THE IMPORTANCE OF TRADITIONAL ECOLOGICAL KNOWLEDGE TAUGHT IN RURAL PRIMARY SCHOOL

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Abstract: Urban people was rich with traditional culture, like folktales, and traditional ceremonies. It was valuable as traditional ecological knowledge (TEK), but people had been forgotten. The integration of TEK into learning in s primary school may be a key tool for the the potential to improve the delivery of educational objectives about science. This paper explores perceptions about using of the value of TEK into formal education, especially in rural primary school. We conducted interviews with 52 participants (educators, officials, and local TEK experts) regarding the use of the formal school system to transmit, maintain, and revitalise TEK in Tawangmangu, Karanganyar District. Participants reported that TEK in Tawangmangu had eroded and identified the formal school system as a principal driver. Most interviewees believed that if an appropriate format could be developed, TEK could be included in the formal education system. Such an approach has potential to maintain customary knowledge and practice in the focus communities. Participants identified several specific domains for inclusion in school curricula, including diversity of food knowledge, agricultural knowledge and practice, especially corn and vegetables, and the reinforcement of respect for traditional authority and values. TEK has potential to add value to formal education in primary school in Tawangmangu by contextualizing the content and process of learning, and by facilitating character development and self-awareness in students. These benefits are relevant with UNESCO-mandated goals for curricular reform and provide a strong argument for the inclusion of TEK in formal school. However, interviewees also noted a number of practical barriers to teaching TEK in primary school. These relates the cultural diversity and views within the community. However, needed further research to the significant epistemological challenges inherent in including TEK in formal school, particularly as participants noted the potential for such approaches to have negative consequences.

Keywords: integration, traditional ecological knowledge, elementary school

INTRODUCTION

Environmental issues dominate social, cultural, and political discourse. There is great attention paid to the impact of human activity on the environment and concern continues to grow amongst the global community. Many contries have recently recognized the importance and relevance of integrating indigenous knowledge into the current environmental education curriculum (Cagivinaka, 2016: 11). The school of environment is interested in developing a frame of mind within its educators and learners that is characterised by respect, diversity of knowledge, and innovation.

Enhancing the current curriculum by including indigenous knowledge, offers a way to support goals associated with local, national, and global sustainability.

There is easy to access and use western science based knowledge regarding the environment, for example in the ways in which ecosystems function (McCarter & Gavin, 2011:3). However, it may be beneficial for the curriculum to include a cultural framework for environmental problem solving that incorporates a more holistic approach. As a starting point for this revision, the school would like to begin the process of thoroughly examining a respectful way of understanding indigenous knowledge as a knowledge system, then moving forward to the possible integration of Traditional Ecological Knowledge into the current curriculum.

This paper will assess the potential integration of western scientific knowledge and TEK, especially to explore perception about possibilities, ways, and barriers to integrate TEK into teaching and learning in primary school in Tawangmangu. The paper will investigate current research that has been carried out on the connections between TEK and western science and how other educational programs have attempted to revise curriculum in a way that offers a decolonized way of teaching and learning. This undertaking is not without its challenges, but an attempt to substantiate an interpretation of TEK and western science will be reinforced by exploring the epistemological and ontological underpinnings of western science and TEK. By introducing TEK to our environmental programs, students would be much better equipped to examine ecological problems from a more holistic and thoughtful framework. Re-examining the cultural assumptions underlying an instructor's own view of science and exposing students to a body of knowledge that connects the environment to human values could begin a process of deep learning by both instructors and students. This learning could strengthen the diversity of thought that is required to come up with new and innovative solutions to some important environmental issues.

The post-colonial world is rich with diversity of culture and values, and ways of knowing (Aikenhead, 2007: 326). There has been a growing interest over the past decade or more by academics, agency scientists, and policymakers in TEK "…as a potential source of ideas for emerging models of ecosystem management, conservation biology, and ecological restoration. It has been recognized as complementary and equivalent to scientific knowledge (Kimmerer, 2001:432). Western science has not failed in understanding the complexities of natural ecosystems, but there has been a deficiency or gap in connecting the natural world with the cultural context in which it exists. Of all the systems that western science has proclaimed to understand, the ecological systems are by far the most complex.

Defenders of TEK based resource management and environmental education rarely agree on how it should be implemented or even the appropriateness of using the knowledge of others which is based on conditions in the past (Reid, 2004: 7). But most agree that there is much to be restored in the way we view the environment and educate students about the environment. Berkes describes TEK as "knowledge of the land….a fairly broad consideration of ecology, but not broad enough to encompass all aspects of knowledge" (Berkes, 2004: 5). TEK is very specific to the local ecosystems. Local

ecological knowledge is based on the direct dependence on local resources over long periods of time. The intimacy between nature and the first inhabitants helped create an Indigenous wisdom. TEK based on observation, inference, verification, and prediction results in a world view that is very different from the science based world view.

