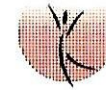




# APEC-ICER 2018



13<sup>th</sup> APEC-KHON KAEN INTERNATIONAL SYMPOSIUM | 11<sup>th</sup> INTERNATIONAL CONFERENCE ON EDUCATIONAL RESEARCH

SEPTEMBER 8-11, 2018 @ KHON KAEN UNIVERSITY | THAILAND



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held in Khon Kaen University, Thailand  
September 8-11, 2018



**Assoc. Prof. Maitree Inprasitha, Ph.D.**

Project Overseer, 13<sup>th</sup> APEC-Khon Kaen International Symposium  
Secretariate, 11<sup>th</sup> ICER Conference

50<sup>th</sup> ANNIVERSARY  
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# APEC-ICER

## 2018

13<sup>th</sup> APEC-KHON KAEN INTERNATIONAL SYMPOSIUM  
"BRIDGE 12 YEARS OF APEC LESSON STUDY TO INSIDE HIGH QUALITY CURRICULUM FOR DIGITAL ECONOMIES"  
11<sup>th</sup> INTERNATIONAL CONFERENCE ON EDUCATIONAL RESEARCH  
"INNOVATIONS FOR CAPACITY BUILDING AND NETWORKING"

**SEPTEMBER 8-11, 2018**

**FACULTY OF EDUCATION  
KHON KAEN UNIVERSITY | THAILAND**

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# APEC-ICER 2018

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11<sup>th</sup> INTERNATIONAL CONFERENCE ON EDUCATIONAL RESEARCH  
"INNOVATIONS FOR CAPACITY BUILDING AND NETWORKING"

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ICER2018

*The 11<sup>th</sup> International Conference on Educational Research:  
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## Rationale and Topical Areas

### Rationale

People everywhere inescapably face the challenges of our rapidly globalizing world. Our ways of life, world views, even our most cherished academic paradigms, are being challenged. The need and opportunity for our education systems is clear: we must rise to this historical occasion, not only to adapt to but to play a central role in the transition toward a sustainable future based on transdisciplinary innovation.

These innovation themes cut across the conference's eleven topical areas. Thus, in addition to the sharing of the latest advances in education research and practice in each area, the conference's goal is to facilitate new thinking via each theme separately and in combination. We expect this transdisciplinary exchange of knowledge will result in the emergence of new strands of thought linking all topical areas, and encouraging development of new, more synergistic modes of education research and practice.

### Topical Areas:

- Teacher Education and Professional Development
- Curriculum and Instruction, Learning in Classroom Context
- Education Measurement and Evaluation
- Languages, Cultures and Social Contexts
- Educational Management: Planning, Policy Implementation and Assessment
- Mathematics and Science Education
- Educational Psychology and Special Education
- Technology and Innovation
- Education for Sustainable Development
- Physical Education
- Art Education and Art Exhibition

## Message from the Host: Faculty of Education, Khon Kaen University

Dear Colleagues,

On behalf of Khon Kaen University, the host of the International Conference on Educational Research (ICER) 2018, I take great pride in welcoming you to *Isaan*, a land rich in history, culture and traditions.



This is the 11<sup>th</sup> Annual Conference which coincides with the 50<sup>th</sup> Anniversary Celebration of the founding of Faculty of Education, KKU. This year the ICER conference's theme is *innovations for capacity building and networking*.

The goals of the conference are to give international educators the opportunity to share ideas and form networks while working together toward achieving the aim of the conference' theme. It is anticipated that the exchange of ideas and research findings will contribute greatly to future generations.

During the ICER 2018 event, the APEC-Khon Kaen International Symposium 2018 with its theme "*Bridge 12 years of APEC Lesson Study to InMside High Quality Curriculum for Digital Economies*" is also held at KKU starting from September 8 to September 11, 2018. The meeting is aimed at discussing the lesson learned from 12 years of implementing lesson study and way forward to inclusive mathematics for sustainability in digital economy. Nonetheless, the two events will share the plenary sessions during the first two days of APEC symposium. This is providing a great opportunity to extend the network of educators and researchers in order to learn and share about the future education.

