeneity test it was found that the data group studied had homogeneous data variance (Table 2).

Linearity test is performed to determine whether the relationship between variables is linear or unlinear. In this study, the results of the linear test of the relationship between variables is shown in Table 3.

From the results of calculations using the SPSS 24.0 program, the influence coefficient variable and path coefficient testing are as follows (Table 4).

Based on the data, the results of testing the hypothesis proposed are as follows (Table 5).

The causal influence diagram of the variables studied is shown in Figure 3.

Table 1. Normality Test Results

Variabel	Skewness Ratio	Kurtosis Ratio	Kolmogorov-Smirnov	Shapiro-Wilk	Conclusion
Leadership principal	1.071 (located in -2 to +2)	0.157 (located in -2 to +2)	Sig value = 0.200 > 0.05	Sig value = 0.578 > 0.05	Normal data distribution
Characteristic of teacher learning	0.631 (located in -2 to +2)	1,723 (located in -2 to +2)	Sig value = 0.069 > 0.05	Sig value = 0.067 > 0.05	Normal data distribution
Utilization of learning facilities	0.030 (located in -2 to +2)	1.373 (located in -2 to +2))	Sig value = 0.095 > 0.05	Sig value = 0.107 > 0.05	Normal data distribution
Student thinking skill	0.813 (located in -2 to +2)	0.353 (located in -2 to +2)	Sig value = 0.087 > 0.05	Sig value = 0.148 > 0.05	Normal data distribution

Table 2. Homogeneity Test Results

No.	Homogeneity Test	Results	Conclusion
1.	$X_1 \rightarrow X_3$	Levene Statistic = 0.944 sig (p) = 0.545 > 0.05	Homogeneous data
2.	$X_1 \rightarrow X_4$	Levene Statistic = 1.200 sig (p) = 0.245 > 0.05	Homogeneous data
3.	$X_2 \rightarrow X_3$	Levene Statistic = 1.459 sig (p) = 0.093 > 0.05	Homogeneous data
4.	$X_2 \rightarrow X_4$	Levene Statistic = 1.419 sig (p) = 0.987 > 0,495	Homogeneous data
5.	$X_3 \rightarrow X_4$	Levene Statistic = 1,587 sig (p) = 0.076 > 0.05	Homogeneous data

Table 3. Linearity Test Results

No.	Variable	R-Square Linear	Conclusion
1	$X_1 \rightarrow X_3$	0.638	The linear regression line shows the direction from the bottom left to the right linear relationship
2	$X_2 \rightarrow X_3$	0.583	The linear regression line shows the direction from the bottom left to the right linear relationship
3	$X_1 \rightarrow X_4$	0.580	The linear regression line shows the direction from the bottom left to the right linear relationship
4	$X_2 \rightarrow X_4$	0.601	The linear regression line shows the direction from the bottom left to the right linear relationship
5	$X_3 \rightarrow X_4$	0.852	The linear regression line shows the direction from the bottom left to the right linear relationship

Table 4. Calculation Results and Path Coefficient Tests

Lane	Beta (β)	Sig
ρ_{y_1}	0.106	0.000
ρ_{y_2}	0.327	0.000
ρ_{y_3}	0.528	0.005
ρ_{y_4}	0.141	0.000
ρ_{y_5}	0.730	0.000

a) The influence of Leadership Principal (X1) on Student Thinking Skill (X4)

- Directly = 0.106
- Indirectly through Utilization of Learning Facilities by: $0.337 \times 0.730 = 0.246$
- Total effect: $0.106 + 0.246 = 0.352$.

b) The influence of Characteristic of Teacher Learning (X2)

on Student Thinking Skill (X4)

- Directly = 0.141
- Indirectly through Utilization of Learning Facilities by: $0.528 \times 0.730 = 0.385$
- Total effect: $0.141 + 0.385 = 0.526$.

c) Large influence of Utilization Facilities (X3) on Student Learning Outcomes (X4) = 0.730

Table 5. Hypothesis Testing Results

No	Hypothesis	Statistical Tests	HoDecision	Conclusion
1.	Principal leadership influences student thinking skill	$H_0: \rho_{y_3} = 0$ $H_1: \rho_{y_3} > 0$	Sig = 0.000 < 0,05; Ho is rejected	Have a significant influence
2.	Teacher of Learning Characteristic influences student thinking skill	$H_0: \rho_{y_4} = 0$ $H_1: \rho_{y_4} > 0$	Sig = 0.005 < 0,05; Ho is rejected	Have a significant influence
3.	Utilization of Learning Facilities influences student thinking skill	$H_0: \rho_{y_5} = 0$ $H_1: \rho_{y_5} > 0$	Sig = 0.000 < 0,05; Ho is rejected	Have a significant influence