METHODOLOGY

Setting

Tawangmangu located on the slope of Lawu turns the most diverse traditions that are still held for generations in the community. Among the cultural development of foreign countries, which can make forget the customary locally, in this region, every village has a traditional ceremony that is still preserved and held regularly until now. Even with little packaging in a ceremony this tradition could add to a tourist attraction that became the mainstay of Karanganyar. For example, in the Pancot village there is *Mondosiyo* traditional ceremony, in the Nglurah village there is *Dhukutan* traditional ceremony, and in the Kalisoro village there is a traditional ceremony to clean villages and earth alms called *Julungan*.

Focus communities

Research is conducted in four rural communities on Tawangmangu Disctrict, that inscludes Tawangmangu, Kalisoro, Nglurah, Pancot-Blumbang Villages. They are 52 participants consisting of educators (n=20) in primary schools, officials (n=20), and local TEK experts (n=12). Informants selection was purposive and non-random, and contacts were gained through snowball sampling methods. For TEK experts and school teachers, our initial participants were selected through consultation with the local fieldworker in each community, and additional participants identified through recommendations of previous interviewees. We recognise the bias inherent in snowball sampling, as the contacts one gains are dependent on the social networks of the gatekeeper informants

Data collection

Data were gathered using semi-structured interviews, which offer the flexibility to gather a wide range of information, and allow the interviewer to gain a more nuanced understanding than a structured questionnaire. All interviews were conducted in Java and Indonesian according to the preferences of the interviewee. There are three prior quentions, includes (1) Could TEK be included into primary school teaching and learning? (2) How mihgt TEK be integrated into primary school teaching and learning?, and (3) What are the possible barriers ti integrating TEK into primary school teaching and learning?

Analysis

To analyze the data carried by some of the techniques written Cohen, Manion, & Morrison (2007: 467-471), the analytic induction 'analytic induction' constant

comparison 'constant comparison', and typological analysis 'typological analysis'. In the first iteration, we read all of the transcripts in order to gain a basic understanding of the responses. During this stage, we made a list of initial codes in the margins of the transcript, and used these labels to develop a general category scheme of participant responses. Second, we began to identify themes by sorting the initial scheme into concrete categories and subcategories. This categorisation reflected the frequency of response as well as the similarity between interviewees. Third, we re-read the transcripts to identify atypical and dissenting cases. The themes developed during this section form the paragraphs of the results section below. Last, we reviewed the themes and evaluated their relationship to the literature.

RESULT

Results of this research are presented here according to the key questions set out at the method section.

Could TEK be legitimately included into primary school teaching and learning?

All participants noted that TEK in Tawangmangu had eroded over recent generations. The data was obtained from a structured interview and indicated that 98% of 52 participants around three vilagges perceived TEK to be eroding. Thirty interviewees (educators and local TEK experts) noted that the formal education system had played a key role in the erosion of this knowledge, alongside other key drivers such as new residnets influence and community inattention. Participants noted that formal education drives TEK erosion through introducing new, competing, forms of knowledge and through a lack of integration with the wider community. As expressed by one elder at Pancot Village, “The kids go to school, and they catch some thinking that isn’t really good - they learn knowledge, but they do not learn wisdom” (Male, 62, local TEK expert).

Although 85% of respondents (44 participants) believed that TEK could be included in the formal school system, we found clear differences in the responses from different interviewee. Teachers and community TEK experts were more likely than not to agree that TEK could be legitimately included in the formal education system. Participants who believed that TEK could be included in formal school systems gave a number of justifications, which coalesce into two main themes. The first group (n = 26) were not concerned about the negative consequences of such a move, and noted that TEK would be a valuable means of counterbalancing the western knowledge that is currently promoted by the school system. A teacher also stressed the role that TEK could play in education: “There are now two roads on offer (western and castom), and it is hard for them to choose. People need their culture and traditions to be taught to them, to give them roots and make sure this choice is easier“ (Female, 40, Teacher). The second group (n = 18) were pragmatic and were concerned with exploiting some of the characteristics of the formal education system to increase TEK transmission. They are concerned with the delivery of traditional ecological kwoledge will reduce formal learning materials. Some of the reasons students will increase the burden of learning,

traditional materials are not entered on the national exam, and the value of the traditional old-fashioned.

The data indicates that a significant proportion of respondents (including 50% of officials) did not agree with the sentiments outlined above. A wide variety of reasons were given, which differed between the interviewee groupings. However in general, these participants were concerned that such a move would remove values, either from TEK itself or from the formal education experience. They also were concerned that integrating TEK and school might devalue the knowledge. Three key reasons were given: (1) by inadvertently increasing the transmission of negative elements of castom, including witchcraft and sorcery, (2) by facilitating the teaching of gendered and secret aspects of TEK to a wider audience than would otherwise be intended; or (3) by promoting the teaching of TEK by the wrong people, if appropriate teachers were unavailable.

How might TEK be integrated into the formal school system?