In closing, I would like to express my gratitude to our co-host institutions, the guest speakers and the organizing committees for their efforts. I also would like to thank all delegations and participants who come from afar to join this event.

Associate Professor Maitree Inprasitha, Ph.D.  
Dean, Faculty of Education  
Director, Institute for Research and Development in Teaching Profession for ASEAN  
Director, Center for Research in Mathematics Education  
Khon Kaen University  
Thailand

## Message from Co-host



The Faculty of Education and Human Development is young faculty that aspires to contribute in meaningful ways to education development in the Asia Pacific Region. It is an integral part of The Education University of Hong Kong - a multidisciplinary education focussed institution with a strong research emphasis. The University has a growing international reputation for excellence in preparing globally aware professional educators, providing culturally enriched educational experiences, and producing research of distinction. Central to the University's values is a commitment to developing international and regional networks that will facilitate the integration of intercultural and global dimensions into its teaching, learning, and research.

At EdUHK we particularly value collaborative research with international partners. We seek to understand better the contexts that influence people in the Asia Pacific region and to identify ways of improving social outcomes for all. We see international partnerships as important opportunities for enhancing the impact of our research.

EdUHK is proud to join with Khon Kaen University to co-host the 2018 International Conference on Educational Research.

Professor Allan Walker  
Joseph Lau Chair Professor of International Educational Leadership  
Dean, Faculty of Education and Human Development  
The Education University of Hong Kong  
HONG KONG SAR  
People's Republic of China

## Message from Co-host

It is an honor for the College of Education of Mindanao State University-Iligan Institute of Technology (MSU-IIT) to continually co-host the International Conference on Educational Research (ICER) in partnership with the Faculty of Education, Khon Kaen University, Thailand. This eleventh annual conference on September 8-9, 2018 with the theme: “Innovations for Capacity Building and Networking” is a very significant occasion to bring to the fore the achievements in the various academic disciplines, share best teaching-learning practices across the globe and increase collaborative linkages of educational institutions through more creative ways.



In our current situation, there are new discoveries that contribute to the evolution of knowledge. This propels innovative ways of doing things. The changes that are happening can best be understood when disseminated in an appropriate assembly such as the ICER. It is a venue where educators and researchers can engage in a dynamic exchange of ideas and experiences in the fields. New learning from this gathering can further promote excellent educational practice.

I wish all the delegates a meaningful encounter of new friends and associates among the participating universities and learning institutions. May they forge stronger collaboration in many areas of academic endeavors so that they can deliver the best and effective services that are responsive to the needs of the learners.

Once again, let me congratulate the Faculty of Education of Khon Kaen University for the commitment to the goals of the ICER. To the organizers and resource persons, thank you for sharing your expertise. To the participants, may the ICER 2018 spark greater enthusiasm for productivity, progress and sustainable life for everyone.

Associate Professor Josefina M. Tabudlong, Ph.D.  
Dean, College of Education  
Mindanao State University-Iligan Institute of Technology  
Mindanao, Philippines

## Message from Co-host



Welcome to the International Conference on Educational Research (ICER) 2018: Innovation for Capacity Building and Networking which will be held during September 8 – 11, 2018 in Faculty of Education Khon Kaen University.

The 11th annual conference alongside with the 50th anniversary of the establishment of the Faculty of Education Khon Kaen University has specific aims to give international educators the opportunity to share ideas and form networks while working together on challenging education for future change. This is in line with the main goal of education in as the fundamental human right. Moreover, hopefully through this conference stable networks between educators, universities, and stakeholders will be formed. In return, it can also ensure the implementation of sustainable education in each country now and after.

However, as a co host of the International Conference on Educational Research (ICER) 2018, the success of this conference depends ultimately to all of us who have supported our members of university to join the conference. Especially, we deliver our greatest appreciation for Khon Khaen University in organizing the technical program; the Program Committee for their thorough and timely reviewing of the papers, and all committee who have helped us to for all participants. Furthermore, recognition should also go to the Local Organizing Committee members who have all worked extremely hard for the details of important aspects of the conference programs and seminar. Truly, thank you to the partners who jointly organize this great and extraordinary event.

