



MINISTRY OF EDUCATION AND CULTURE
UNIVERSITAS NEGERI SEMARANG
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
DEPARTMENT OF INTEGRATED SCIENCES
IN COLLABORATION WITH PERKUMPULAN PENDIDIK IPA INDONESIA
JURNAL PENDIDIKAN IPA INDONESIA



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Phone (+6224) 70805795, Fax. (+6224) 8508005, E-mail: jpii@mail.unnes.ac.id, Website: <http://journal.unnes.ac.id/nju/index.php/jpii>

LETTER OF ACCEPTANCE
JURNAL PENDIDIKAN IPA INDONESIA (JPII)
No: 89/JPII/R.A./2021

The officials of Jurnal Pendidikan IPA Indonesia (JPII) (Nationally Accredited and Indexed by Scopus) give special thanks for submitting article for March 2021 Edition. Based on reviewers' decision, we as the officials stated that:

Article Title : **INDONESIAN CURRICULUM REFORM IN POLICY AND LOCAL WISDOM: PERSPECTIVES FROM SCIENCE EDUCATION**

Authors : **N. Suprpto, B. K. Prahani, T. H. Cheng**

is **accepted** and is going to be published in JPII March 2021 Edition.

The admission letter is made for appropriate use only. Thank you for the cooperation.

Semarang, 25th March, 2021

Editor-in-Chief of JPII,


ISSN 2089-4392 **Dr. Parmin, M.Pd.**

NIP 197901232006041003



Nadi Suprpto <nadisuprpto@unesa.ac.id>

Update: Manuscript Review

1 message

Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>
To: Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>

Tue, Feb 9, 2021 at 7:58 AM

Dear Authors,

We are pleased to inform you that the reviewer has uploaded the review results of your article. Please check your OJS account for the newest review results. We are looking forward to your revision **not later** than February 12, 2021. Thank you.

Best regards,
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Science Education Studies Program , Faculty of Mathematics and Natural Sciences, Semarang State University (UNNES)

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Nadi Suprpto <nadisuprpto@unesa.ac.id>

INDONESIAN CURRICULUM REFORM IN THE CONTEXT OF POLICY AND LOCAL WISDOM: PERSPECTIVES FROM SCIENCE EDUCATION

1 message

Ph.D., **CIQaR Nadi Suprpto** <journal@mail.unnes.ac.id>
To: Andin Vita Amalia <andinvitaamalia1985@gmail.com>
Cc: jpii@mail.unnes.ac.id

Wed, Feb 10, 2021 at 1:18 PM

Dear Editor,

I have revised the manuscript accordingly. I uploaded the two versions of manuscript: Indonesia and English. I have also did a payment of publication cost.

Regards,

Nadi Suprpto, PhD

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2 messages

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To: Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>

Mon, Feb 15, 2021 at 10:16 AM

Dear Authors,

We are pleased to inform you that the reviewer has uploaded the review results of your article. Please check your OJS account for the newest review results. We are looking forward to your revision **not later** than February 18, 2021. Thank you.

Best regards,
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Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>
To: Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>

Wed, Feb 17, 2021 at 7:02 AM

Dear Editor

I have finished the revision according to the **Reviewer C** comments/ suggestions.

Sincerely yours.

Nadi Suprpto, Ph.D

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Nadi Suprpto <nadisuprpto@unesa.ac.id>

Manuscript Update

2 messages

Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>
To: Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>

Thu, Feb 18, 2021 at 11:36 AM

Dear Author;

We are pleased to announce that your article is going to be published in March 2021 edition. At this stage, there are two aspects required from you:

1) You should make sure you do proof-reading effectively in order to produce a quality publication in JPPI. **Proofread must be from an official, reliable, and professional institution.** When the proofread is done please send us the article that has been proofread and the official letter or certificate from the proofread institution. If you have any difficulty in finding an institution in a short time, we have a recommendation. You may do proofreading and editing on SELECT (Semarang Language Consultant) (<http://select.or.id/>), or by phone number in (+6285700952423 / +6285877370020).

2) We encourage you to upload the similarity report of your article on your OJS account as a supplementary file. We are going to accept the article having a **≤20% similarity rate**. Please be aware of using trusted plagiarism/similarity checker applications such as Grammarly, Turnitin Premium, or others. Please avoid using the free application to make the results accountable. For your information, SELECT also provides this service. Thus, you may ask to have your manuscript checked by submitting it to the website.

Please finish the proofread and plagiarism checking **before Wednesday, 24 February 2021**. Thank you for submitting your manuscript to Jurnal Pendidikan IPA Indonesia. The Editors of the JPPI are looking forward to your continued contributions to the Journal.

Best Regards,
JPPI Team

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Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>
To: Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>

Sat, Feb 20, 2021 at 10:36 PM

Dear Editor of JPPI,

I have uploaded the result of proofreading of my manuscript entitled **INDONESIAN CURRICULUM REFORM IN POLICY AND LOCAL WISDOM: PERSPECTIVES FROM SCIENCE EDUCATION**, including the certificate of proofreading and the results of similarity check from Turnitin via **OJS**. Then, I have also revised the metadata, including title, abstract, and the references list.

Here, I am sending those files.

Sincerely yours,

Nadi Suprpto, Ph.D

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3 attachments



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Manuscript Update

6 messages

Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>
To: Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>

Tue, Mar 16, 2021 at 1:09 PM

Dear Author,

Congratulations. Your article has been chosen to publish in JPPI March 2021 Issue. We hereby attach three files consisting of your latest article, letter of statement, and declaration of originality.

We encourage you to:

- 1). Read carefully the latest article that has been through our final review, if there is any correction, this is the last chance to fix it, make a note on the pdf file and send back to us if you have any correction;
- 2). Read carefully the declaration of originality and letter of statement, sign the letters, and upload it on your OJS account as the supplementary file;
- 3). Upload the Turnitin report on your OJS account as the supplementary file.
- 4). Complete all your authors' names in the metadata OJS as well.

We are waiting for your response and congratulations once more.

Thank you for your cooperation.

All the best,

JPPI Team

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Nadi Suprpto <nadisuprpto@unesa.ac.id>
To: Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>

Tue, Mar 16, 2021 at 3:05 PM

Dear Editor of JPPI

Thank you for the beneficial information.

I have uploaded via OJS for the three files.

I would like to underline that I have revised the Figure 4 in the manuscript because the original pdf is not complete. Please help me to check it

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To: Nadi Suprpto <nadisuprpto@unesa.ac.id>

Fri, Mar 19, 2021 at 10:04 AM

Dear Author,

Thank you for your update. We will revise it right away. Thank you.

Regards,
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To: Nadi Suprpto <nadisuprpto@unesa.ac.id>

Thu, Mar 25, 2021 at 10:48 AM

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Regards,
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Thu, Mar 25, 2021 at 11:07 AM

Thank you, I will do that.

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Thu, Mar 25, 2021 at 11:16 AM

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Thu, Mar 25, 2021 at 10:48 AM

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Nadi Suprpto, PhD

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Letter of Acceptance

1 message

Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>
To: Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>

Fri, Mar 26, 2021 at 9:18 AM

Dear Authors,

We are pleased to send the LoA and publication receipt of your manuscript.
It has been a pleasure to work with you.
Thank you very much.

Best regards,
JPPII Team

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Article Checking

3 messages

Jurnal Pendidikan IPA Indonesia <jpii@mail.unnes.ac.id>

Wed, Mar 31, 2021 at 3:17 PM

To: Isaac <matereisaac@yahoo.com>, Yeison Alberto Garces Gomez <ygarces@ucm.edu.co>, Aisyah binti Mohamad Sharif <aisyah@fsmt.upsi.edu.my>, W Linda Yuhana <linda.yuhanna@unipma.ac.id>, andajuanda@syekhnurjati.ac.id, Erlina Erlina <erlina@fkip.untan.ac.id>, Nadi's Learning and Teaching <nadisuprpto@unesa.ac.id>, MITHEN LULLULANGI UNM <mithen@unm.ac.id>, Esty Haryani <esty.haryani@wmich.edu>, deni nasir ahmad <deninasirahmad@gmail.com>, Budiyo Saputro <budiyonosaputro@iainsalatiga.ac.id>, urwatin@mail.unnes.ac.id, wpurnami naingalis <wpurnami@gmail.com>, evi fatimatur <evi_fatimatur@yahoo.com>, evifatimatur@uinsby.ac.id, Arif Sholahuddin <arif.science.edu@ulm.ac.id>

Dear Author,

Congratulations. We would like to inform you that your article has been published on the Web. Please check it for the last time. We will wait until Sunday, 04 April 2021. After passing the Sunday, it cannot be edited again. If there is any correction, make a note on the pdf file and send it back to us.

Thank you for your attention. We would like to hear from you soon. Congratulations!

Sincerely,
JPII Team

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W Linda Yuhana <linda.yuhanna@unipma.ac.id>

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The sub heading I mean are:

Curriculum Policy and Policy Borrowing

Four Stages of Borrowing

From four Pillars of Learning by UNESCO to Five Pillars of the Indonesian Education System

Indonesian Science Curriculum Framework

1. Learning to believe and convince the Almighty God

2. Learning to know

3. Learning to do/work

4. Learning to live together

5. Learning to be or develop as a whole

Philosophy of Indonesian Local Wisdom

Globalization + Localization = Glocalization

Cultural-Based Learning (CBL)

Policy Borrowing versus Local Wisdom

Please help me to correct it.

As a comparison, I sent the last document either doc and pdf, to help solve this problem.

Again, thank you for your cooperation and helping.

Sincerely yours,

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2 attachments



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**INDONESIAN CURRICULUM REFORM IN THE CONTEXT OF POLICY
AND LOCAL WISDOM: PERSPECTIVES
FROM SCIENCE EDUCATION**

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ABSTRACT

The article endeavours to summarize the issue of Indonesian curriculum reform in the context of policy and local wisdom. The perspectives on science education influence the analyses and discussions presented in the article. This paper is part of a position paper (PP) in which the authors tailoring their ideas based on their experiences and searching literature review. The views regarding curriculum policy, science local wisdom, and ethnoscience were developed based on the analysis of theoretical and empirical literature regarding these issues. The discussion is divided into five parts: curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural based learning, science local wisdom and ethnoscience, and 'policy borrowing vs local wisdom'. The significance of the results gives a lens to the government, academicians, policy makers, and educational communities.

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Keywords: Curriculum reform, policy, local wisdom, science education, Indonesia

INTRODUCTION

In response to the globalization, rethinking the curriculum to equip young generation to better education in the future is an essential suggested. One form of rethinking the curriculum is the curriculum change as a result of government policy, the influence of public and media scrutiny, the result of the standardized test such as TIMSS, PISA, PIRLS, or by previous research findings (Brown & Beswick, 2014; Suprpto, 2016). Countries in Asia-pacific that succeed in their educational reform such as Singapore and South Korea reduced the amount of knowledge that young people have to learn to make room for more creativity according to their previous research findings. In Taiwan, contemporary efforts in education are grasped from an exemplar for the flowing of the combination ideas of globalization and localization. These terms trigger the concept of 'glocalization'- "think globally act locally". A recall, all reform programs implemented in Taiwan's education system have controlled to significant changes in the academic field (Chou & Ching, 2012). Besides, China proposed three wisdom traditions: Confucianism, Taoism, and Buddhism embodied in their curriculum as stated in the Hangzhou model (Hua, Wenjun, & Pinar, 2014).

Indonesia as a developing country using the basic government policy and the results of TIMSS and PISA tests as a reference in their curriculum reform. Recently, Indonesia changed their curriculum known as the K-13 (Indonesian Curriculum of 2013). Even earlier, less than ten years the curriculum has changed in the absence of a comprehensive research study. Consequently, there is an impression that the disassembly of building a curriculum that applies is normal. Though the evaluation of the implementation of the previous curriculum was not finished but was immediately followed by the presence of the new curriculum. From a series of curriculum that has been implemented were an excellent idea but the implementations were still

far from satisfactory. The main obstacle is the evaluation of the implementation and supervision aspects since the extent of the territory of Indonesia and the unequal of human resource capability, in this case, is the teacher.

We underlined two main issues will be revealed in this paper, namely how curriculum policy-making and the extent of local wisdom. As expressed by Pinar (2014, p 17-18) that "for rational reconstruction of the curriculum field in the US emphasizes two points: the study of the past of the area and even more the international scholarly exchange of research, ideas, and concept". There would be no harm if the thought was used in Indonesia. Therefore, considering the curriculum policy, we highlighted the importance of adopting research findings from countries that are already established. Hence, the term of policy borrowing becomes necessary to be disclosed. Also, based on the length history in sociocultural aspects, Indonesia has a strong foundation based on local wisdom. Both thought it would be discussed in this paper. To sum up, the article endeavours to highlight the issue of Indonesian curriculum reform in the context of policy and local wisdom with science education perspectives as well as our academic background.

METHODS

This paper is part of position paper (PP) in which the authors tailoring their ideas based on their experiences and searching literature review. A PP must establish an amalgamated voice in areas where controversy occurs based upon numerous practices. Typically, "a PP should elucidate the knowledge gap, followed by an evidence-based review of options, leading to an endorsed position" (Bala et al., 2018). A PP should represent more than views or consensus of the authors but should present current thoughts and practices. According to Fleming (2019), there are at least five steps in presenting position paper as illustrated in Figure 1.

