

# ETHNO-STEM INTEGRATED INQUIRY LEARNING ON FRACTURE TREATMENT STUDY MATERIALS WITH SANGKAL PUTUNG THERAPY IN TRAINING ANALYSTS THINKING SKILLS

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## Abstract

Bones are one of the most important parts of the human body. Musculoskeletal soft tissue trauma that results in breaking of the bone structure will cause fractures due to the impact of hard objects. Treatment of fracture grafting can be done by means of modern medicine (surgical surgery) and traditional medicine (non-surgical surgery). One form of traditional medicine in the treatment of fractures is sangangkal putung. Some people in Indonesia still choose to treat fractures to the sangkal putung. The purpose of this research is to understand the application of Ethno-STEM integrated inquiry learning to study materials for fracture treatment using sangkal putung to train students' critical thinking.

This type of research is a qualitative research. Data collection was carried out by observation, interview and documentation methods. The results of data retrieval then carried out data analysis using data reduction, data presentation, and drawing conclusions.

The results showed that in inquiry learning that was integrated with EthnoSTEM in the traditional medicine of Sangkal Putung, students could practice critical thinking skills in understanding and analyzing information related to the behavior of Sangkal Putung therapists in fracture treatment skills and the reasons patients/community prefer from treating broken bones to traditional Sangkal Putung medicine and students getting real and active learning experiences.

**Keywords:** Sangkal Putung, Inquiry, Ethno-STEM.

## INTRODUCTION

Bones are one of the most important parts of the human body. The function of bones is as a framework and support for the human body as well as a place for muscles to attach so that the body can move optimally. If the bone itself is damaged, the bone function becomes extremely important. (Triono & Murinto, 2015).

A fracture is a continuation of bone or a broken bone structural unit, and it can occur in the form of cracks, crumbs, or fragments of the cortex that have broken off.

There are two types of fractures: open fractures and closed fractures, which are distinguished by how the bone and the tissue surrounding it are interconnected. Closed fractures are fractures without a connection between the bone fragments and the outside world, whereas open fractures cause damage to the skin tissue to connect the bone fragments to the outside world (Suwahyu et al., 2021).

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Fractures can be treated surgically or non-surgically orthopedically. Musculoskeletal soft tissue trauma that results in the breaking of the bone structure will cause fractures due to the impact of hard objects. The process of healing fractures is a natural biological process that will occur in every fracture (Suwahyu et al., 2021).

A sick body can be restored through treatment. In the field of health, there are two types of treatment: traditional treatment and modern treatment. Modern treatment is a method of treatment that is carried out based on scientific research and based on knowledge from various aspects. Usually, the medical treatment uses several applied scientific disciplines in treating a disease. In modern treatment, splicing fractures is done through surgery using tools such as plates and screws (Sjamsuhidajat dan De Jong, 2009).

Whereas traditional treatment is a way of healing beyond medical science. The traditional treatment uses expertise or skills that are gifts from God and passed down from generation to generation. According to Law Number 36 of 2009 concerning health, traditional health services are treatment and/or care by methods and drugs that refer to experiences and skills handed down empirically which can be accounted for and implemented by the norms prevailing in society, health services Traditional treatment is divided into traditional health services that use skills and traditional health services that use herbs. According to the Ministry of Health of the Republic of Indonesia (2015) Number 1076/MENKES/SK/VII/2003 concerning the Implementation of Traditional Treatment, classifies the types of traditional treatment which include: a) traditional treatment skills consisting of massage, broken bones, circumcision, traditional medicine, reflection, acupressure, acupuncture, chiropractic and other traditional treatments with similar methods; b) traditional herb treatment consisting of traditional Indonesian herb medicine (jamu), gurab, healer, shinshe, homeopath, aromatherapy and other traditional treatment using similar methods; c) traditional treatment with a religious approach consisting of traditional treatment with an approach to Islam, Christianity, Hinduism or Buddhism; d) supernatural traditional treatment consisting of traditional internal treatment (prana), paranorma, qigong (Chinese), spiritual healers and other traditional treatments with similar methods (Hartono et al., 2020).