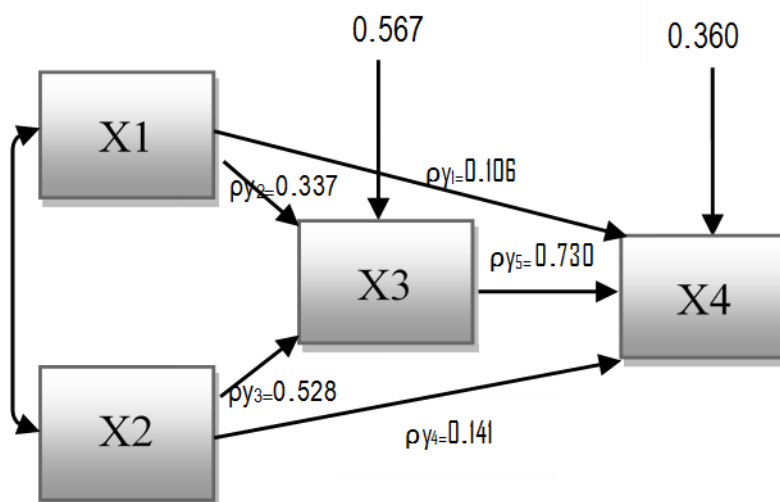


Figure 3: Causal influence diagram of the variables

The findings of this study indicate that Principal leadership (X1) has a positive influence on Student Thinking Skills (X4). Similarly, the Principal's leadership (X1) has a positive influence on the Utilization of Learning Facilities (X3). From the research, the influence of the Principal was greater on the use of learning facilities than the direct influence on students. This means that the role of the Principal facilitator is very important in the implementation of education, especially in determining the vision of the school, achievement orientation, agent of change, providing learning facilities, motivating teachers to utilize learning facilities in schools and from other sources, monitoring and supervising learning in utilizing learning facilities (lihat juga: (Anderson, 2004; Nanus, 2004). Agung (2018) showed that school management by the Principal will create a conducive school environment, and will support a teacher's learning pattern that is planned, systematic, and better results oriented.

Teacher learning characteristics have a positive direct influence on students' thinking abilities. But the positive influence on students' thinking skills will be greater through the use of learning facilities by educators / teachers. The results of this study indicate that the characteristics of teacher learning which include educational background, competence, self-development, and the realization of the

PBL approach, will be more successful in forming high-level thinking skills (HOTS) if supported by the availability and utilization of learning facilities. Teaching and learning activities are not only centered on the delivery of scientific theories and concepts, but also by practice. Students tend to more easily digest and understand teaching materials, because they are equipped with learning facilities in the form of enrichment books, learning media, and practicum in school laboratories. Teachers are also more empowered with complete learning facilities in implementing learning activities.

Implied competence, sustainable professionalism development, and utilization of the PBL approach and learning facilities by the teacher will result in good learning and will cause their students to have high-level thinking skills (HOTS). Now and in the future, the challenges of teachers are even more along with changes and developments in the global era. Anticipating, responding, and adapting to changes and developments in the global era, requires a learning paradigm shift in the teacher, including: (1) visionary, (2) creative, (3) implementing collaborative learning; (9) applying problem-based and project-based learning (see; De Graaf, Annete, 2003; Lambros, 2004; Rhem, 1998); (4) developing sustainable professionals; (5) utilizing optimal learning facilities, and (6) reflective and analytical

skills (ISTE, 2008; Pearlman, 2009, Agung, 2017). Especially in the use of learning facilities, not only will it support students' comfort in digesting and understanding theories and concepts, but also make them active, not monotonous, adds fun to learning, and produces creative, collaborative, and high-level thinking skills. From this study it is clear that the use of learning facilities has a relatively large positive influence on students' thinking skills.

CONCLUSION AND RECOMMENDATION

The results showed that Principal Leadership, Teacher Learning Characteristics, and Utilization of Learning Facilities had a positive effect on Student Thinking Ability. Principal leadership and teacher learning characteristics show indirect effects through the use of learning facilities that are large compared to direct influence. This implies that the use of learning facilities is an important variable in building students' thinking skills.

Related to research results, it is recommended that:

(1) Training should be provided to principals to be visionary, achievement oriented, and able to realize the role of facilitator and motivator, and also monitor and supervise the learning and utilization of learning facilities by the teacher;

(2) Training should be provided to teachers in utilizing the PBL approach and learning facilities in schools and other sources;

(3) Regulations should be made to involve parental participation, especially in supporting the provision of learning facilities.

Conflict of interests

The authors declare that they have no conflict of interests.

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