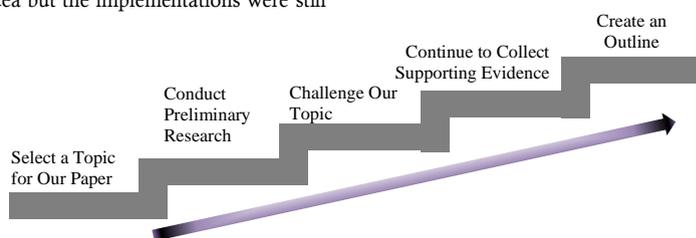


Figure 1. The Steps in Presenting Position Paper (Fleming, 2019)

In conducting preliminary research, there are variety of methods used to produce position paper such as perception on curriculum reform of the specific country. This study utilized Khan's

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- contain urgency (importance) to research
 - contain a carrying capacity in the form of supporting data and facts
 - contain a preliminary study as a basis for the importance of the research conducted
 - contain a GAP ANALYSIS Departing from the preliminary study, analysis of published articles formulated in the Gap analysis
- GAP ANALYSIS refers to articles published in various internationally reputable journals to emphasize the novelty of research.
- clear limitation of research objective

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- ### Commented [U3]: METHODS should
- contain detailed research stages
 - Each stage is explained and analyzed by what method
 - Data analysis must be with clear references
 - The research instruments used were elaborated to the data analysis technique
 - It is hoped that there will be a modification in the stages of research from sources referred by the researcher

research and the authors' previous research method. The step comprises of five headings: "framing problems for a review, identifying relevant work, assessing the quality of studies, summarizing the evidence, and interpreting the findings" (Khan, Kunz, Kleijnen, & Antes, 2003; Suprpto, 2016; Suprpto, Liu, & Ku, 2017; Suprpto & Pai, 2015). Meanwhile, in creating an outline, there are five essential issues: (1) introducing our topic with some basic background information; (2) introducing possible objections to our position; (3) supporting and acknowledging the opposing points; (4) explaining that our position is still the best one, despite the strength of counter-arguments; and (5) summarizing our argument and restating our position (Fleming, 2019). Accordingly, the discussion in this paper is divided into five parts: curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural based learning, science local wisdom and ethnoscience, and 'policy borrowing versus local wisdom'.

RESULTS AND DISCUSSION

Curriculum Policy and Policy Borrowing

The recognition of the educational system as an authoritative social institution to empower Indonesian civilian to become intellectual persons is one of the vision of Indonesian education (MOE, 2013). The new policy on curriculum is intended to authorize teachers for developing learning activities relevant to the students' need, the real condition of the school, and the necessity to link it to the surroundings. Central Government is responsible for guidance in developing competency based-school level curriculum. The Curriculum Centre (Pusat Kurikulum) of the Ministry of Education and Culture (MOEC) helps the academic stakeholders develop their curriculum by providing curriculum models that can be implemented at the school level.

Nevertheless, the above ideas are very good but the implementations were still far from satisfactory. One of the reasons is there is nothing wrong in the decision-making curriculum. We underline the existence of policy borrowing. "A policy

borrowing approach searches the international experience, i.e., a unique, transferable best practice" (Raffe, 2011: 1). Policy learning uses the experience for a broader range of goals, including better thoughtful one's system, identifying trends and general pressures that affect all systems (Portnoi, 2016).

In our point of view, learning from the experience of other countries and especially from the countries believed to represent best practice by policy-makers is one of a significant policy borrowing. For instance, about 40 years ago Indonesian education equivalent to Malaysia but now is far behind. Even in the 1970s, many Malaysian lecturers studied in Indonesia, but this time is the opposite situation happened, many Indonesian students pursue their master and doctoral degree in Malaysia. It may be that it is time for Indonesia to borrow curriculum policy from Malaysia or surrounding countries, such as Singapore, Thailand, Taiwan, Japan, Korea, and others. Perhaps, in this way, the education curriculum in Indonesia is not only useful in their ideas but also it becomes essential in the implementation process.

Lingard (2010) noted that "to be effective, policy borrowing must be accompanied by policy learning, which takes account of research on the effects of the policy that will be borrowed in the source system, learning from that and then applying that knowledge to the borrowing system through careful consideration of national and local histories, cultures and so on". Therefore, policy borrowing becomes a reason for a country to reform its curriculum. In conclusion, policy borrowing must be followed by an excellent teaching-learning process and still consider local historical heritage, customs, and local wisdom. Indonesia, with nearly 17,000 islands and about 250 million in populations can be explored their local culture.

In the next section, we describe the stages of policy borrowing in education and analyse some examples of policy borrowing in education (science education) that have been integrated in Indonesia curriculum. This effort is useful for other countries in which they have same situation like in Indonesia

Table 1. The Process of Policy Borrowing in Education

Stages	Substages	Definition
Cross-National Attraction (CNA)	Impulses-externalizing potential	CNA stage includes impulses and externalizing potential. Meanwhile, impulses relate to an academic investigation of the situation in an external environment and perceptions of other approaches to educational enquiries. Indeed, the distortion or exaggeration of evidence from abroad to highlight perceived deficiencies at home has also influenced CNA (Phillips, 2000). On the other hand, adjusting philosophy, enabling structures, goals, processes, strategies, and techniques are belongs to externalizing potential.

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Stages	Substages	Definition
Decision	theoretical-phoney-realistic/practical decisions-quick fix decision	The second stage involves an extensive variability of measures through which government and policy makers attempt to initiate the process of change.
Implementation	Support-vs-resistance	This stage constitutes the adaptation any a new model will be subjected to within the context of the borrower system.
Internalization/Indigenization	the existing system impact-absorption of external features-synthesis-evaluation	'Internalization', or 'indigenization' of policy becomes part of the educational system of the borrower country. It is possible to evaluate its effects on the pre-existing provisions in education.

Source: Phillips and Ochs (2003)

Four Stages of Borrowing

Phillips and Ochs (2003) postulated 'borrowing' as a series of four principal processes: "(1) Cross-National Attraction (Impulses and Externalizing Potential), (2) Decision, (3) Implementation, and (4). Internalization/ Indigenization". Through these processes, the country implements best practices from the target country.

The following some examples of policy borrowing in education and science education that have been integrated in Indonesia curriculum. First, the discussion of five pillars of Indonesia education system adapted from four pillars of learning from UNESCO is exemplified. Second, the borrowing of science curriculum framework which is influenced by Singaporean science curriculum framework is also illustrated. Third, the narrative of 3N and 5N local wisdom and its connection with traditional and constructive learning is also depicted.

From four pillars of learning by UNESCO to five pillars of Indonesian education system

Based on UNESCO, the curriculum should be reorganized and restructured around the four pillars of learning: "learning to know, learning to do, learning to live together, and learning to be" (UNESCO, 1996). 'Learning to know' represents acquiring some information as factual knowledge. It emphasizes rote learning or conventional curriculum rather than focuses on the mastering of knowledge themselves. 'Learning to know' presumes to learn to learn, relating to memory and thought. 'Learning to do' implies an alteration form of skill or competence. It also represents a mix of higher-order skills specific to each individual. 'Learning to live together' denotes the development of such qualities as: knowledge and understanding of self and others; respect of other people, cultures, and value systems; appreciation of the diversity and an awareness of the similarities between; empathy in caring and sharing; and capability of resolving conflicts; etc. 'Learning to be' implies "a curriculum aiming at cultivating qualities of creativity; developing critical thinking and training independent judgment; attaining human values; and emerging aspects of a person's potential: reasoning, physical capacity, memory, social skills, and communication" (Fraure, 1972).

The results of policy borrowing can be seen the following *five pillars of Indonesian education system*:

1. Learning to believe and convince the almighty God

Trusting and believing in the Almighty God does not exist in the 4 (four) UNESCO pillars. Indonesia is a marvellous country that upholds religious values; therefore, this pillar is included in the pillars of learning in Indonesia. As for the implementation process, this pillar has already existed with the existence of religious subjects and civics who teaches character and trust in the Almighty God. And now even in the purpose of learning it has included a spiritual element in Competence-1 (K1).

2. Learning to know

This pillar learns to know about how to gain knowledge, understanding with existing media. Media can be in the form of books, internet, and other technologies. At this time technology to support the advancement of science is rapidly growing, almost all information gathered from various parts of the world can be easily accessed by the internet. The implementation of this pillar has been running in Indonesia. The process of learning, reading, memorizing, and listening in class is the implementation of this pillar.

3. Learning to do/work

Learning to do or work is inseparable from learning to know because actions are inseparable from science. Learning to do or work in essence is related to vocational. So, learning to work is an effort to always do and practice skills for professionalism at work. So that it can meet the demands of work in the community.

4. Learning to live together

The fourth pillar is learning to live together because people have different backgrounds. Especially in the current era of globalization, people from various ethnic, racial, religious, educational backgrounds, etc. People will be incorporated into an environment in the community; therefore, mutual help and respect for one another are needed in order to create an orderly and safe society. So that it is always necessary to learn to live together.

5. Learning to be or develop as a whole
 The fifth pillar is learning to be or develop as a whole related to the demands of an increasingly complex life so that it takes a character in the individual. Learning becomes an optimally developed person who has the right and balance in his personality, moral, intellectual, emotional, spiritual, and social. In order to fulfil that all individuals are required to develop all aspects of their lives. Regardless of whom the individual will be and what his important work is, he becomes a superior figure. Figure 2(a) describes science curriculum framework in Singapore across all levels from primary to pre-university. The framework was conceptualized from theories into

practice of inquiry science, piloted by a set of preferred outcomes of education and vision of Singaporean science education (Chin & Poon, 2014). The development of the high school science curriculum is carried out in order to achieve the dimensions of knowledge competence, scientific work, and scientific attitudes as daily behaviour in interacting with society, the environment and the use of technology, as illustrated in Figure 2(b). The figure also shows that students are able to apply the Natural Sciences competencies learned in schools to become behaviours in people's lives and utilize society and the environment as a source of learning.

Indonesian science curriculum framework

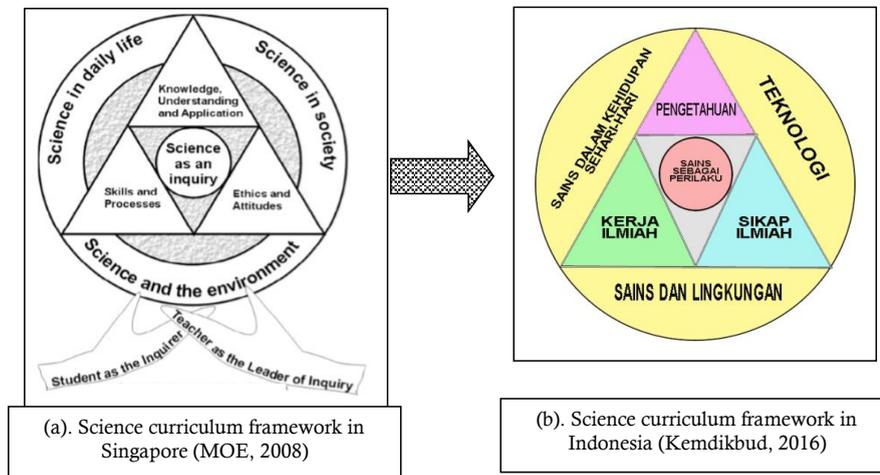


Figure 2. Adaptation of Indonesian Science Curriculum Framework from Singaporean Framework through Policy Borrowing

Philosophy of Indonesian Local Wisdom

Local Wisdom as knowledge related to experience in trying and integrated with an understanding of the culture and natural conditions of a place (Atmojo et al., 2018; Dwianto et al., 2017; Hartini et al., 2018; Setiawan et al., 2017; Suastra et al., 2017; Wahyuni, 2015). Indonesian people have confidence associated with the willingness to exchange researches, ideas, and concepts. But that will be discussed here only the things that stand out and

entrenched in the communities. The following Table 2, the philosophy of achieving knowledge of original Indonesian people was influenced by the culture of Mainland China and the Middle East. Therefore, some idioms become beliefs in the community. These beliefs have already entrenched in the community and delivered hereditary.

Table 2. Some Idioms based on the Philosophy of Indonesian Local wisdom

Idiom	Meaning	Country relating beliefs
Tuntutlah ilmu walau ke negeri China (Indonesian language)	Seek knowledge even to China	China (Mainland China and Republic of China, Taiwan)
اطلبوا العلم ولو في الصين (Arabic language; read: <i>uthlubul 'ilma walau fis shin</i>)		Middle East (Saudi Arabia)

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Moreover, the second local wisdom is "Patrap Triloka" (Ana, Harsono, & Rahayuningsih, 2009; Pustaka, 2013). It was first familiarized in 1931 by

R.M. Suwardi Surjaningrat [well known as: Ki Hajar Dewantara], the Indonesian Founding Father of Education. As a great educator, his

popular article was —“Als ik eens Nederlander was” (“If I were a Dutchman”), which sarcastically criticized the Dutch colonialism in Indonesia (Kenji, 1977; Ki Hajar Dewantara, 1962). He established a “Students’ Garden” (Taman Siswa), an ancient school that cultivated Indonesian people by equipping them with nationalistic views as part of his political efforts for Indonesian independence. He was also deeply concerned with the education of the indigenous people in Indonesian. ” Ing Ngarso Sung Tuladha; Ing Madya Mangun Karsa; Tut Wuri Handayani” (“at the front providing a model, in the middle creating an intention, and at the back giving valuable support”) became well-known motto in

his life (Ana et al., 2009; Ki Hajar Dewantara, 1962). However, his philosophy on education reflected by the motto is still relevant now. Additionally, Indonesia has also been inspired by the spirit of 3N. According to him, the 3N is “Niteni” (to observe in detail intentionally), “Nirokake” (to imitate constructively), and “Nambahi” (to develop, to add, and to modify). The extension of 3N is 5N by adding *Nulari* and *Ngrembakake*. The comparison of traditional, constructive, and the extent of 3N local-wisdom based learning approach or 5N is showed in Table 3.