When asked about appropriate subject material for the teaching of TEK in primary school, interviewees (mostly TEK experts) identified six domains of knowledge that would be suitable for inclusion as subjects in the formal school system. The first three (medicine, agriculture, and construction) refer to theoretical and practical TEK skills that participants felt are at risk of not being effectively transmitted and would translate well to the school environment. That is, they could be taught in a classroom through instruction from local resource people. Participants noted that the inclusion of TEK such as this in curriculum modules would increase intergenerational delivery of these domains; would make the younger generation more 'useful' in the community environment; and would increase their self reliance. In recommending the next two subject domains (resource management and respect) participants were more concerned with ensuring the delivery of appropriate norms and values to ensure cohesion within the community environment.

This was considered critical for the effectiveness of natural resources, such as through spatial and temporal restrictions on resource use known as "tabu" and to foster appropriate attitudes to persons and property within the community. Participants commented that the individualistic ethic of the formal school system had resulted in a lack of respect for traditional institutions, and had increased incidences of theft or lack of appropriate deference to social hierarchies.

There was some dissent on whether norms and values could be transmitted in school, which we return to in describing the barriers below. One official (Male, c.60) in Nglurah Village provided an instructive example of how TEK and formal school might be integrated from another villages in Tawangmangu. For several years the interviewee has been working with the school board to break down the barriers between school and the community. They have been allowing local experts to come and teach TEK. This activity have ensured community participation in the school board and regular contact with school authorities. The interviewee stressed that the focus has been on teaching values rather than specific skills. For example, he observed that being able to weave a

mat or cooking rice corn is not the end goal of the teaching process, but rather the development of the patience and commitment to be able to complete the task.

What are the possible barriers to teaching TEK in schools?

Interviewees highlighted multiple barriers to the inclusion of TEK in formal education, especially primary school, of which several have already been noted. These can be broadly divided into practical and epistemological barriers.

Practical barriers were associated both with characteristics of the formal school system and the nature of TEK. Within the former grouping, issues with ensuring that the correct resource people are able to teach and that there was sufficient time in the curriculum have already been mentioned. An additional key dynamic is the lack of consistent political support for TEK. This was perceived to be a problem by the majority of officials and teachers. The sheer cultural diversity was also cited as a barrier to the effective integration of TEK into the formal school system. This is particularly true in the secondary school setting, where students commonly come from around Tawangmangu are represented in a single classroom.

Interviewees also cited a number of epistemological barriers to the inclusion of TEK in the school system. Some of the most commonly expressed reservations were associated with differing methods of knowledge delivery between the formal school system and a traditional system. The formal school uses a teacher- centered model in which one or two instructors dispense public knowledge to many learners, regardless of gender or age. This model was considered to be at odds with systems of TEK by several interviewees, who noted that much TEK was private and was held by particular family groups or individuals. Moreover, traditional routes of knowledge delivery would have been based around vertical (parent-child) means rather than horizontal (within peer groups) or oblique (one instructor to many learners) means.

By way of example, in traditional medicine, some use domains (such as that of how to treat common ailments such as headaches) are considered common property and could be taught at school. However, treatment of more serious illnesses or those with traditional aetiologies is the domain of certain individuals.

More broadly, then, there was a common perception that while the Western-derived formal education system is based an ethic of every student having the right to know everything, this is not always congruent with customary systems of knowledge transmission and acquisition. Moreover, practice and ownership of TEK was considered to be bound by an ethic of respect and by social norms that existed outside the transmission of the knowledge itself. Underlying such concerns is a common conception that the two systems of knowledge transmission are fundamentally different. Ideally, TEK is embedded in everyday life, whereas formal school is perceived as a discrete entity that exists outside the framework of the village. Whilst the transmission of TEK from teacher to learner is based in the practical reality of the lived environment, knowledge in school is theoretical, conceived and stored in paper and books. As such, those interviewees who did not support the teaching of TEK in school often noted that it

was impossible to teach TEK adequately in the academic, formal context, as this would remove the connection between knowledge the teaching of practical skills.

CONCLUSION

We find that TEK may be able to add value to the formal school system in Tawangmangu, especially in primary school. In addition, this may assist in the maintenance of ethnobiological knowledge. However, we note that the value of formal education to TEK is less assured, and that overcoming the practical and epistemological barriers outlined above will require considerable effort. Indeed, to do so may require a substantial redesign of the entire school system, to allow for not just the dissemination of other forms of knowledge but also to empower other ways of being, knowing, and learning. However, critically, we note that the desire for such a radical change in education policy may not always exist at the local level. Ideally then, local people would have more power to determine the content and structure of the education system. Education reformists, ethnobiologists, and practitioners of cultural conservation have all called for the inclusion of TEK in the formal school system. However, little research has occurred examining the feasibility of this approach.What is now needed is more detailed research on how to cope with the kinds of barriers identified here, or to determine if other modes of TEK conservation would be more practical. As a discipline, ethnobiology is in a unique position to assist the conservation of biocultural diversity, and a more systematic examination of the potential options for the maintenance and revitalisation of TEK will be a vital contribution over the coming years.

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