Traditional treatment can also be referred to as alternative medicine from medical procedures to traditional procedures. Currently, traditional treatment is one of the alternative treatments which is still in great demand by the public. One such traditional treatment is the treatment of Sangkal Putung fractures (Shobdie & Mubarakah, n.d.). Sangkal Putung is a type of traditional treatment for fractures, dislocations, sprains, and strains (Yuniar et al., 2017).

At this time, the field of ethnomedicinal from the history of scientific fields is part of anthropology which studies a lot of

traditional treatment that has developed in society. Traditional treatment is still accepted by society as an alternative to medical treatment. Sangkal Putung is a popular term for alternative treatment for grafting broken bones due to accidents using traditional methods without surgery. It is said that for hundreds of years the expertise to repair broken bones has been mastered by therapists who have spread across various regions in Indonesia. Sangkal Putung traditional treatment is a form of local culture in the health sector. Local culture is a characteristic of ethical and cultural values in society that are passed down from generation to generation. Local culture embodies ideas and values, local views that are wise, full of wisdom, and which are embedded and embraced by every member of society (Saputri, Priyatni, dan Widiati, 2021). Local cultural expressions refer to the accumulated experiences of a community which is then passed down from generation to generation (Rosilawati et al. 2020).

Indonesia is a country that has a diversity of ethnicities, cultures, and religions (Lestari, 2016; Pitoyo dan Triwahyudi, 2017). According to numerous studies that have been done, local culture has a lot of advantageous effects. A location will be more innovative if it has a strong local culture (Yuliasuti dan Sukmawati, 2020). The local culture found in society can be used for education or learning (Sudarmin, 2016). Bone fractures are one of the materials being studied. Analyzing traditional fracture treatment using the Sangkal Putung clinic is a fundamental ability expected in bone fracture content so that students can practice critical thinking in comprehending the teaching strategy. This study aims to examine the traditional medicine of Sangkal Putung and reveal the potential of existing scientific knowledge. Through this research it is hoped that it can reveal the ethno science and local wisdom values in the Sangkal Putung culture.

The learning process needs to be carefully planned out for it to take place successfully and provide the desired competencies. Selecting a learning model is one of the steps a teacher takes to get ready to teach in class. One of the techniques for choosing a learning model is knowing the characteristics of the material. The characteristics of the material for traditional Sangkal Putung treatment include material that emphasizes the information on health phenomena that exist in the local community/culture. The cluster of learning models which include information processing includes the concept formation model or inductive thinking (inductive thinking), concept acquisition models (concept attainment), memories models (memory assists), advance organizers models (advance organizer), inquiry (scientific inquiry), exercises inquiry (inquiry training), and sinektik (synectics) (Rustaman, 2009).

The inquiry learning model refers to the level of students' ability to investigate something given by the teacher in class. According to Sanjaya (2008), inquiry-based learning is a series of learning that emphasizes the process of

thinking analytically to seek and find answers to a problem in question (Irmita, 2018). According to Al-Tabani (2014) inquiry is a core part of contextual-based learning activities. It is hoped that the knowledge and skills acquired by students are not the results of remembering a set of facts, but rather the result of discovering themselves. In this case, the inquiry learning model places the teacher not as a source of learning, but as a facilitator and motivator for student learning. According to Hamdayama (2016) inquiry is a series of learning activities that emphasize and find answers to a problem in question. Through the Inquiry learning model, students are able and find their answers to the problems found in learning which is nothing but the ability to think critically (Yanti & Gani, 2016) (Haspen et al., 2021). This is consistent with the assertion made by Septiani et al. (2012) that inquiry-based learning requires students to actively learn how to conduct both individual and group investigations to address the issues raised. Meidawati (2014) claims that inquiry-based learning equips students with the skills to recognize problems, come up with solutions, form questions, carry out experiments, analyze the data, and work in groups (Irmita, 2018). The inquiry method of learning is a good way to develop student's critical thinking skills because it enables teachers to connect classroom lessons to social issues and help students apply their daily life-acquired knowledge to real-world situations, making the content more relevant to them (Suryati, 2014).