Table 3. The Indonesia Local-wisdom 5N

Traditional learning (Duschl & Gitomer, 1991)	Constructive learning (Duschl & Gitomer, 1991)	Local-wisdom 5N (Ana et al., 2009)
Scientific knowledge	Knowledge about science	<i>Niteni</i> (to observe in detail intentionally)
What we know	How and why we know	<i>Nirokake</i> (to imitate constructively)
Emphasizes wholly developed final form of reasoning and explanations	Emphasizes knowledge, growth, and explanation development	<i>Nambahi</i> (to develop, to add, and to modify)
Breadth of knowledge	Depth of knowledge	<i>Nulari</i> (to disseminate and to continuously improve)
Basic scientific knowledge	Conceptualized science knowledge	<i>Ngrembakake</i> (to grow and to give a multiply benefit)

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Globalization + Localization = Glocalization

Based on the Oxford dictionary of new words, the term “glocal” and the process noun “glocalization” are “formed by combining global and local to make a blend”. According to [Wordspy \(2018\)](#), “glocalization means the creation of products or services intended for the global market, but customized to suit the local cultures”. Many researchers used the term “think globally, act locally” to express glocalization. For example, [Tien and Talley \(2012\)](#) positioned the types of curricula required for “glocalization” to ensure that will allow students to communicate more effectively. Furthermore, glocalization could be a real and new prospect, being characterized by some extrinsic features ([Shamsuddoha, 2008](#)): “*universality* (it addresses to actors of both developed and developing countries), *concreteness* (emerging from its tendency to assess the results of policies and actions), *mobilize human energy* (spurring de-bureaucratized public administrations, socially-oriented enterprises, volunteers, and individuals towards a glocal action), *sustainability* (it addresses a double orientation to exploit both local and global opportunities, also referring to powerful political and economic actors”.

To achieved glocalization in the curricula, we propose cultural based learning (CBL) in science education. Through CBL, the idea of glocalization bridges the impact of globalization and the extent of local wisdom or the effect of localization in science education.

Cultural Based Learning (CBL)

Indonesia is known as a nation and country that is rich in cultural treasures and traditions. Each island, even in each region, has its peculiarities in customs, traditional food and drink, traditional clothing, regional specialties, language, and regional arts. All of which are local wisdom and culture. Each region will undoubtedly vary from one another. The culture and local wisdom of an area need to be continuously developed and preserved so that they can become part of the archipelago's wealth that can be derived from generation-to-generation. The development of information and technology as well as the globalization era has influenced the development and preservation of local culture and wisdom ([Aikenhead & Jegede, 1999](#); [Baker & Taylor, 1995](#)). Most people now, especially the younger generation, begin to forget the local culture and wisdom in their area. They are more familiar with fast food than existing local foods, prefer and begin to imitate the lifestyle and culture of other countries, such as K-Pop, Punk, Hip-Hop, and others. The globalization era that threatens the destruction of national cultural customs with the understanding of materialism, hedonism, and individualism is a challenge that must be addressed immediately.

The function of tradition and cultural arts in people's lives can be used as a medium of education, information, entertainment, social control tools, and maintenance of values and

norms, as well as customs that develop in the community. Local wisdom and regional culture can be a source of learning for students because students who come to school already have initial knowledge (pre-concept) and bring cultural values that come from their families and regional communities (Aikenhead & Jegede, 1999).

Cultural Based Learning in the Indonesian 2013 curriculum brings together schools and communities in the educational dimension. The curriculum structure developed in 2013 is holistic based on science (natural, social, and cultural) (Permendikbud, 2013). Through ethnics-based learning, students will make direct observations so that students can identify scientific questions, explaining phenomena scientifically, and can make conclusions (Baker & Taylor, 1995; Cobern & Aikenhead, 1996). Cultural knowledge is not only about local wisdom, but also abstract knowledge contained in the culture itself (i.e. the philosophy of community life). This can be developed in the theme of learning, so that cultural values can become character development as students. Ethnography is very relevant to the foundation of the 2013 curriculum development philosophy. The curriculum was developed using philosophy namely (Hartanto, 2013):

- 1) Education is rooted in national culture to build the life of the nation today and in the future. This means that in the 2013 curriculum developed based on the diverse Indonesian culture and directed to build a better nation's life in the future,
- 2) Learners are creative heirs of national culture. The 2013 curriculum positions cultural excellence to be studied, applied, and manifested in personal life, in social interactions in the surrounding community, and in the life of the nation today.
- 3) Education is aimed at developing intellectual smartness and academic brilliance through disciplinary education.
- 4) Education is purposed to shape a better present and future life from the past for human and nation.

The success of the learning process in schools is strongly influenced by the cultural background of the academic community where the school is placed. This is similar to what was stated by Ibrahim (2002) which stated that in addition to philosophical, psychological and scientific and technological foundations, socio-cultural foundations must be considered in curriculum development because education is always contained values that must be in accordance with the values prevailing in the community. Therefore, curriculum planning and implementation became more an innovative process rather than a predetermined value (Putriène, 2017).

Until now, learning is rarely found by integrating ethnosience-based learning in learning methods,

learning materials, and learning assessment. Attempts to integrate ethnosience-based learning into school learning curricula, in order to accommodate cultural differences in learners, utilize cultural resources as a source of learning content, and use them as a starting point for the development of culture itself. Thus, culture-based learning influences the learning process of students, including 1) positive influence will emerge if the learning at school that is being studied is in harmony with the daily cultural knowledge of students. This learning process is called learning enculturation; 2) learning centred on students will run effectively because the process of assimilation and learning accommodation of students will run effectively. This can support students to solve learning problems by integrating the knowledge and experience they experience in everyday life.

Science Local Wisdom and Ethnosience

The word ethnosience derived from the word *ethnos* (Greek) which means nation, and *scientia* (Latin) means knowledge. Therefore, ethnosience is knowledge possessed by a cultural community (George, 1991). According to Moore (1998), ethnosience is a branch of cultural study that seeks to understand how indigenous people understand their nature. Natives usually have a life ideology and philosophy that influences their survival. On this basis, it can be stated that ethnosience is one of the new ethnographic forms. Through ethnics, cultural researchers will actually be able to build a theory that the grass root does not have to adopt western cultural theories that are not necessarily relevant. Research into ethnics on cultural phenomena is always 'ethno-and' or 'folk-based'. The presence of ethnosience will indeed give fresh air to cultural research (Davison & Miller, 1998). Therefore, there are indeed many cultural researchers who systematically utilize ethnics' studies. Indeed, there are no similar opinions regarding the term ethnics among researcher's culture. There are those who call cognition anthropology, ethnographic semantics, and descriptive semantics (Spradley, 2001). These various terms arise because each expert gives a different emphasis, but the essence is to find a scientific level of cultural studies.

Ethnosience is a learning approach that implements regional culture or local wisdom as objects of learning science. Ethnosience can be defined as a tool of knowledge possessed by a society / ethnic group obtained by using certain methods and following certain procedures which are part of a particular community tradition and its truth can be tested empirically (Davison & Miller, 1998; George, 1991). Students no longer view science as a foreign culture that they must learn, but view science as a culture and local wisdom that they already recognize in their daily lives. With this ethnosience approach, students are taught to transform or reconstruct original science

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(knowledge that develops in society) into scientific science related to the material being studied.

The model of science learning based on local wisdom can be done through the reconstruction of indigenous science (local/original science) into western science or scientific science. Application of science learning model based on local wisdom is by observing a culture that exists in the community to further reconstruct the scientific concepts that ultimately can foster the value of the conservation character of students. Model of learning based on local wisdom is done by reconstructing original science. Reconstruction is meant to be rearranging or translating original science into concepts of western science or scientific science. This original science is obtained

through observing the cultures in the community. Therefore, it can be said that this learning model is based on local wisdom, because it is obtained from original knowledge (indigenous knowledge) or local (local genius) intelligence of a society that comes from the noble values of cultural traditions to regulate the order of community life in order to achieve community progress both in creating peace and improvement of community welfare. Through the reconstruction of original science, applications will be obtained from scientific concepts, so as to deepen the mastery of the concept of science. This certainly shows that a culture that has taken root in our nation has values that are very beneficial for human life. The following vignettes are the example of ethnoscience, the model of science learning based on local wisdom.

 <p>Reog Ponorogo</p> <p>(Source: Authors)</p>	<p>Theme: Energy and muscle movement</p> <p><i>Reog Ponorogo is a traditional performing art with diverse backgrounds. This art has become a living part of the community that symbolizes as well as a representation of the daily activities. At the Reog address, a player shoulders Barongan or a very heavy lion's head. Not even any player can do it because it requires sufficient training and strength and confidence from a strong self. The power of shouldering Barongan is inseparable from the theory of lifting the heavy load. In scientific knowledge, this theory can be studied in the chapter on energy and muscle movement. Besides that, the position when he wanted to lift Barongan also determined the strength of the shoulders of the Barongan.</i></p>
 <p>(Source: Authors)</p>	<p>Theme: Lunar calendar</p> <p><i>Sea alms tradition is routinely carried out by traditional fishermen Teleng Ria Pacitan. Precisely towards the new Hijriyah year [lunar calendar in Islamic beliefs] or commonly known as Suro (Muharram) month. It has become a tradition that is rooted in the beliefs of local people that every month before the fishermen has to do sea alms. Even though the fishermen themselves did not know the beginning of the emergence of this tradition, they were convinced that at that time they had to carry out sea charity.</i></p>
<p><i>Apart from the existence of the trust or simply preserving the ancestral cultural heritage, the implementation of the tradition of sea alms is lively and contains the values of local wisdom that has its characteristics. In the month of Suro or the Hijriyah new year the conditions of the moon are in the phase of the new moon where the sea level is attracted to the gravities of the moon so that it is appropriate to catch the fish of Suro month around September or October where the month is the best season to find fish because the fish tend to aggressive change in the season.</i></p>	

Figure 3. The Vignettes of Ethnoscience in Indonesian (*Reog Ponorogo* and *Sedekah Laut*)

Policy Borrowing versus Local Wisdom

Among the many benefits of the existence of a policy borrowing that can be adapted from other countries and on the other hand, there is a lot of Indonesian local wisdom. The most important thing is how to optimize the two concepts to run sustainably and in synergy in the country. One way is to maintain the 'core identity' (*Jati Diri*) of the nation, with the intention of screening various

policies from other countries that do not conflict with local potential and local wisdom in Indonesia. For this reason, the synergy between globalization and localization is necessary. Figure 3 illustrates a positive quadrant of policy borrowing and local wisdom. Accordingly, the concept of glocalization must be gradually introduced, developed and implemented. The balancing between globalization effect and glocalization should be

addressed. Therefore, an effort to maintain local science (indigenous science) is necessary.

Ogawa (2002) stated that one of the intuitive sciences is social or cultural or also called indigenous science or original science. Snively & Corsiglia (2001) emphasized that original science is related to scientific knowledge gained through oral culture in a place that has long been occupied.

This knowledge is already a part of their culture which is derived from their views on the universe that is relatively believed by the community. However, until now the original science which is a sub-culture of the community group was not fully realized and received less attention from science education experts and science teacher in Indonesia.

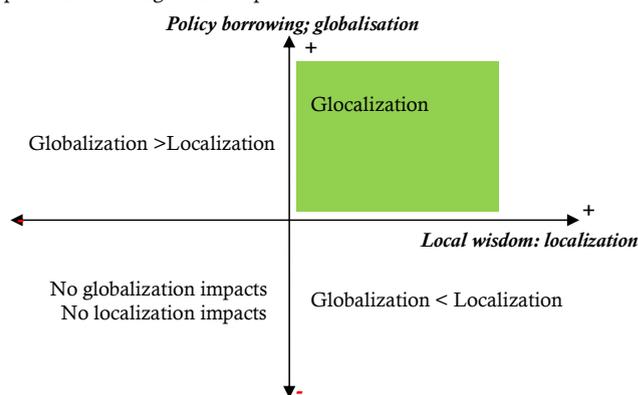


Figure 4. The Positive Quadrant of Policy Borrowing and Local Wisdom

CONCLUSION

The paper has already presented five main headings regarding Indonesian curriculum reform from the perspectives of science education, including: (1) curriculum policy and policy borrowing, (2) philosophy of Indonesian local wisdom, (3) cultural based learning, (4) science local wisdom and ethnoscience, and (5) 'policy borrowing versus local wisdom'. Each heading has a significant relationship with each other. By starting from the curriculum context, Indonesia has nationally established several changes in their curriculum, for instance, the implementation of the new curriculum since 2013. It is in line with the efforts of policy borrowing regarding represent best practice and gaining some experiences from other countries. However, one important thing that the successful implementation of the new curriculum depends on the readiness of all Parties involved at the operational level in the learning process. It is necessary for policy-makers in Indonesia to conduct the Indonesian Founding Father of Education in the creation of their curriculum so that the younger generation will not forget their local wisdom. The balancing between the process of borrowing and the existence of local wisdom keeps the 'core identity' (*jati diri*) of the nation. Consequently, science education learning should integrate cultural based learning (CBL) and ethnoscience in mainly classroom activities. Finally, by balancing globalization and localization through glocalization is proposed in this review paper. One effort to perform glocalization is the implementation of cultural based learning (CBL) with ethnoscience in science education.