Last but not least, thank you to all participants of ICER 2018 who have shared idea and insight also with the good cooperation for supporting the education quality. I firmly believe by this conference, we can create foundation of life through education and take part in realizing sustainable development goals (SDGs) especially for quality education. Thus, we expect to get technical insight and tremendous opportunities for formal and informal networking which will be useful for every aspect of life.

Sujarwanto  
Dean, Education Faculty  
Universitas Negeri Surabaya  
Indonesia

## Message from Co-host



The Central University of Technology (CUT) is extremely proud to be associated with Khon Kaen University, not only as a MoU partner, but also by participating in co-hosting the *International Conference on Educational Research (ICER) 2018: Innovations for Capacity Building and Networking*. CUT also congratulates Khon Kaen University on the institution's 50<sup>th</sup> anniversary celebration- indeed a mammoth milestone achieved through a life long commitment to quality teacher education and

becoming a leading, international faculty of education.

As a global south partner to ICER 2018, CUT pledges its support in solidifying its current engagements with Khon Kaen University and forging vibrant relations and collaborative interactions with the other partners partaking in ICER 2018. CUT further commends Professor Maitree Inprasitha and the local ICER Organising Committee members for their leadership demonstrated in coordinating activities, confined to the successful operationalisation of this milestone event.

I'm hopeful that the ICER 2018 gathering will be blessed with fruitful engagements which could provide a platform for research collaboration, international partnerships and networking opportunities amongst participants. CUT is indeed geared in learning good practices from partner institutions across the Asian context.

Professor Nosisi Nellie Feza  
Dean, Faculty of Humanities,  
Central University of Technology,  
South Africa

## Message from Co-host



I would like to sincerely congratulate Khon Kaen University for organizing ICER 2018. Especially, it is a great pleasure for KNUE to co-host ICER this year.

I myself have had many chances of visiting Khon Kaen APEC for Lesson Study Group and have participated in ICER since its early years. Every time I visit Khon Kaen, I am highly impressed with academic enthusiasm of the College of Education, Khon Kaen University under the leadership of Associate Professor Maitree Inprasitha. Moreover, I have been certainly able to find their advancement of academic capabilities in ICER.

Through continuous collaborative activities in ICER, KNUE and Khon Kaen University are expected to establish more close relationships. I am looking forward to more exchanges of students and faculty members between KNUE and Khon Kaen University.

I would like to appreciate your kind invitation to KNUE as a co-host of ICER 2018. KNUE will do its role so as to contribute to development of ICER.

Once again, I congratulate all of you for opening ICER 2018 successfully.

Professor Lew Hee-chan  
President, Korea National University of Education  
South Korea

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## Developing Tolerance and Social Justice Attitudes Through Learning Subjects: ALLR Learning Model

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### Abstract

The development of tolerance attitude and social justice on students should also be done through learning subjects. This research intends to find a learning model (in this case, learning model for natural science subject) that can develop the attitude of tolerance and social justice. The current research is design research. However, this research was conducted only up to the prototyping stage. Analyzing the needs and context, reviewing the literature, developing a conceptual or theoretical framework are done in the preliminary stage of this research. Furthermore, designing a teaching model, holding Forum Group Discussion, designing improvement, and validating the teaching model was done in the prototyping stage. The data required in this study are the responses, suggestions, and results of the feasibility assessment of the teaching model according to the teaching and learning expert; were obtained through questionnaires and interviews. Data were analyzed descriptively. This study produces an ALLR learning model (Activity-based, Lesson Learn, Reflection), which is considered feasible to be used in science classes to develop an attitude of tolerance and social justice.

**Keywords:** ALLR learning model, tolerance and social justice attitudes.

### INTRODUCTION

Indonesia is a multiculturalism country with a very complex diversity in ethnicity, race, culture, language, beliefs, and religion. The diversity possessed by the Indonesian people will be an inspiration and potential for national development. Thus, the Indonesian dream to realize a fair and prosperous society which stated in the preamble of the 1945 Constitution of the Republic of Indonesia.