The inquiry learning model can be integrated into the Ethno-STEM approach. The Ethno-STEM approach originally came from the Ethno-Science approach. The Ethno-Science Approach is a process of reconstructing original science that develops in the local community to be integrated into scientific science (Khoiri, 2018). According to Sumarni (2018) that ethnoscience can scientifically analyze (Scientification) traditional herbal medicine ethnomedicines with a STEM approach. The Ethno-STEM approach can be interpreted as a process of building scientific concepts through the local culture and integrating with STEM. STEM learning is learning that integrates the principles of science, technology, engineering, and mathematics (Gonzalez and Kuenzi, 2012). STEM is an interdisciplinary approach by integrating the four disciplines of science, technology, engineering, and mathematics which are applied in real-world contexts. STEM education is a teaching and learning approach between two or more STEM components or between one STEM component and other disciplines (Becker & Park, 2011) (Jaenudin et al., 2021). The STEM approach is an approach that can create students who can face the increasingly complex challenges of life in the 21st century by developing problem-solving skills, critical thinking, creativity, and innovation, systematic and logical (Nurhasnah, 2020). The integration of STEM education into teaching and learning may be carried out at all levels of education, from elementary school to university, because aspects of STEM implementation such as intelligence, creativity, and design ability do not depend on age (Sanders

et al, 2011) (Irmita, 2018).

## METHOD

This research is a qualitative research. The research was conducted to understand the application of the Ethno-STEM integrated inquiry learning model to study materials for fracture treatment using Sangkal Putung sphincter therapy to train students' critical thinking. The data collection is done by observation, interview, and documentation methods. Observations were made by observing the physical condition of the patient, the condition of the surrounding environment, and the daily activities carried out by the therapist, as well as the activities of the Sangkal Putung massage that took place in their daily lives. Interviews were conducted with therapists and patients. The therapist is the person who performs the Sangkal Putung treatment while the patient is the person who gets the Sangkal Putung treatment. Documentation is done by capturing pictures of the activities carried out in the Sangkal Putung activity.

Data analysis used an interactive model from Milles Hubberman which consisted of data reduction, data presentation, and conclusion/verification. Meanwhile, to obtain data validity, the researcher triangulated the data using data source triangulation, technical triangulation, and data collection time triangulation. This data analysis contains the explanation and confirmation of the conclusions of research findings related to therapist behavior in the skills of Sangkal Putung treatment and the reasons why people prefer traditional Sangkal Putung treatment so that they can train students' critical thinking skills.

## RESULTS AND DISCUSSIONS

The results of observations and interviews about the traditional medicine of Sangkal Putung were then used as a reference in preparing the learning plan. The learning design developed applies an inquiry learning model that is integrated with Ethno-STEM with the local culture of traditional Sangkal Putung treatment for bone fractures.

Students are expected to be active in finding and determining the form of questions needed so that they will gain a strong understanding of the material being studied (Novitaningrum, 2014), especially in the material of traditional Sangkal Putung treatment. Critical thinking skills are one of the higher-order thinking skills that require students to use the cognitive level at the level of analysis, evaluation, and creation (Permana, 2019). Each inquiry syntax requires higher-level thinking skills, namely orientation, formulating problems, proposing hypotheses, collecting data, testing hypotheses, and formulating conclusions. Hamdani and Susilawati, they stated that the use of inquiry-based teaching materials was effective in increasing learning outcomes, generic science skills, concept

mastery and actively involving students in discovering concepts (Andayani, 2020).