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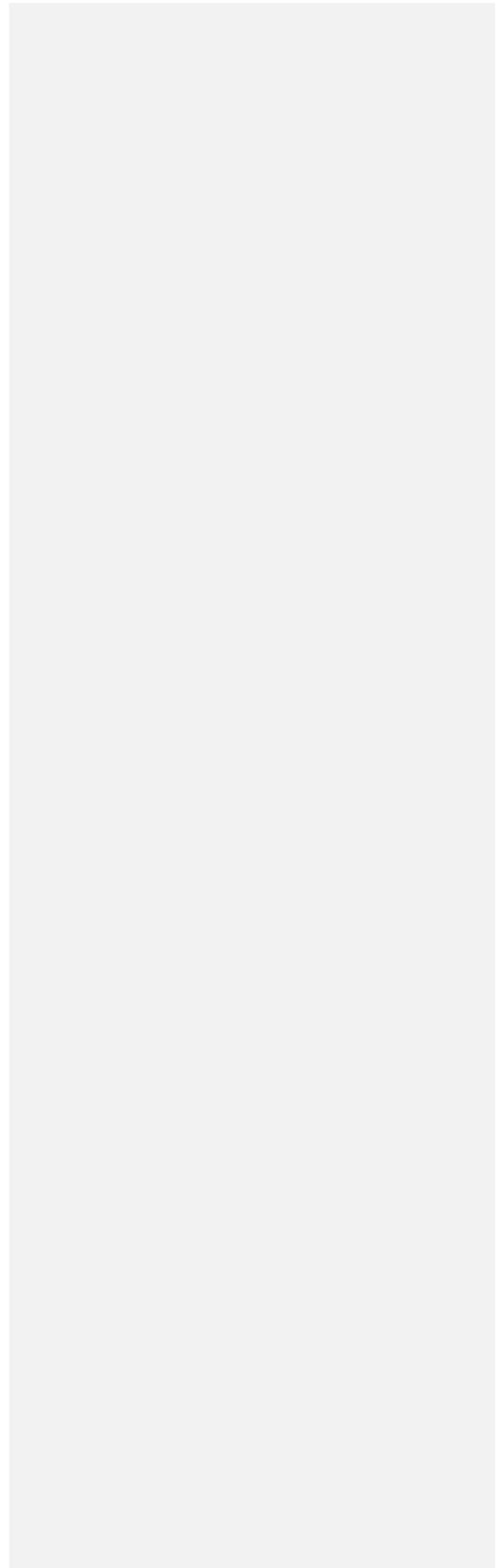
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Parts of review	Guidelines	Yes	Partly	No	Reviewer's note for improvement	Author's responds (highlight of revision)
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November 07, 2020

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Thanks to editors for having spent a great deal of time and care to provide positive recommendations for our articles. Researchers welcome all positive recommendations with pleasure because editor feedback has greatly helped improve the quality of our articles. Title: Indonesian Curriculum Reform in the Context of Policy and Local Wisdom: Perspectives from Science Education. Researchers have revised all feedback from the editor (attached). Researchers really hope that this article can be published at Jurnal Pendidikan IPA Indonesia. Thank you very much.

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- *clear limitation of research objective*

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- *Each stage is explained and analyzed by what method*
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**INDONESIAN CURRICULUM REFORM IN THE CONTEXT OF POLICY
AND LOCAL WISDOM: PERSPECTIVES
FROM SCIENCE EDUCATION**

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ABSTRACT

The article endeavours to summarize the issue of Indonesian curriculum reform in the context of policy and local wisdom. The perspectives on science education influence the analyses and discussions presented in the article. This paper is part of a position paper (PP) in which the authors tailoring their ideas based on their experiences and searching literature review. The views regarding curriculum policy, science local wisdom, and ethnoscience were developed based on the analysis of theoretical and empirical literature regarding these issues. The discussion is divided into five parts: curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural based learning, science local wisdom and ethnoscience, and 'policy borrowing vs local wisdom'. The significance of the results gives a lens to the government, academicians, policy makers, and educational communities.

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Keywords: Curriculum reform, policy, local wisdom, science education, Indonesia

INTRODUCTION

In response to the globalization, rethinking the curriculum to equip young generation to better education in the future is an essential suggested. One form of rethinking the curriculum is the curriculum change as a result of government policy, the influence of public and media scrutiny, the result of the standardized test such as TIMSS, PISA, PIRLS, or by previous research findings (Brown & Beswick, 2014; Suprpto, 2016). Countries in Asia-pacific that succeed in their educational reform such as Singapore and South Korea reduced the amount of knowledge that young people have to learn to make room for more creativity according to their previous research findings. In Taiwan, contemporary efforts in education are grasped from an exemplar for the flowing of the combination ideas of globalization and localization. These terms trigger the concept of 'glocalization'- "think globally act locally". A recall, all reform programs implemented in Taiwan's education system have controlled to significant changes in the academic field (Chou & Ching, 2012). Besides, China proposed three wisdom traditions: Confucianism, Taoism, and Buddhism embodied in their curriculum as stated in the Hangzhou model (Hua, Wenjun, & Pinar, 2014).

Indonesia as a developing country using the basic government policy and the results of TIMSS and PISA tests as a reference in their curriculum reform. Recently, Indonesia changed their curriculum known as the K-13 (Indonesian Curriculum of 2013). Even earlier, less than ten years the curriculum has changed in the absence of a comprehensive research study. Consequently, there is an impression that the disassembly of building a curriculum that applies is normal. Though the evaluation of the implementation of the previous curriculum was not finished but was immediately followed by the presence of the new curriculum. From a series of curriculum that has been implemented were an excellent idea but the implementations were still

far from satisfactory. The main obstacle is the evaluation of the implementation and supervision aspects since the extent of the territory of Indonesia and the unequal of human resource capability, in this case, is the teacher.

We underlined two main issues will be revealed in this paper, namely how curriculum policy-making and the extent of local wisdom. As expressed by Pinar (2014, p 17-18) that "for rational reconstruction of the curriculum field in the US emphasizes two points: the study of the past of the area and even more the international scholarly exchange of research, ideas, and concept". There would be no harm if the thought was used in Indonesia. Therefore, considering the curriculum policy, we highlighted the importance of adopting research findings from countries that are already established. Hence, the term of policy borrowing becomes necessary to be disclosed. Also, based on the length history in sociocultural aspects, Indonesia has a strong foundation based on local wisdom. Both thought it would be discussed in this paper. To sum up, the article endeavours to highlight the issue of Indonesian curriculum reform in the context of policy and local wisdom with science education perspectives as well as our academic background.

METHODS

This paper is part of position paper (PP) in which the authors tailoring their ideas based on their experiences and searching literature review. A PP must establish an amalgamated voice in areas where controversy occurs based upon numerous practices. Typically, "a PP should elucidate the knowledge gap, followed by an evidence-based review of options, leading to an endorsed position" (Bala et al., 2018). A PP should represent more than views or consensus of the authors but should present current thoughts and practices. According to Fleming (2019), there are at least five steps in presenting position paper as illustrated in Figure 1.

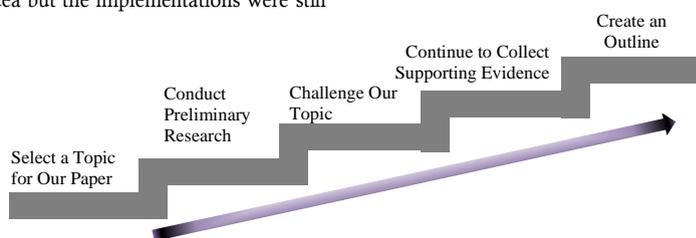


Figure 1. The Steps in Presenting Position Paper (Fleming, 2019)

In conducting preliminary research, there are variety of methods used to produce position paper such as perception on curriculum reform of the specific country. This study utilized Khan's

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- contain detailed research stages
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research and the authors' previous research method. The step comprises of five headings: "framing problems for a review, identifying relevant work, assessing the quality of studies, summarizing the evidence, and interpreting the findings" (Khan, Kunz, Kleijnen, & Antes, 2003; Suprpto, 2016; Suprpto, Liu, & Ku, 2017; Suprpto & Pai, 2015). Meanwhile, in creating an outline, there are five essential issues: (1) introducing our topic with some basic background information; (2) introducing possible objections to our position; (3) supporting and acknowledging the opposing points; (4) explaining that our position is still the best one, despite the strength of counter-arguments; and (5) summarizing our argument and restating our position (Fleming, 2019). Accordingly, the discussion in this paper is divided into five parts: curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural based learning, science local wisdom and ethnoscience, and 'policy borrowing versus local wisdom'.

RESULTS AND DISCUSSION

Curriculum Policy and Policy Borrowing

The recognition of the educational system as an authoritative social institution to empower Indonesian civilian to become intellectual persons is one of the vision of Indonesian education (MOE, 2013). The new policy on curriculum is intended to authorize teachers for developing learning activities relevant to the students' need, the real condition of the school, and the necessity to link it to the surroundings. Central Government is responsible for guidance in developing competency based-school level curriculum. The Curriculum Centre (Pusat Kurikulum) of the Ministry of Education and Culture (MOEC) helps the academic stakeholders develop their curriculum by providing curriculum models that can be implemented at the school level.

Nevertheless, the above ideas are very good but the implementations were still far from satisfactory. One of the reasons is there is nothing wrong in the decision-making curriculum. We underline the existence of policy borrowing. "A policy

borrowing approach searches the international experience, i.e., a unique, transferable best practice" (Raffe, 2011: 1). Policy learning uses the experience for a broader range of goals, including better thoughtful one's system, identifying trends and general pressures that affect all systems (Portnoi, 2016).

In our point of view, learning from the experience of other countries and especially from the countries believed to represent best practice by policy-makers is one of a significant policy borrowing. For instance, about 40 years ago Indonesian education equivalent to Malaysia but now is far behind. Even in the 1970s, many Malaysian lecturers studied in Indonesia, but this time is the opposite situation happened, many Indonesian students pursue their master and doctoral degree in Malaysia. It may be that it is time for Indonesia to borrow curriculum policy from Malaysia or surrounding countries, such as Singapore, Thailand, Taiwan, Japan, Korea, and others. Perhaps, in this way, the education curriculum in Indonesia is not only useful in their ideas but also it becomes essential in the implementation process.

Lingard (2010) noted that "to be effective, policy borrowing must be accompanied by policy learning, which takes account of research on the effects of the policy that will be borrowed in the source system, learning from that and then applying that knowledge to the borrowing system through careful consideration of national and local histories, cultures and so on". Therefore, policy borrowing becomes a reason for a country to reform its curriculum. In conclusion, policy borrowing must be followed by an excellent teaching-learning process and still consider local historical heritage, customs, and local wisdom. Indonesia, with nearly 17,000 islands and about 250 million in populations can be explored their local culture.

In the next section, we describe the stages of policy borrowing in education and analyse some examples of policy borrowing in education (science education) that have been integrated in Indonesia curriculum. This effort is useful for other countries in which they have same situation like in Indonesia

Table 1. The Process of Policy Borrowing in Education

Stages	Substages	Definition
Cross-National Attraction (CNA)	Impulses-externalizing potential	CNA stage includes impulses and externalizing potential. Meanwhile, impulses relate to an academic investigation of the situation in an external environment and perceptions of other approaches to educational enquiries. Indeed, the distortion or exaggeration of evidence from abroad to highlight perceived deficiencies at home has also influenced CNA (Phillips, 2000). On the other hand, adjusting philosophy, enabling structures, goals, processes, strategies, and techniques are belongs to externalizing potential.

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Stages	Substages	Definition
Decision	theoretical-phoney-realistic/practical decisions-quick fix decision	The second stage involves an extensive variability of measures through which government and policy makers attempt to initiate the process of change.
Implementation	Support-vs-resistance	This stage constitutes the adaptation any a new model will be subjected to within the context of the borrower system.
Internalization/Indigenization	the existing system impact-absorption of external features-synthesis-evaluation	'Internalization', or 'indigenization' of policy becomes part of the educational system of the borrower country. It is possible to evaluate its effects on the pre-existing provisions in education.

Source: Phillips and Ochs (2003)

Four Stages of Borrowing

Phillips and Ochs (2003) postulated 'borrowing' as a series of four principal processes: "(1) Cross-National Attraction (Impulses and Externalizing Potential), (2) Decision, (3) Implementation, and (4). Internalization/ Indigenization". Through these processes, the country implements best practices from the target country.

The following some examples of policy borrowing in education and science education that have been integrated in Indonesia curriculum. First, the discussion of five pillars of Indonesia education system adapted from four pillars of learning from UNESCO is exemplified. Second, the borrowing of science curriculum framework which is influenced by Singaporean science curriculum framework is also illustrated. Third, the narrative of 3N and 5N local wisdom and its connection with traditional and constructive learning is also depicted.