One of the values that is currently in the spotlight in Indonesia is the value of humanity and the value of social justice. In Indonesian society which consists of various cultures, human values lead to tolerance about differences between individuals and between groups. Thus, social cohesion for Indonesia people is important in order to develop careness and an attitude to not arbitrarily to others. In addition, trust in groups is important in order to realize justice and civilized humanity values.

The rise of intolerance and social justice conflicts shows the erosion of the values of the integrity of the Indonesian people, especially in terms of ethics, morals, and trust (Kuwado, 2016; Putra, 2017; Hakim, 2016). The character of the nation that has the spirit of

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cooperation and helping each other for the progress of the nation begins to fade away. If this continue, similar conflicts will continue to occur. In dealing with this, social engineering are needed in various components of the life of the nation, state, and community in Indonesia. One of these social engineering is in the field of education, namely character education.

Natural Science (IPA) is an arranged and systematically knowledge and used to describe natural phenomena (Wahyana in Trianto, 2010). Nash (in Hendro, 1992) explained that the way science observes this world is analytically, complete, careful, and connects this world between a phenomenon and other phenomena so that the whole forms a new perspective on the object being observed. Meanwhile, Asy'ari (2006) defines science or science as human knowledge about nature which is obtained in a controlled manner, besides being a product that is human knowledge of science or science as a process that is how to get that knowledge. From some of these opinions, it can be stated that natural science is a systematic knowledge, organized regularly, and is knowledge gained through collecting data with experiments, observations, and deductions to produce an explanation of a symptom that can be trusted.

Science learning has a strategic role in improving the quality of human resources. This is based on the science learning process that provides skills and habits of scientific thinking, high-level thinking skills, and complex problem analysis skills to be applied in life. Science learning also has relationships with various concepts in various scientific disciplines and is dynamic. So far, science learning can be used as a vehicle to build moral, character, and noble character. If science learning is applied correctly, it will be able to touch the various "values" needed in the formation of students' character. Thus, in its teaching practice, science learning is not only the transfer of knowledge, but also teaches the values of life hidden within it.

In its teaching practice, science learning does not only aim to improve the ability to work and think regularly and systematically according to scientific procedures, but also to foster a strengthening of scientific attitudes in solving problems. Scientific attitudes include skepticism, being critical, sensitive, objective, honest, open, right and able to work together. Openness and cooperation will not be realized if one cannot accept the difference between one group and another. Tolerance towards the diversity that occurs in the surrounding environment needs to be emphasized in every science lesson.

Learning science can be used as an approach to building moral, noble character and character. Through science education students will know themselves and their God. As a result of research by Zuchdi et al. (2010) which shows that the character education model with a comprehensive approach, which is combined with the learning of study fields and based on the development of school culture, can improve the results of study and the quality of students' character. Character education integrated into learning in various fields of study can provide meaningful experiences for students because they understand, internalize, and actualize through learning processes. Thus, these values can be absorbed naturally through daily activities.

As for the research conducted by Ekowati and Nenohai (2016), it can be seen that research activities based on problems indicate that students are very active and show a positive response in learning activities. The attitude of environmental careness began to appear after using a mathematical thematic book which developed as a guidebook for teachers and practice books for students. This shows that the planting of attitudes can be done through the learning process by developing tools and using certain models. However, the attitude developed in those research is still related to the learning material.

Previous research conducted by researchers shows that character education related to moral values has been carried out by several lecturers in the classroom. There are three ways in implementing Pancasila values that have been done by lecturers in Faculty of Mathematics and Natural Science of Unesa, i.e. by integrating values in classroom activities, giving meaningful learning model, and exploring local cultural heritage of the community (Widodo et al. 2016).

In addition, the results of previous studies also show that the cultivation of Pancasila values for students through lectures in the science field is considered important because it will affect students' attitudes, especially when directly involved in community life as a teacher. In addition, the cultivation of Pancasila values is also possible during the learning process, including linking and applying Pancasila values in material content during learning through activity-based learning that creates positive attitudes as the embodiment of Pancasila values.