From four pillars of learning by UNESCO to five pillars of Indonesian education system

Based on UNESCO, the curriculum should be reorganized and restructured around the four pillars of learning: "learning to know, learning to do, learning to live together, and learning to be" (UNESCO, 1996). 'Learning to know' represents acquiring some information as factual knowledge. It emphasizes rote learning or conventional curriculum rather than focuses on the mastering of knowledge themselves. 'Learning to know' presumes to learn to learn, relating to memory and thought. 'Learning to do' implies an alteration form of skill or competence. It also represents a mix of higher-order skills specific to each individual. 'Learning to live together' denotes the development of such qualities as: knowledge and understanding of self and others; respect of other people, cultures, and value systems; appreciation of the diversity and an awareness of the similarities between; empathy in caring and sharing; and capability of resolving conflicts; etc. 'Learning to be' implies "a curriculum aiming at cultivating qualities of creativity; developing critical thinking and training independent judgment; attaining human values; and emerging aspects of a person's potential: reasoning, physical capacity, memory, social skills, and communication" (Fraure, 1972).

The results of policy borrowing can be seen the following *five pillars of Indonesian education system*:

1. Learning to believe and convince the almighty God

Trusting and believing in the Almighty God does not exist in the 4 (four) UNESCO pillars. Indonesia is a marvellous country that upholds religious values; therefore, this pillar is included in the pillars of learning in Indonesia. As for the implementation process, this pillar has already existed with the existence of religious subjects and civics who teaches character and trust in the Almighty God. And now even in the purpose of learning it has included a spiritual element in Competence-1 (K1).

2. Learning to know

This pillar learns to know about how to gain knowledge, understanding with existing media. Media can be in the form of books, internet, and other technologies. At this time technology to support the advancement of science is rapidly growing, almost all information gathered from various parts of the world can be easily accessed by the internet. The implementation of this pillar has been running in Indonesia. The process of learning, reading, memorizing, and listening in class is the implementation of this pillar.

3. Learning to do/work

Learning to do or work is inseparable from learning to know because actions are inseparable from science. Learning to do or work in essence is related to vocational. So, learning to work is an effort to always do and practice skills for professionalism at work. So that it can meet the demands of work in the community.

4. Learning to live together

The fourth pillar is learning to live together because people have different backgrounds. Especially in the current era of globalization, people from various ethnic, racial, religious, educational backgrounds, etc. People will be incorporated into an environment in the community; therefore, mutual help and respect for one another are needed in order to create an orderly and safe society. So that it is always necessary to learn to live together.

5. Learning to be or develop as a whole
 The fifth pillar is learning to be or develop as a whole related to the demands of an increasingly complex life so that it takes a character in the individual. Learning becomes an optimally developed person who has the right and balance in his personality, moral, intellectual, emotional, spiritual, and social. In order to fulfil that all individuals are required to develop all aspects of their lives. Regardless of whom the individual will be and what his important work is, he becomes a superior figure. Figure 2(a) describes science curriculum framework in Singapore across all levels from primary to pre-university. The framework was conceptualized from theories into

practice of inquiry science, piloted by a set of preferred outcomes of education and vision of Singaporean science education (Chin & Poon, 2014). The development of the high school science curriculum is carried out in order to achieve the dimensions of knowledge competence, scientific work, and scientific attitudes as daily behaviour in interacting with society, the environment and the use of technology, as illustrated in Figure 2(b). The figure also shows that students are able to apply the Natural Sciences competencies learned in schools to become behaviours in people's lives and utilize society and the environment as a source of learning.

Indonesian science curriculum framework

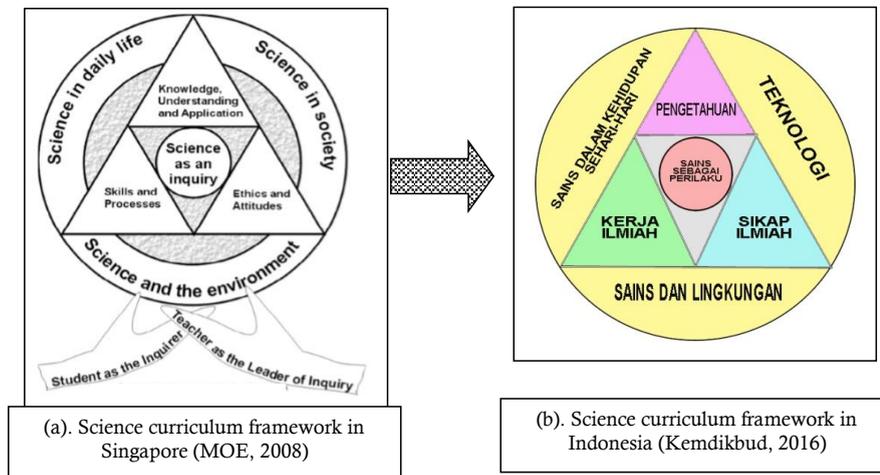


Figure 2. Adaptation of Indonesian Science Curriculum Framework from Singaporean Framework through Policy Borrowing

Philosophy of Indonesian Local Wisdom

Local Wisdom as knowledge related to experience in trying and integrated with an understanding of the culture and natural conditions of a place (Atmojo et al., 2018; Dwianto et al., 2017; Hartini et al., 2018; Setiawan et al., 2017; Suastra et al., 2017; Wahyuni, 2015). Indonesian people have confidence associated with the willingness to exchange researches, ideas, and concepts. But that will be discussed here only the things that stand out and

entrenched in the communities. The following Table 2, the philosophy of achieving knowledge of original Indonesian people was influenced by the culture of Mainland China and the Middle East. Therefore, some idioms become beliefs in the community. These beliefs have already entrenched in the community and delivered hereditary.

Table 2. Some Idioms based on the Philosophy of Indonesian Local wisdom

Idiom	Meaning	Country relating beliefs
Tuntutlah ilmu walau ke negeri China (Indonesian language)	Seek knowledge even to China	China (Mainland China and Republic of China, Taiwan)
اطلبوا العلم ولو في الصين (Arabic language; read: <i>uthlubul 'ilma walau fis shin</i>)		Middle East (Saudi Arabia)

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Moreover, the second local wisdom is "Patrap Triloka" (Ana, Harsono, & Rahayuningsih, 2009; Pustaka, 2013). It was first familiarized in 1931 by

R.M. Suwardi Surjaningrat [well known as: Ki Hajar Dewantara], the Indonesian Founding Father of Education. As a great educator, his

popular article was —“Als ik eens Nederlander was” (“If I were a Dutchman”), which sarcastically criticized the Dutch colonialism in Indonesia (Kenji, 1977; Ki Hajar Dewantara, 1962). He established a “Students’ Garden” (Taman Siswa), an ancient school that cultivated Indonesian people by equipping them with nationalistic views as part of his political efforts for Indonesian independence. He was also deeply concerned with the education of the indigenous people in Indonesian. ” Ing Ngarso Sung Tuladha; Ing Madya Mangun Karsa; Tut Wuri Handayani” (“at the front providing a model, in the middle creating an intention, and at the back giving valuable support”) became well-known motto in

his life (Ana et al., 2009; Ki Hajar Dewantara, 1962). However, his philosophy on education reflected by the motto is still relevant now. Additionally, Indonesia has also been inspired by the spirit of 3N. According to him, the 3N is “Niteni” (to observe in detail intentionally), “Nirokake” (to imitate constructively), and “Nambahi” (to develop, to add, and to modify). The extension of 3N is 5N by adding *Nulari* and *Ngrembakake*. The comparison of traditional, constructive, and the extent of 3N local-wisdom based learning approach or 5N is showed in Table 3.

Table 3. The Indonesia Local-wisdom 5N

Traditional learning (Duschl & Gitomer, 1991)	Constructive learning (Duschl & Gitomer, 1991)	Local-wisdom 5N (Ana et al., 2009)
Scientific knowledge	Knowledge about science	<i>Niteni</i> (to observe in detail intentionally)
What we know	How and why we know	<i>Nirokake</i> (to imitate constructively)
Emphasizes wholly developed final form of reasoning and explanations	Emphasizes knowledge, growth, and explanation development	<i>Nambahi</i> (to develop, to add, and to modify)
Breadth of knowledge	Depth of knowledge	<i>Nulari</i> (to disseminate and to continuously improve)
Basic scientific knowledge	Conceptualized science knowledge	<i>Ngrembakake</i> (to grow and to give a multiply benefit)

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Globalization + Localization = Glocalization

Based on the Oxford dictionary of new words, the term “glocal” and the process noun “glocalization” are “formed by combining global and local to make a blend”. According to [Wordspy \(2018\)](#), “glocalization means the creation of products or services intended for the global market, but customized to suit the local cultures”. Many researchers used the term “think globally, act locally” to express glocalization. For example, [Tien and Talley \(2012\)](#) positioned the types of curricula required for “glocalization” to ensure that will allow students to communicate more effectively. Furthermore, glocalization could be a real and new prospect, being characterized by some extrinsic features ([Shamsuddoha, 2008](#)): “*universality* (it addresses to actors of both developed and developing countries), *concreteness* (emerging from its tendency to assess the results of policies and actions), *mobilize human energy* (spurring de-bureaucratized public administrations, socially-oriented enterprises, volunteers, and individuals towards a glocal action), *sustainability* (it addresses a double orientation to exploit both local and global opportunities, also referring to powerful political and economic actors”.

To achieved glocalization in the curricula, we propose cultural based learning (CBL) in science education. Through CBL, the idea of glocalization bridges the impact of globalization and the extent of local wisdom or the effect of localization in science education.

Cultural Based Learning (CBL)

Indonesia is known as a nation and country that is rich in cultural treasures and traditions. Each island, even in each region, has its peculiarities in customs, traditional food and drink, traditional clothing, regional specialties, language, and regional arts. All of which are local wisdom and culture. Each region will undoubtedly vary from one another. The culture and local wisdom of an area need to be continuously developed and preserved so that they can become part of the archipelago's wealth that can be derived from generation-to-generation. The development of information and technology as well as the globalization era has influenced the development and preservation of local culture and wisdom ([Aikenhead & Jegede, 1999](#); [Baker & Taylor, 1995](#)). Most people now, especially the younger generation, begin to forget the local culture and wisdom in their area. They are more familiar with fast food than existing local foods, prefer and begin to imitate the lifestyle and culture of other countries, such as K-Pop, Punk, Hip-Hop, and others. The globalization era that threatens the destruction of national cultural customs with the understanding of materialism, hedonism, and individualism is a challenge that must be addressed immediately.

The function of tradition and cultural arts in people's lives can be used as a medium of education, information, entertainment, social control tools, and maintenance of values and

norms, as well as customs that develop in the community. Local wisdom and regional culture can be a source of learning for students because students who come to school already have initial knowledge (pre-concept) and bring cultural values that come from their families and regional communities (Aikenhead & Jegede, 1999).

Cultural Based Learning in the Indonesian 2013 curriculum brings together schools and communities in the educational dimension. The curriculum structure developed in 2013 is holistic based on science (natural, social, and cultural) (Permendikbud, 2013). Through ethnics-based learning, students will make direct observations so that students can identify scientific questions, explaining phenomena scientifically, and can make conclusions (Baker & Taylor, 1995; Cobern & Aikenhead, 1996). Cultural knowledge is not only about local wisdom, but also abstract knowledge contained in the culture itself (i.e. the philosophy of community life). This can be developed in the theme of learning, so that cultural values can become character development as students. Ethnography is very relevant to the foundation of the 2013 curriculum development philosophy. The curriculum was developed using philosophy namely (Hartanto, 2013):

- 1) Education is rooted in national culture to build the life of the nation today and in the future. This means that in the 2013 curriculum developed based on the diverse Indonesian culture and directed to build a better nation's life in the future,
- 2) Learners are creative heirs of national culture. The 2013 curriculum positions cultural excellence to be studied, applied, and manifested in personal life, in social interactions in the surrounding community, and in the life of the nation today.
- 3) Education is aimed at developing intellectual smartness and academic brilliance through disciplinary education.
- 4) Education is purposed to shape a better present and future life from the past for human and nation.

The success of the learning process in schools is strongly influenced by the cultural background of the academic community where the school is placed. This is similar to what was stated by Ibrahim (2002) which stated that in addition to philosophical, psychological and scientific and technological foundations, socio-cultural foundations must be considered in curriculum development because education is always contained values that must be in accordance with the values prevailing in the community. Therefore, curriculum planning and implementation became more an innovative process rather than a predetermined value (Putriène, 2017).

Until now, learning is rarely found by integrating ethnosience-based learning in learning methods,

learning materials, and learning assessment. Attempts to integrate ethnosience-based learning into school learning curricula, in order to accommodate cultural differences in learners, utilize cultural resources as a source of learning content, and use them as a starting point for the development of culture itself. Thus, culture-based learning influences the learning process of students, including 1) positive influence will emerge if the learning at school that is being studied is in harmony with the daily cultural knowledge of students. This learning process is called learning enculturation; 2) learning centred on students will run effectively because the process of assimilation and learning accommodation of students will run effectively. This can support students to solve learning problems by integrating the knowledge and experience they experience in everyday life.

Science Local Wisdom and Ethnosience

The word ethnosience derived from the word *ethnos* (Greek) which means nation, and *scientia* (Latin) means knowledge. Therefore, ethnosience is knowledge possessed by a cultural community (George, 1991). According to Moore (1998), ethnosience is a branch of cultural study that seeks to understand how indigenous people understand their nature. Natives usually have a life ideology and philosophy that influences their survival. On this basis, it can be stated that ethnosience is one of the new ethnographic forms. Through ethnics, cultural researchers will actually be able to build a theory that the grass root does not have to adopt western cultural theories that are not necessarily relevant. Research into ethnics on cultural phenomena is always 'ethno-and' or 'folk-based'. The presence of ethnosience will indeed give fresh air to cultural research (Davison & Miller, 1998). Therefore, there are indeed many cultural researchers who systematically utilize ethnics' studies. Indeed, there are no similar opinions regarding the term ethnics among researcher's culture. There are those who call cognition anthropology, ethnographic semantics, and descriptive semantics (Spradley, 2001). These various terms arise because each expert gives a different emphasis, but the essence is to find a scientific level of cultural studies.

Ethnosience is a learning approach that implements regional culture or local wisdom as objects of learning science. Ethnosience can be defined as a tool of knowledge possessed by a society / ethnic group obtained by using certain methods and following certain procedures which are part of a particular community tradition and its truth can be tested empirically (Davison & Miller, 1998; George, 1991). Students no longer view science as a foreign culture that they must learn, but view science as a culture and local wisdom that they already recognize in their daily lives. With this ethnosience approach, students are taught to transform or reconstruct original science

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(knowledge that develops in society) into scientific science related to the material being studied.

The model of science learning based on local wisdom can be done through the reconstruction of indigenous science (local/original science) into western science or scientific science. Application of science learning model based on local wisdom is by observing a culture that exists in the community to further reconstruct the scientific concepts that ultimately can foster the value of the conservation character of students. Model of learning based on local wisdom is done by reconstructing original science. Reconstruction is meant to be rearranging or translating original science into concepts of western science or scientific science. This original science is obtained

through observing the cultures in the community. Therefore, it can be said that this learning model is based on local wisdom, because it is obtained from original knowledge (indigenous knowledge) or local (local genius) intelligence of a society that comes from the noble values of cultural traditions to regulate the order of community life in order to achieve community progress both in creating peace and improvement of community welfare. Through the reconstruction of original science, applications will be obtained from scientific concepts, so as to deepen the mastery of the concept of science. This certainly shows that a culture that has taken root in our nation has values that are very beneficial for human life. The following vignettes are the example of ethnosience, the model of science learning based on local wisdom.

 <p>Reog Ponorogo</p> <p>(Source: Authors)</p>	<p>Theme: Energy and muscle movement</p> <p><i>Reog Ponorogo is a traditional performing art with diverse backgrounds. This art has become a living part of the community that symbolizes as well as a representation of the daily activities. At the Reog address, a player shoulders Barongan or a very heavy lion's head. Not even any player can do it because it requires sufficient training and strength and confidence from a strong self. The power of shouldering Barongan is inseparable from the theory of lifting the heavy load. In scientific knowledge, this theory can be studied in the chapter on energy and muscle movement. Besides that, the position when he wanted to lift Barongan also determined the strength of the shoulders of the Barongan.</i></p>
 <p>(Source: Authors)</p>	<p>Theme: Lunar calendar</p> <p><i>Sea alms tradition is routinely carried out by traditional fishermen Teleng Ria Pacitan. Precisely towards the new Hijriyah year [lunar calendar in Islamic beliefs] or commonly known as Suro (Muharram) month. It has become a tradition that is rooted in the beliefs of local people that every month before the fishermen has to do sea alms. Even though the fishermen themselves did not know the beginning of the emergence of this tradition, they were convinced that at that time they had to carry out sea charity.</i></p>
<p><i>Apart from the existence of the trust or simply preserving the ancestral cultural heritage, the implementation of the tradition of sea alms is lively and contains the values of local wisdom that has its characteristics. In the month of Suro or the Hijriyah new year the conditions of the moon are in the phase of the new moon where the sea level is attracted to the gravities of the moon so that it is appropriate to catch the fish of Suro month around September or October where the month is the best season to find fish because the fish tend to aggressive change in the season.</i></p>	

Figure 3. The Vignettes of Ethnosience in Indonesian (*Reog Ponorogo* and *Sedekah Laut*)

Policy Borrowing versus Local Wisdom

Among the many benefits of the existence of a policy borrowing that can be adapted from other countries and on the other hand, there is a lot of Indonesian local wisdom. The most important thing is how to optimize the two concepts to run sustainably and in synergy in the country. One way is to maintain the 'core identity' (*Jati Diri*) of the nation, with the intention of screening various

policies from other countries that do not conflict with local potential and local wisdom in Indonesia. For this reason, the synergy between globalization and localization is necessary. Figure 3 illustrates a positive quadrant of policy borrowing and local wisdom. Accordingly, the concept of glocalization must be gradually introduced, developed and implemented. The balancing between globalization effect and glocalization should be

addressed. Therefore, an effort to maintain local science (indigenous science) is necessary.

Ogawa (2002) stated that one of the intuitive sciences is social or cultural or also called indigenous science or original science. Snively & Corsiglia (2001) emphasized that original science is related to scientific knowledge gained through oral culture in a place that has long been occupied.

This knowledge is already a part of their culture which is derived from their views on the universe that is relatively believed by the community. However, until now the original science which is a sub-culture of the community group was not fully realized and received less attention from science education experts and science teacher in Indonesia.

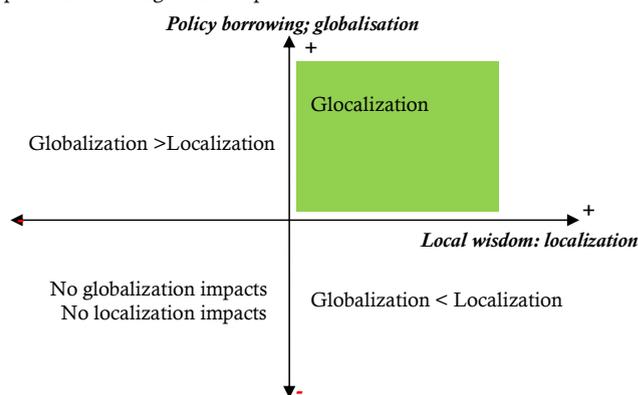


Figure 4. The Positive Quadrant of Policy Borrowing and Local Wisdom

CONCLUSION

The paper has already presented five main headings regarding Indonesian curriculum reform from the perspectives of science education, including: (1) curriculum policy and policy borrowing, (2) philosophy of Indonesian local wisdom, (3) cultural based learning, (4) science local wisdom and ethnoscience, and (5) 'policy borrowing versus local wisdom'. Each heading has a significant relationship with each other. By starting from the curriculum context, Indonesia has nationally established several changes in their curriculum, for instance, the implementation of the new curriculum since 2013. It is in line with the efforts of policy borrowing regarding represent best practice and gaining some experiences from other countries. However, one important thing that the successful implementation of the new curriculum depends on the readiness of all Parties involved at the operational level in the learning process. It is necessary for policy-makers in Indonesia to conduct the Indonesian Founding Father of Education in the creation of their curriculum so that the younger generation will not forget their local wisdom. The balancing between the process of borrowing and the existence of local wisdom keeps the 'core identity' (*jati diri*) of the nation. Consequently, science education learning should integrate cultural based learning (CBL) and ethnoscience in mainly classroom activities. Finally, by balancing globalization and localization through glocalization is proposed in this review paper. One effort to perform glocalization is the implementation of cultural based learning (CBL) with ethnoscience in science education.

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2. For books, please refer to the original/primary book reference no matter the date.

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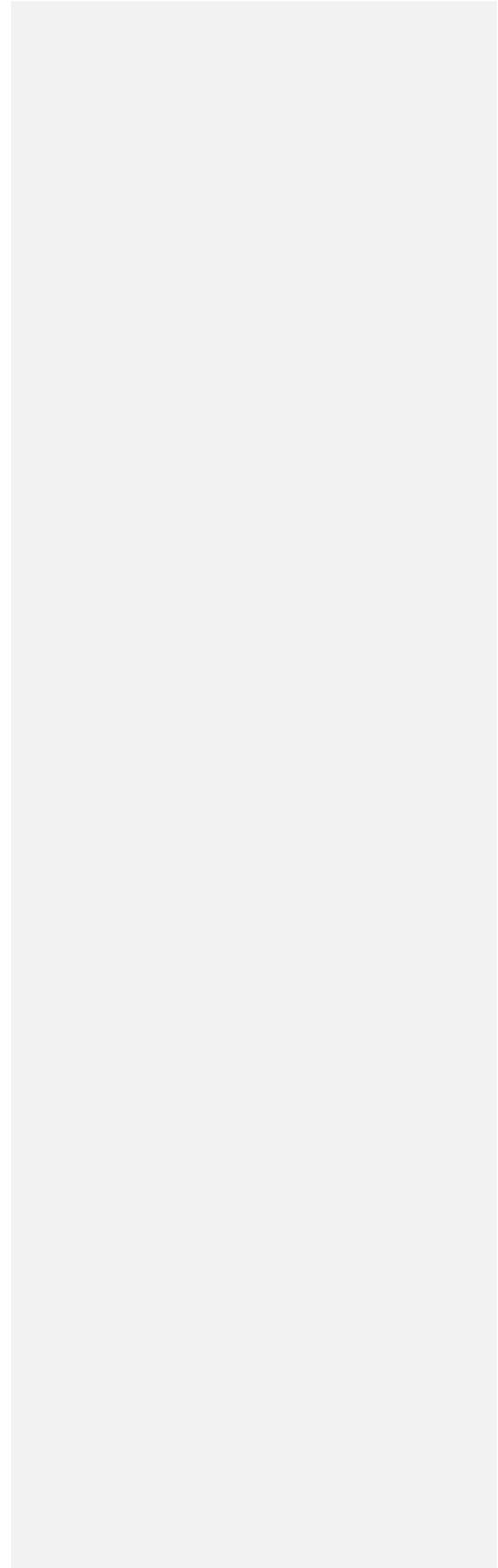
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**INDONESIAN CURRICULUM REFORM IN THE CONTEXT OF POLICY
AND LOCAL WISDOM: PERSPECTIVES
FROM SCIENCE EDUCATION**

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INDONESIAN CURRICULUM REFORM IN POLICY AND LOCAL WISDOM: PERSPECTIVES FROM SCIENCE EDUCATION

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ABSTRACT

This article summarizes the issue of Indonesian curriculum reform in policy and local wisdom. The perspectives on science education influence the analysis and discussions. This paper is part of a position paper (PP) in which the writers tailored their ideas based on their experiences and literature review. The views regarding curriculum policy, science local wisdom, and ethnoscience were developed based on theoretical and empirical literature regarding these issues. The discussion is divided into five parts: curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural-based learning, science local wisdom and ethnoscience, and policy borrowing versus local wisdom. The significance of the results gives a view to the government, academicians, policymakers, and educational communities.

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Keywords: curriculum reform; policy; local wisdom; science education; Indonesia

INTRODUCTION

In response to globalization, rethinking the curriculum to equip the young generation for better education in the future is an essential suggestion. One form of rethinking the curriculum is the curriculum change as a result of government policy, the influence of public and media supervisory, the result of the standardized test such as TIMSS, PISA, PIRLS, or by previous research findings (Brown & Beswick, 2014; Suprpto, 2016; Ningsih & Jha, 2021). Countries in Asia-pacific that succeed in their educational reform, such as Singapore and South Korea, reduced the amount of knowledge that young people have to learn to make more room for creativity, according to their previous research findings. In Taiwan, new education efforts are grasped from an exemplar for integrating the combined ideas of globalization and localization. These terms trigger the concept of “glocalization: think globally act lo-

cally.” Even all reform programs implemented in Taiwan’s education system have controlled significant academic field changes (Chou & Ching, 2012). Besides, China proposed three wisdom traditions: Confucianism, Taoism, and Buddhism, in their curriculum as stated in the Hangzhou model (Hua et al., 2014).

Indonesia, as a developing country, uses the basic government policy and the results of TIMSS and PISA tests as a reference in their curriculum reform. Recently, Indonesia changed its curriculum to K-13 (Indonesian Curriculum of 2013). Even less than ten years, the curriculum has changed in the absence of a comprehensive research study. Consequently, there is an impression that the disassembly of building a curriculum that applies is normal. However, the evaluation of the previous curriculum’s implementation was not finished, but the new curriculum immediately followed it. A series of the implemented curriculum was an excellent idea, but the implementations were still far from satisfactory. The main obstacle is the evaluation of the implemen-

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tation and supervision aspects since the extent of Indonesia and the unequal of human resource capability, in this case, is the teachers.

Empiric evidence and previous research showed the development of local wisdom in Indonesia include local wisdom in elementary schools (Andriana et al., 2017); junior high schools (Suastra, 2010; Suastra et al., 2011; Damayanti et al., 2013; Khusniati, 2014; Andriana et al., 2017; Dwianto et al., 2017; Kurniawati et al., 2017; Suastra, 2017; Septiani, 2020); senior high schools (Suastra, 2013; Ardan et al., 2015; Hidyanto et al., 2016; Suastra et al., 2017; Hartini et al., 2018); higher education and society (Meliono, 2011; Ardan et al., 2015; Atmojo, 2015; Parmin et al., 2015; Rusilowati et al., 2015; Ratana-Ubol, 2016; Susilawati et al., 2016; Setiawan et al., 2017; Toharudin & Kurniawan, 2017; Atmojo et al., 2018; Septiani, 2020).