Based on the results of these studies it appears that the activity of transferring reasoning into a broader context of life affects the moral knowing and moral feeling of students greatly. Moral knowledge contains moral awareness, knowledge of moral values, perspective determination, moral thinking, decision making, and personal knowledge. While moral feeling (moral feeling) contains conscience, self-esteem, empathy, loving good things, self-control, and humility.

Based on the data and facts that have been explained, it can be seen that in order to instill the values of Pancasila, in this case it is focused on the development of tolerance and social justice in the field of natural science studies. So, to answer these problems we need a model that can be used by lecturers to integrate these values and apply them in learning. The models developed by the researchers are ALLR (activity based, lesson learned, reflection) learning models that can be used as guidelines for lecturers in developing tolerance and social justice through lectures in the science study field.

## **METHOD**

This study uses a research design pattern to the prototyping phase. In the preliminary research phase needs and context analysis, review of literature, development of a conceptual or theoretical framework for the study. At the prototyping phase the design of the lecture model, Forum Group Discussion, design improvement, and lecture model validation were carried out. The data needed in this study is the results of the assessment of the feasibility of the lecture model and the suggestions according to the learning experts obtained through questionnaires. The data obtained is then analyzed descriptively.

## **RESULTS AND DISCUSSION**

### **The Learning Model of ALLR**

Based on the research that has been done, it is obtained the learning model of ALLR (activity based, lesson learned, reflection). ALLR learning model, is a learning model that combines the concepts of activity based learning, lesson learned, and reflection. Activity based learning is an approach in learning that emphasizes student activities optimally to obtain learning outcomes in the form of a balanced combination of cognitive, affective, and psychomotor aspects. In the learning process, activity based learning encourages and develops student activity in understanding concepts and theories through various experiential activities in

various learning environments, which include the environment inside and outside the classroom.

From this concept, there are two important things related to activity based learning, namely:

- a. Emphasizing the development of student activities and creativity optimally, taking into account the balance between physical, mental activities, including emotional and intellectual activities. Therefore, activity based learning is not only seen from psychomotor activities, but also cognitive and affective activities of students.
- b. Activity based learning requires balanced and integrated learning outcomes between cognitive, affective, and psychomotor abilities.

Activity based learning helps students to be actively involved in understanding scientific concepts, learning processes, and providing opportunities to apply / apply them in the activities of daily life (Shah and Rahat, 2014). Harfield, Davies, Hede, and Panko Kenley (2007), stated that activity based learning emphasizes the development of the ability of students to be actively involved in real life experiences, so that students are able to achieve higher-order performance such as level problem solving abilities. high.

Lesson learned is knowledge or understanding gained by someone based on experience, which has a significant impact on themselves. This experience can be either positive or negative. In the context of ALLR, lessons learned are the ability of a person to interpret and take lessons from the learning process that has been carried out and then apply it in a broader context of life. As in Chapter II explained that wisdom is something that is very valuable and most important of a science, it can even be said as an urgency of science. So, someone who is able to take lessons from an event, then someone can be said to be an expert and has perfect knowledge in a matter. This is because the person is able to understand the nature of the events he encounters or experiences so that he is able to take ibroh, wise in deciding, smart in acting, and having the ability to minimize errors or failures in life.

Reflection (reflection) is an assessment activity carried out by students on the teaching and learning process that has been carried out. Reflection is a process of reviewing experiences by describing, analyzing, and evaluating the learning that has been done. Reflection is needed to get a picture of the success rate of the learning plan. The results of reflection can be used to determine the next steps needed in learning.

In learning activities, lecturers and students can reflect on evaluating the entire set of learning activities and the results obtained to further discover the direct and indirect benefits of the learning outcomes that have taken place, provide feedback on learning processes and outcomes, carry out activities follow-up in the form of assignments, both individual and group assignments, and inform the planned learning activities for the next meeting.

From the description above, it can be concluded that the ALLR learning model is a learning model that emphasizes on student activities by combining and balancing between cognitive, affective, psychomotor aspects and encouraging students to be able to interpret and take lessons as well as providing ample space for students to provide reflection on learning activities that have taken place.