The writers highlighted two main problems addressed in this paper: (1) how is curriculum policymaking?; (2) To what extent do local wisdom exist in Indonesia?. Pinar (2014) stated that the rational reconstruction of the curriculum field in the US emphasizes two points: the study of the past of the area and the international scholarly exchange of research, ideas, and concept. There would be no harm if the thought were used in

Indonesia. Therefore, considering the curriculum policy, we highlighted the importance of adopting research findings from countries that are already established it. Hence, the term of policy borrowing becomes necessary to be disclosed. Based on the history in sociocultural aspects, Indonesia has a strong foundation based on local wisdom. Both thoughts would be discussed in this paper. This article aims to highlight the issue of Indonesian curriculum reform in policy and local wisdom from science education perspectives and our academic background.

METHODS

This paper is part of a position paper (PP) in which the writers tailored their ideas based on their experiences and literature review. A PP must establish a merged voice in areas where controversy occurs based upon numerous practices. Typically, “a PP should elucidate the knowledge gap, followed by an evidence-based review of options, leading to an endorsed position” (Bala et al., 2018). A PP should represent more than the views or consensus of the writers but should present current thoughts and practices. According to Fleming (2020), there are at least five steps in presenting a position paper, as illustrated in Figure 1.



Figure 1. The Steps in Presenting Position Paper (Fleming, 2020)

In conducting preliminary research, various methods are used to produce position papers, such as perception on curriculum reform of the specific country. This study utilized Khan’s research and the writers’ previous research method. The step comprises of five headings: “framing problems for a review, identifying relevant work, assessing the quality of studies, summarizing the evidence, and interpreting the findings” (Khan et al., 2003; Suprpto & Pai, 2015; Suprpto, 2016; Suprpto et al., 2017). Meanwhile, in creating an outline, there are five essential issues: (1) introducing our topic with some basic background in-

formation; (2) introducing possible objections to our position; (3) supporting and acknowledging the opposing points; (4) explaining that our position is still the best one, despite the strength of counter-arguments; and (5) summarizing our argument and restating our position (Fleming, 2020). Accordingly, this paper’s discussion is divided into five parts: curriculum policy and policy borrowing, philosophy of Indonesian local wisdom, cultural-based learning, science local wisdom and ethnosience, and policy borrowing versus local wisdom.

RESULTS AND DISCUSSION

The recognition of the education system as an authoritative social institution to empower Indonesian civil society to become intellectual people is one of Indonesian education's visions. The new policy on curriculum is intended to authorize teachers for developing learning activities relevant to the students' needs, the real condition of the school, and the necessity to link it to the surroundings. Central Government is responsible for developing a competency-based-school level curriculum as stated on National Education System Law No. 20 enacted in July 2003 (MoNE, 2003). The Curriculum Centre of the Ministry of Education and Culture (MOEC) helps the academic stakeholders develop their curriculum by providing curriculum models that can be implemented at the school level.

Nevertheless, the above ideas are excellent, but the implementations were still far from satisfactory. One of the reasons is there is nothing wrong with the decision-making curriculum. We underline the existence of policy borrowing. "A policy borrowing approach searches the international experience, i.e., a unique, transferable best practice" (Raffe, 2011). Policy learning uses the experience for a broader range of goals, including better thoughtful one's system, identifying trends and general pressures that affect all systems (Portnoi & Laura, 2016). In our views, learning from other countries' experiences and especially from the countries believed to represent best practice by policymakers is one of a significant policy borrowing. For instance, about 40 years ago, Indonesian education equivalent to Malaysia but now is far behind. Even in the 1970s, many Malaysian

lecturers studied in Indonesia, but the opposite situation happened. Many Indonesian students pursue their master's and doctoral degrees in Malaysia. It may be that it is time for Indonesia to borrow curriculum policy from Malaysia or surrounding countries, such as Singapore, Thailand, Taiwan, Japan, Korea, and others. Perhaps, in this way, the education curriculum in Indonesia is not only useful in their ideas but also becomes essential in the implementation process. On the other hand, some educational experts argued that Indonesia experienced a negative situation due to the careless recruitment of teachers, the quality of teaching institutions for prospective teachers is not good, and student input for prospective teachers is "the third tier."

Lingard (2010) noted that "policy borrowing must be accompanied by policy learning to be effective, which takes account of research on the effects of the policy that will be borrowed in the source system, learning from that and then applying that knowledge to the borrowing system through careful consideration of national and local histories, cultures, and others." Therefore, policy borrowing becomes a reason for a country to reform its curriculum. In conclusion, policy borrowing must be followed by an excellent teaching-learning process and still consider local historical heritage, customs, and local wisdom. Indonesia, with nearly 17,000 islands and about 250 million populations, can be explored its local culture. In the next section, we describe the stages of policy borrowing in education and analyze some examples of policy borrowing in education (science education) that have been integrated into the Indonesian curriculum. This effort is useful for other countries in which they have the same situation, like in Indonesia.

Table 1. The Process of Policy Borrowing in Education

Stages	Substages	Definition
Cross-National Attraction (CNA)	Impulses-externalizing potential	CNA stage includes impulses and externalizing potential. Meanwhile, impulses relate to an academic investigation of the situation in an external environment and perceptions of other approaches to educational inquiries. Indeed, the distortion or exaggeration of evidence from abroad to highlight perceived deficiencies at home has also influenced CNA (Phillips, 2000). On the other hand, adjusting philosophy, enabling structures, goals, processes, strategies, and techniques are belongs to externalizing potential.
Decision	Theoretical-phoney-realistic/practical decisions-quick fix decision	The second stage involves an extensive variability of measures through which government and policymakers attempt to initiate the process of change.
Implementation	Support- <i>vs</i> -resistance	This stage constitutes the adaptation, and a new model will be subjected to the borrower system.
Internalization/Indigenization	the existing system impact-absorption of external features-synthesis-evaluation	'Internalization,' or 'indigenization' of policy, becomes part of the borrower country's educational system. It is possible to evaluate its effects on the pre-existing provisions in education.

Source: Phillips & Ochs (2003)

Phillips and Ochs (2003) postulated 'borrowing' as a series of four principal processes: "(1) Cross-National Attraction (Impulses and Externalizing Potential); (2) Decision; (3) Implementation; and (4) Internalization/ Indigenization". Through these processes, the country implements best practices from the target country.

The following are some examples of policy borrowing in education and science education integrated into the Indonesian curriculum. First, the discussion of the five pillars of Indonesia's education system adapted from four pillars of learning from UNESCO is exemplified. Second, the borrowing of science curriculum framework influenced by the Singaporean science curriculum framework is also illustrated. Third, the narrative of 3N and 5N local wisdom and its connection with traditional and constructive learning is also depicted.

Based on UNESCO, the curriculum should be reorganized and restructured around the four pillars of learning: "learning to know, learning to do, learning to live together, and learning to be" (UNESCO, 1996). 'Learning to know' represents acquiring some information as factual

knowledge. It emphasizes rote learning or conventional curriculum rather than focuses on the mastering of knowledge themselves. 'Learning to know' presumes to learn, relating to memory and thought. 'Learning to do' implies an alteration form of skill or competence. It also represents a mix of higher-order skills specific to each individual. 'Learning to live together' denotes the development of such qualities as knowledge and understanding of self and others; respect of other people, cultures, and value systems; appreciation of the diversity and an awareness of the similarities between; empathy in caring and sharing; and capability of resolving conflicts; and many more. 'Learning to be' implies "a curriculum aiming at cultivating qualities of creativity; developing critical thinking and training independent judgment; attaining human values; and emerging aspects of a person's potential: reasoning, physical capacity, memory, social skills, and communication" (Faure, 1972).

The results of policy borrowing can be seen in the following five pillars of the Indonesian education system:

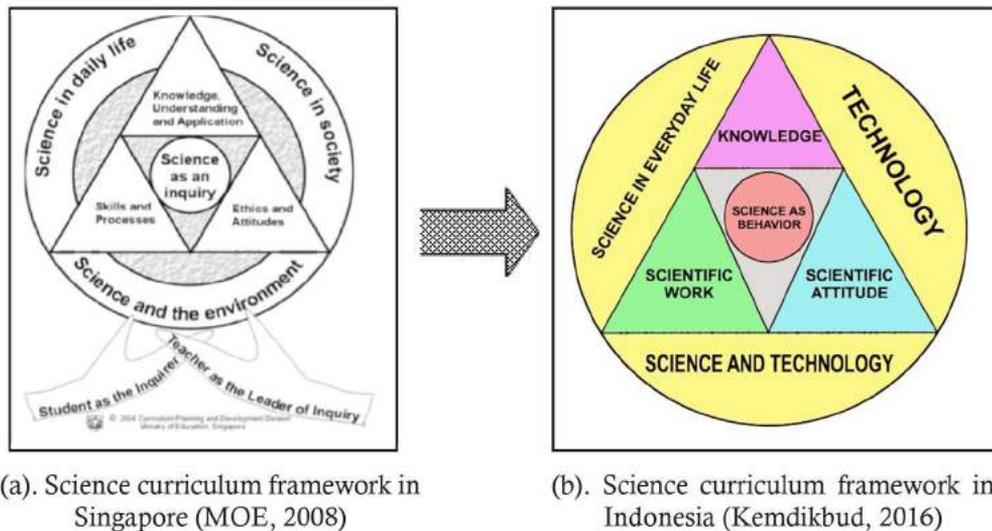


Figure 2. Adaptation of Indonesian Science Curriculum Framework from Singaporean Framework (a) through Policy Borrowing and (b) the Indonesian framework was translated into English by the authors

First, learning to believe and convince the Almighty God. Trusting and believing in the Almighty God does not exist in the 4 (four) UNESCO pillars. Indonesia is a beautiful country that upholds religious values; therefore, this pillar is included in the pillars of learning in Indonesia. As for the implementation process, this pillar has already existed with religious subjects and civics who teach character and trust in the Almighty

God. Furthermore, now, even in the purpose of learning, it has included a spiritual element in Competence-1 (K1).

Second, learning to know. This pillar learns to know about how to gain knowledge, understanding with existing media. Media can be in the form of books, the internet, and other technologies. Technology to support the advancement of science is rapidly growing. Almost all

information gathered from various parts of the world can be easily accessed by the internet. The implementation of this pillar has been running in Indonesia. The process of learning, reading, memorizing, and listening in class is implementing this pillar.

Third, learning to do/work. Learning to do or work is inseparable from learning to know because actions are inseparable from science. Learning to do or work, in essence, is related to vocational. So, learning to work is an effort always to do and practice skills for professionalism at work to meet the demands of work in the community.

The fourth pillar is learning to live together because people have different backgrounds. Especially in the current era of globalization, people from various ethnic, racial, religious, educational backgrounds, and many more. Wingard et al. (2020) people will be incorporated into an environment in the community; therefore, mutual help and respect are needed to create an orderly and safe society so that it is always necessary to learn to live together.

The fifth pillar is learning to be or develop as a whole related to the demands of an increasingly complicated life so that it takes a character in the individual. It is learning to become an optimally developed person who has the right and balance in his personality, moral, intellectual, emotional, spiritual, and social. All individuals are required to develop all aspects of their lives to fulfill that. Regardless of whom the individual will be and what his important work is, he becomes a prominent figure. Figure 2(a) describes

the science curriculum framework in Singapore across all levels from primary to pre-university.

The framework was conceptualized from theories into the practice of inquiry science, piloted by a set of preferred outcomes of education and vision of Singaporean science education (Chin & Poon, 2014). The development of the high school science curriculum is carried out to achieve the dimensions of knowledge competence, scientific work, and scientific attitudes as daily behavior in interacting with society, the environment, and technology, as illustrated in Figure 2(b). The figure also shows that students can apply the Natural Sciences competencies learned in schools to become behaviors in people's lives and utilize society and the environment as a learning source.

In previous research, local Wisdom as knowledge related to experience in trying and integrated with an understanding of the culture and natural conditions of a place (Mungmachon 2012; Pornpimon et al., 2014; Ratana, 2016; Dwianto et al., 2017; Setiawan et al., 2017; Suastra et al., 2017; Atmojo et al., 2018; Hartini et al., 2018). Indonesian people have confidence associated with the willingness to exchange researches, ideas, and concepts. However, that will be discussed here only the things that stand out and are entrenched in the communities. In Table 2, the philosophy of achieving knowledge of original Indonesian people was influenced by the culture of Mainland China and the Middle East. Therefore, some idioms become beliefs in the community. These beliefs have already been entrenched in the community and delivered hereditary.

Table 2. Some Idioms based on the Philosophy of Indonesian Local Wisdom

Idiom	Meaning	Country relating beliefs
<i>Tuntutlah ilmu walau ke negeri China</i> (Indonesian language)		China (Mainland China and Republic of China, Taiwan)
اطلبوا العلم ولو في الصين (Arabic language; read: <i>uthlubul'ilmawalau fis shin</i>)	Seek knowledge even to China	Middle East (Saudi Arabia)

Moreover, the second local wisdom is "Patrap Triloka" (Ana et al., 2009). It was first familiarized in 1931 by R.M. Suwardi Surjanigrat [well known as Ki Hajar Dewantara], the Indonesian Founding Father of Education. As a great educator, his popular article was —"Al-sikeens Nederlander was" ("If I were a Dutchman"), which sarcastically criticized the Dutch colonialism in Indonesia (Dewantara, 1962; Su-

parlan, 2018). He established "Taman Siswa," an old school that cultivated Indonesian people by equipping them with nationalistic views as part of his political efforts for Indonesian independence. He was also profoundly concerned with the education of the indigenous people in Indonesia." Ing Ngarso Sung Tuladha; Ing Madya Mangun Karsa; Tut Wuri Handayani" ("at the front providing a model, in the middle creating

an intention, and at the back giving valuable support”) became a well-known motto in his life (Dewantara, 1962; Ana et al., 2009). However, his philosophy on education reflected by the motto is still relevant now. Additionally, Indonesia has also been inspired by the spirit of 3N. According to him, the 3N is “Niteni” (to observe in detail

intentionally), “Nirokake” (to imitate constructively), and “Nambahi” (to develop, to add, and to modify). The extension of 3N is 5N by adding *Nulari* and *Ngrembakake*. The comparison of traditional, constructive, and the extent of 3N local-wisdom based learning approach or 5N is showed in Table 3.

Table 3. The Indonesia Local-wisdom 5N

Traditional learning (Duschl & Gitomer, 1991)	Constructive learning (Duschl & Gitomer, 1991)	Local-wisdom 5N (Ana et al., 2009)
Scientific knowledge	Knowledge about science	<i>Niteni</i> (to observe in detail intentionally)
What we know	How and why we know	<i>Nirokake</i> (to imitate constructively)
Emphasizes wholly developed final form of reasoning and explanations	Emphasizes knowledge, growth, and explanation development	<i>Nambahi</i> (to develop, to add, and modify)
Breadth of knowledge	Depth of knowledge	<i>Nulari</i> (to disseminate and to continuously improve)
Basic scientific knowledge	Conceptualized science knowledge	<i>Ngrembakake</i> (to grow and to give a multiplied benefit)

Based on the Oxford dictionary of new words, the term “glocal” and the process noun “glocalization” are “formed by combining global and local to make a blend.” According to Roudomeyof (2016), “glocalization means creating products or services intended for the global market but customized to suit the local cultures.” Many researchers used the term “think globally, act locally” to express glocalization. For example, Tien and Talley (2012) established the types of curriculum required for “glocalization” to ensure that will allow students to communicate more effectively. Furthermore, glocalization could be a real and new prospect, being characterized by some extrinsic features (Shamsuddoha, 2008): “*universality* (it addresses to actors of both developed and developing countries), *concreteness* (emerging from its tendency to assess the results of policies and actions), *mobilize human energy* (spurring de-bureaucratized public administrations, socially-oriented enterprises, volunteers, and individuals towards a glocal action), *sustainability* (it addresses a double orientation to exploit both local and global opportunities, also referring to powerful political and economic actors.”

To achieved glocalization in the curriculum, we propose cultural-based learning (CBL) in science education. Through CBL, the idea of glocalization bridges the impact of globalization and the extent of local wisdom or the effect of localization in science education. Indonesia is known as a nation and country that is rich in cultural treasures and traditions. Each island and region has its peculiarities in customs, traditional food

and drink, traditional clothing, regional specialties, language, and regional arts. All of which are local wisdom and culture. Each region will undoubtedly vary from one another. The culture and local wisdom of an area need to be continuously developed and preserved to become part of the archipelago’s wealth derived from generation to generation. The development of information and technology, as well as the globalization era, has influenced the development and preservation of local culture and wisdom (Baker & Taylor, 1995; Aikenhead & Jegede, 1999). Most people now, especially the younger generation, begin to forget the local culture and wisdom in their area. They are more familiar with fast food than local foods, prefer and begin to imitate the lifestyle and culture of other countries, such as K-Pop, Punk, Hip-Hop, and others. The globalization era that threatens the national cultural customs with the understanding of materialism, hedonism, and individualism is a challenge that must be addressed immediately.

The function of tradition and cultural arts in people’s lives can be used as a medium of education, information, entertainment, social control tools, and maintenance of values and norms and customs that develop in the community. Local wisdom and regional culture can be a source of learning for students because students who come to school already have initial knowledge (pre-concept) and bring cultural values from their families and regional communities (Aikenhead & Jegede, 1999).

Cultural-Based Learning in the Indonesian 2013 curriculum brings together schools and communities in the educational dimension. The implementation of the curriculum structure developed in 2013 is holistically based on science (natural, social, and cultural) (Permendikbud, 2013; Rhosalia, 2017). Through ethnics-based learning, students will make direct observations so that students can identify scientific questions, explaining phenomena scientifically, and can make conclusions (Baker & Taylor, 1995; Cobern & Aikenhead, 1997). Cultural knowledge is not only about local wisdom but also abstract knowledge contained in the culture itself (i.e., the philosophy of community life). It can be developed in the theme of learning so that cultural values can become character development as students. Ethnography is very relevant to the foundation of the 2013 curriculum development philosophy. The curriculum was developed using philosophy: (a) Education is rooted in national culture to build the nation's life today and in the future. It means that the 2013 curriculum was developed based on the diverse Indonesian culture and directed to build a better nation's life in the future; (b) Learners are creative heirs of national culture. The 2013 curriculum positions cultural excellence to be studied, applied, and manifested in personal life, social interactions, and the life of the nation today; (c) Education is aimed at developing intellectual smartness and academic brilliance through disciplinary education; (d) Education is purposed to shape a better present and future life from the past for human and nation (Hartanto, 2013; Beach et al., 2018).

The success of the learning process in schools is strongly influenced by the academic community's cultural background where the school is placed. The statement is similar to what was stated by Othman et al. (2015), which stated that in addition to philosophical, psychological, and scientific, and technological foundations, sociocultural foundations must be considered in curriculum development because education is always contained values that must be following the values prevailing in the community. Therefore, curriculum planning and implementation became more an innovative process rather than a predetermined value (Putriéné, 2017).

Learning is rarely found by integrating ethnoscience-based learning in learning methods, learning materials, and learning assessment. Attempts to integrate ethnoscience-based learning into school learning curricula to accommodate

cultural differences in learners, utilize cultural resources as a source of learning content, and use them as a starting point for developing culture. Thus, culture-based learning influences the learning process of students, including 1) positive influence will emerge if the learning at school that is being studied is in harmony with the daily cultural knowledge of students. This learning process is called learning enculturation; 2) learning-centered on students will run effectively because assimilation and learning accommodation will run effectively. It can support students to solve learning problems by integrating knowledge and experience in everyday life.

The word ethnoscience is derived from the word *ethnos* (Greek), which means nation, and *Scientia* (Latin) means knowledge. Therefore, ethnoscience is the knowledge possessed by a cultural community (George, 1991). According to Moore (1998), ethnoscience is a cultural study branch that seeks to understand how indigenous people understand their nature. Natives usually have a life ideology and philosophy that influences their survival. On this basis, it can be stated that ethnoscience is one of the new ethnographic forms. Through ethnics, cultural researchers will build a theory that the grass-root does not have to adopt western cultural theories that are not necessarily relevant. Research into ethnics on cultural phenomena is always 'ethno' or 'folk-based.' The presence of ethnoscience will indeed give fresh air to cultural research (Davison & Miller, 1998). Therefore, there are indeed many cultural researchers who systematically utilize ethnics' studies. Indeed, there are no similar opinions regarding the term ethics among the researcher's culture. Some call cognition anthropology, ethnographic semantics, and descriptive semantics (Spradley, 1979). These various terms arise because each expert gives a different emphasis, but the essence is to find a scientific level of cultural studies.

Ethnoscience is a learning approach that implements regional culture or local wisdom as objects of learning science. Ethnoscience can be defined as a tool of knowledge possessed by a society/ethnic group obtained by using specific methods and following certain procedures that are part of a particular community tradition, and its truth can be tested empirically (George, 1991; Davison & Miller, 1998). Students no longer view science as a foreign culture that they must learn but view science as a culture and local wisdom that they already recognize in their daily lives. With this ethnoscience approach, students are

taught to transform or reconstruct original science (knowledge that develops in society) into scientific science related to the material being studied.

The science learning model based on local wisdom can be done by reconstructing indigenous science (local/original science) into western science or scientific science. Application of science learning model based on local wisdom is by observing a culture that exists in the community to reconstruct further the scientific concepts that ultimately can foster the value of the conservation character of students. Model of learning based on local wisdom is done by reconstructing original science. Reconstruction is meant to be rearranging or translating original science into concepts of western science or scientific science. This original science is obtained through obser-

ving the cultures in the community. Therefore, it can be said that this learning model is based on local wisdom because it is obtained from indigenous knowledge or local genius of a society that comes from the noble values of cultural traditions to regulate the order of community life to achieve community progress both in creating peace and improvement of community welfare. Through the reconstruction of original science, applications will be obtained from scientific concepts to deepen science concepts mastery. It certainly shows that a culture that has taken root in our nation has values that are very beneficial for human life. The following vignettes are the example of ethnosience, the model of science learning based on local wisdom.

ReogPonorogo



(Source: Authors)

Theme: Energy and muscle movement

ReogPonorogo is a traditional performing art with diverse backgrounds. This art has become a living part of the community that symbolizes as well as a representation of the daily activities. At the Reog address, a player shoulders Barongan or a very heavy lion's head. Not even any player can do it because it requires sufficient training and strength and confidence from a strong self. The power of shouldering Barongan is inseparable from the theory of lifting the heavy load. In scientific knowledge, this theory can be studied in the chapter on energy and muscle movement. Besides that, the position when he wanted to lift Barongan also determined the strength of the shoulders of the Barongan.

SedekahLaut (Sea Alms)



(Source: Authors)

Theme: Lunar calendar

Sea alms tradition is routinely carried out by traditional fishermen Teleng Ria Pacitan. Precisely towards the new Hijriyah year [lunar calendar in Islamic beliefs] or commonly known as Suro (Muharram) month. It has become a tradition that is rooted in the beliefs of local people that every month before the fishermen has to do sea alms. Even though the fishermen themselves did not know the beginning of the emergence of this tradition, they were convinced that at that time they had to carry out sea alms. Apart from the existence of the trust or simply preserving the ancestral cultural heritage, the implementation of the tradition of sea alms is lively and contains the values of local wisdom that has its characteristics.

In the month of Suro or the Hijriyah new year the conditions of the moon are in the phase of the new moon where the sea level is attracted to the gravities of the moon so that it is appropriate to catch the fish of Suro month around September or October where the month is the best season to find fish because the fish tend to aggressive change in the season.

Figure 3. The Vignettes of Ethnosience in Indonesian (*ReogPonorogo* and *SedekahLaut*)

Many benefits of policy borrowing can be adapted from other countries, and on the other hand, there is much Indonesian local wisdom. The most important thing is how to optimize the two concepts to run sustainably and in synergy in the country. One way is to maintain the identity (*Jati Diri*) of the nation, to screen various policies from other countries that do not conflict with local potential and local wisdom in Indonesia. For

this reason, the synergy between globalization and localization is necessary. Figure 4 illustrates a positive quadrant of policy borrowing and local wisdom. Accordingly, the concept of glocalization must be gradually introduced, developed, and implemented. The balance between the globalization effect and glocalization should be addressed. Therefore, an effort to maintain local science (indigenous science) is necessary.

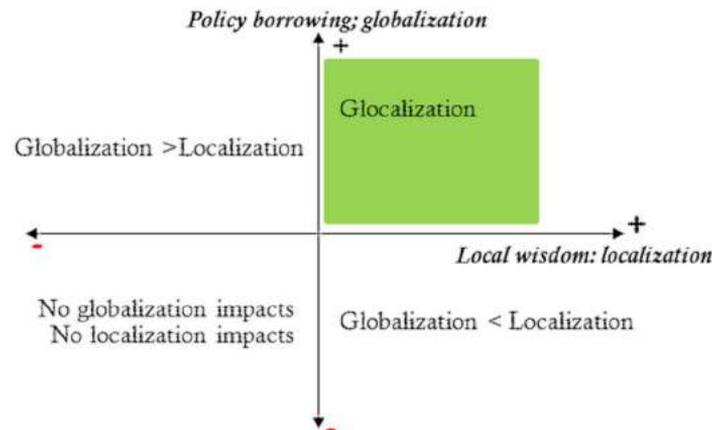


Figure 4. The Positive Quadrant of Policy Borrowing and Local Wisdom

Ogawa (1999) and Cronje et al. (2015) stated that one of the intuitive sciences is social or cultural or indigenous science or original science. Snively & Corsiglia (2001) emphasized that original science is related to scientific knowledge gained through oral culture in a place that has long been occupied. This knowledge is a part of their culture derived from their views on the universe relatively believed by the community. However, the original science, a sub-culture of the community group, was not fully realized and received less attention from science education experts and science teachers in Indonesia.

CONCLUSION

The paper has already presented five main headings regarding Indonesian curriculum reform from the perspectives of science education, including (1) curriculum policy and policy borrowing; (2) philosophy of Indonesian local wisdom; (3) cultural-based learning; (4) science local wisdom and ethnosience; and (5) policy borrowing versus local wisdom. Each heading has a significant relationship with the other. Starting from the curriculum context, Indonesia has nationally established several curriculum changes, such as implementing the new curriculum since 2013. It is in line with policy borrowing efforts

regarding represent best practices and gaining some other countries' experiences. However, one crucial thing that the successful implementation of the new curriculum depends on the readiness of all parties involved at the operational level in the learning process. Policymakers in Indonesia must conduct the Indonesian Founding Father of Education to create their curriculum so that the younger generation will not forget their local wisdom. The balance between borrowing and the existence of local wisdom keeps the identity (*jati diri*) of the nation.

Consequently, science education learning should be integrated into cultural-based learning (CBL) and ethnosience in most classroom activities. Finally, balancing globalization and localization through glocalization is proposed in this review paper. One effort to perform glocalization is the implementation of cultural-based learning with ethnosience in science education.

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