Each learning model is characterized by a typical syntax that distinguishes the learning model from other learning models. Likewise with this developed learning model, ALLR learning model has syntax consisting of 6 stages. These stages are presented in the following Table 1.

Table 1 Stage of ALLR Model


Syntax	Theoretical Based	Student Activity	Lecturer Activity
Syntax 1: Orient students to the phenomena to be investigated or problems to be solved.	<ol style="list-style-type: none"> <li>1. Constructive theory: Top-down learning, namely learning activities begin with complex problems to be solved then develop or find (with teacher guidance) the basic abilities needed.</li> <li>2. Gagne learning transfer theory: <ul style="list-style-type: none"> <li>▪ To get the attention of student lecturers can use animation, demonstrators, and so on.</li> <li>▪ Provide information related to learning objectives for students.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss and use the capabilities possessed to make observations of the phenomena presented by the lecturer.</li> <li>2. Using his thinking ability to formulate problems.</li> </ol>	<ol style="list-style-type: none"> <li>1. Focus student attention by displaying phenomena, demonstrations, or stories to raise problems.</li> <li>2. Motivate students to engage in investigation or problem solving activities.</li> <li>3. Convey learning objectives.</li> </ol>
Syntax 2: Design an investigation or problem solving process.	<ol style="list-style-type: none"> <li>1. Vigotsky Theory: Scaffolding that is carried out appropriately will be able to encourage students to achieve their level of potential development (Slavin, 2000).</li> </ol>	Design ways to solve problems that have been conveyed by the lecturer on syntax 1.	<ol style="list-style-type: none"> <li>1. Guiding students to design problem-solving process.</li> <li>2. Perform scaffolding and provide feedback.</li> </ol>
Syntax 3: Guiding inquiry or applying problem solving methods in groups.	<ol style="list-style-type: none"> <li>1. Constructivist theory: learners must find.</li> <li>2. The purpose of cooperative learning is to create a situation where individual success is determined or influenced by the success of the group (Lundgren L., 1994).</li> </ol>	<ol style="list-style-type: none"> <li>1. Implement a plan to solve the problem.</li> <li>2. Formulate findings by making conclusions based on the data obtained.</li> </ol>	<ol style="list-style-type: none"> <li>1. Divide students into groups.</li> <li>2. Encourage students to collect appropriate data and information.</li> <li>3. Guiding students in carrying out the process of investigation or problem solving.</li> </ol>
Syntax 4: Develop and present the results of an investigation or problem solving.	<ol style="list-style-type: none"> <li>1. Vygotsky's theory: learning precedes development and learning involves acquiring signs through teaching and information from others (Slavin, 2009).</li> <li>2. Albert Bandura's theory of social learning: The theory of social learning proposed by Bandura believes that everything can be learned when the learner observes continuously on a particular behavior and</li> </ol>	<ol style="list-style-type: none"> <li>1. Making documentation of the results of the investigation that has been carried out, the documentation can be in the form of a report, video, or model.</li> <li>2. Conducting presentations or communication in other forms.</li> </ol>	<ol style="list-style-type: none"> <li>1. Guiding students in making documentation of the problem solving process.</li> <li>2. Guiding and directing students in presenting the results obtained.</li> <li>3. Give students feedback on the presentation.</li> </ol>

Syntax	Theoretical Based	Student Activity	Lecturer Activity
	then puts the results of observation into his long-term memory.		
Syntax 5: Lesson Learned (Retrieval of wisdom).	<ol style="list-style-type: none"> <li>1. The meaning of wisdom in the Qur'an, the book Mu'jaam Maqaayis Al Lughah, the Lisaanul 'Arabic book, the book of Taajul' Aruusy, and the book of As Shikhah.</li> <li>2. Gagne learning transfer theory: transfer (new) knowlede to the wider context</li> <li>3. Thomas Lickona character education: character education is a deliberate effort to help someone so that he is able to understand, pay attention to, and carry out core values in ethics.</li> <li>4. Moral development Lawrence E. Kholberg: Postconventional, Autonomous, or Principle Level</li> <li>5. At this level, there is a clear effort to formulate moral values and principles that have validity and can be applied.</li> </ol>	Formulate lessons learned from (new) knowledge (concept/principe) to the wider context with analogy, similarity, and examples.	<ol style="list-style-type: none"> <li>1. Guiding students in taking lessons learned from learning activities.</li> <li>2. Develop tolerance and social justice for students.</li> </ol>
Syntax 6: Reflection	<ol style="list-style-type: none"> <li>1. Gagne learning transfer theory: feedback means providing information related to existing understanding that we can use to improve understanding in the future.</li> <li>2. Piaget's theory of the concept of schema, organization, disequilibrium, assimilation and accommodation (Santrock, 2008).</li> </ol>	Reflecting the learning process	Guiding and giving reinforcement to students in reflection

The syntax that distinguishes the ALLR model from other learning models is the fifth and sixth syntax. At the fifth and sixth syntax, lecturers play an important role in learning activities. The lecturer acts as a mentor as well as a facilitator for students in taking lessons in learning and as input for moral values in this case tolerance and social justice for students. Considering that lecturers play an important role in this syntax, it is better before starting the learning activities, the lecturer explores the lessons learned in advance about the material content and the phenomena presented in the learning. In addition, the lecturer also guides the discussion regarding the entire set of learning activities and the results obtained. So that, lecturers and students together can find direct and indirect benefits from the learning outcomes that have been implemented.

### Student Activity Sheet

Student Activity Sheet (worksheet) is a sheet that contains tasks that must be done by students. The developed worksheet refers to the developed model book. The worksheet is used to develop tolerance and social justice for students through lectures in the field of Natural Sciences. The characteristics of the worksheet are worksheets in accordance with the developed model, worksheets contain problems that need to be solved, problems in worksheets can help improve students' problem solving skills, the problem is the application of concepts in the field of Natural Sciences, Problems in worksheets can be solved by scaffolding lecturers, directives in the worksheet can serve as "assistance" for students, equipment and materials that are needed realistically for higher education institution, worksheets can develop tolerance and social justice, and worksheets facilitate students in transferring knowledge into real life situation.



### PROBLEM SOLVING IDEAS

Discuss in your group how to solve the problem. These tasks may help you to find some ideas.

1. Discuss about the effect of concentration of solution to the amount of plasmolized cell.
2. Find literatures to find the answers.

### Character Building

Working in Group

Do not forget to work in group to finish this task. Share your idea in proper manner to your friends.

Figure 1 Part of Plant Anatomy and Physiology Worksheet


### EVALUATING ALTERNATIVE SOLUTION OF THE PROBLEM

1. Evaluate alternative solution in group.
2. Continue to discuss with other groups in class.
3. If there are any differences in groups, write the advice given by your friends in worksheet

### REFLECTION

This learning tells us about mutual relationship with one another. Land that is given fertilizer will give some harvest later (corn). Now, let you find in group another example that can reflect what you learned today.

### The Importance of Working Together



In order to decide the *solution* for the problem, you need to discuss in group. You need to *respect* other people opinion.

Figure 2 Part of Basic Chemistry Worksheet

Figure 1 and Figure 2 shows an example of worksheet that contains problem solving activity and character building feature. This feature emphasizes about collaboration skills in heterogen group. Students are reminded to share their ideas in group in proper manner. In the end of the worksheet, students reflect what they learn related to some attitude that concern about tolerance and social justice values in class. Students will evaluate themselves and be asked to be honest with the answers.

## Desk Evaluation and Forum Group Discussion Results

### *Validity of The Learning Model*

Table 2 shows the results of the desk evaluation of the ALLR learning model in terms of aspects of supporting theories, relevant learning models, ALLR learning models, syntax of ALLR learning model, and management and learning environment. Based on Table 3 it is known that in learning models ALLR, aspects of supporting theories and relevant learning models get relatively high ratings (close to the ideal percentage score).

However, in the aspect of the ALLR learning model, the syntax of the ALLR learning model, as well as management and learning environment the scores obtained were still below 80%. These results indicate that improvements to the ALLR learning model are still needed to produce better learning models, including aspects that must be improved. There are also some advices from other lectures to revise the worksheets that is showed in Table 3.

Table 2 Model Validity Criteria

Criteria of Validity	Score (%)
Supporting theories	85
Relevant learning models	83
ALLR learning model	78
Syntax of the ALLR learning model	79
Management and learning environment	79

Table 3 Desk Evaluation Advices

Model Validity Criteria	Advices from Desk Evaluation and Forum Group Discussion
Supporting theories	<ul style="list-style-type: none"> <li>Elaborated about Piaget and Vygotsky's constructivism theory furthermore.</li> <li>Discussion related to wisdom in scientific terminology needs to be added.</li> <li>Associate the discussion of each theory with the ALLR learning model.</li> </ul>
Relevant learning models	<ul style="list-style-type: none"> <li>The syntax of each model does not need to be included.</li> </ul>
ALLR learning model	<ul style="list-style-type: none"> <li>The benefits and objectives of ALLR learning model need to be included.</li> </ul>
Syntax of the ALLR learning model	<ul style="list-style-type: none"> <li>Syntax 5 and 6 which are characteristic of ALLR learning need to be explained again.</li> </ul>
Management and learning environment	<ul style="list-style-type: none"> <li>Can be made in table form, making it easier to learn.</li> </ul>

Suggestions for improvement from experts on ALLR learning models can be seen in Table 3. Based on these suggestions, improvements were made to the ALLR learning model, in order to obtain a good learning model.

### Worksheet Validity Based on Desk Evaluation

The results of the 3 expert assessment analysis on the developed worksheets are shown in Table 1.4. In the table, it appears that there are nine criteria that are assessed, namely the worksheet in accordance with the model developed, the worksheet contains problems that need to be solved, problems in the worksheet can help improve students' problem solving skills, the problem is the application of concepts in the field of science studies, Problems in worksheets can be solved by lecturer scaffolding, directives in worksheets can serve as "assistance" for students, equipment and materials that are realistically needed for the condition of state universities in Indonesia, worksheets can develop tolerance and social justice, and worksheets facilitate students in transferring knowledge gained from learning into situations in real life.

The average assessment of experts is in the range of 77% to 87%. On the other hand, the average total rating is 81% of the ideal score. These results indicate that according to the judgment of experts, the developed worksheets are suitable for use and can be implemented in the teaching of science studies.

Table 4 Results of Worksheet Desk Evaluation

Worksheet Validity Criteria	Score of Validity (%) of Worksheet					
	1	2	3	4	5	6
The worksheet is in accordance with the model developed.	79	78	77	80	78	79
The worksheet contains problems that need to be solved.	84	84	83	83	83	83
Problems in worksheet can help improve students' problem solving skills.	85	82	86	86	87	86
This problem is the application of concepts in the field of science studies.	82	82	80	83	83	82
Problems in worksheets can be solved by lecturer scaffolding.	80	80	83	80	84	83
Directives in the worksheet can function as "assistance" for students.	84	84	80	84	83	80
Equipment and materials needed are realistic for the condition of state universities in Indonesia.	82	83	80	80	83	80
Worksheets can develop tolerance and social justice.	79	80	78	77	78	80
The worksheet facilitates students in transferring knowledge gained from learning into real life situations.	80	80	78	80	78	81

Note:

1 and 2: Plant Anatomy and Physiology Worksheets

3 and 4: Basic of Natural Science Worksheets

5 and 6: Basic of Chemistry Worksheets

The advice for improving the worksheet from the expert assessment is not too much. The suggestion is that the concepts in the field of Natural Sciences in each worksheet are explained more specifically. However, in accordance with the purpose of making this worksheet which is used to give direction to students in the process of investigation or problem solving, the explanation of the concepts in the field of science study is not carried

out in the worksheet. However, it is discussed in syntax 3 or 4 in the learning process. Nevertheless, minor improvements to the developed Worksheets are still being carried out.

## CONCLUSION

It can be concluded that the ALLR and worksheet learning models developed are feasible to use and can be implemented in the teaching of science studies.

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