Students were asked to do an orientation to the Sangkal Putung clinic to be able to observe and interact directly with therapists, patients, and the environment at the Sangkal Putung clinic. Students make a problem formulation based on the results of the orientation that has been done then make questions that are an elaboration of the problem formulation. These questions will be used as guidelines for interviews with therapists and patients at the Sangkal Putung clinic. At the stage of proposing a hypothesis, students are asked to respond to the questions that have been made and used as material for discussion. The results of the discussion are an improvement from the questions that have been made before. Furthermore, the questions that have been prepared will be used by students in collecting data through observation and interviews with therapists and patients at the Sangkal Putung clinic. The results of the data collection are in the form of interview transcripts which will be tested hypotheses and then students analyze the results of the interviews to formulate conclusions. By using the inquiry learning model, students get real and active learning experiences. Besides that, the inquiry model motivates students to solve problems independently and have critical thinking skills in analyzing information (Solihin et al., 2018).

The results of the inquiry learning process on the traditional medicine of Sangkal Putung are as follows:

What is the meaning of Sangkal Putung?

Based on the results of interviews with several therapists, the term Sangkal Putung originates from the words Sangkal and Putung. Sangkal is the tip of the rice field plow, and Putung means broken. If interpreted, it is to rearrange the broken. Sangkal Putung is an effort to rebuild broken bones with a prayer dissertation. Some say that the term Sangkal Putung comes from the Javanese language, Sangkal means to refuse, while Putung means to break. In Indonesian it is treatment for broken bones while in English it is treat broken bones. The meaning of Sangkal Putung is a traditional treatment for a broken leg or hand without surgery. Usually, injuries or fractures occur due to activity. The term for a person who traditionally provides fracture treatment services is also called a traditional healer (Madura), Sangkal Putung (Java), and sandro pauru (South Sulawesi). The definition of denture Putung is an alternative treatment for joining broken bones due to accidents or falls using traditional methods without undergoing orthopedic surgery.

How was the therapist's history of being able to do the traditional Sangkal Putung treatment?

The results of interviews with several therapists regarding the history/beginning of being able to do Sangkal Putung treatment were (1) having the desire to learn to master the science of Sangkal Putung and participating in Sangkal Putung training and then opening a practice. There is an

organization for a group of putung therapists called Pepatri. (2) Sangkal putung knowledge is obtained through the inheritance of skills from offspring or family. Inheritance of skills or known as the transfer of knowledge in the treatment of Sangkal Putung is learning that is informal or takes place in the family environment. Based on this, the abilities or talents that exist in the skills of the Sangkal Putung den are hereditary in nature from the family and are still in the family lineage so they are determined to continue to look after it. Did not take the Sangkal Putung training. This activity that has been passed down from generation to generation is a process of transferring knowledge as a form of learning.

In supervising the treatment of Sangkal Putung, the regional government grants license to practice and provide guidance to Sangkal Putung therapists.

What is the traditional therapy technique for Sangkal Putung?

The results of interviews with several therapists regarding the technique of Sangkal Putung are carried out using massage, rubbing, pressure, and pulling. The Sangkal Putung treatment technique begins when the patient with a fracture is first examined on the part that is complained of. The initial inspection is to diagnose the severity and as a consideration for deciding how to massage. The reason is that each injury will be different in the treatment of the massage. However, some identify that by magical means, a person can acquire the knowledge of Sangkal Putung from generation to generation. Patients who suffer from broken bones, they will feel pain when massaged, because they will be stretched and straightened. The therapist's hands used for massaging must use oil before starting to massage the patient. This is because during the massage process the skin does not feel rough, making it easier for the massage process. The oils used by the therapists are different, such as coconut oil mixed with wasp oil, and special oil for Sangkal Putung.

Restore the broken bones, is similar to traditional fracture treatment in general, that is, after the massage/ordering process, the broken bones are protected/supported with wooden boards and then bandaged and covered with bandages to make them safer. There is a part of the broken bone pulled. Then some are only smeared with oil and then bandaged, and patients are given medicines containing calcium such as sinsei medicine or a kind of herbal medicine from China or medicine from cured fish that aims to grow callus/new bone so that it can connect broken bones.

How long has the patient been doing traditional Sangkal Putung treatment?

The results of interviews with therapists and patients explain that after the patient has received treatment from the Sangkal Putung, how long it takes to recover from a broken bone or muscle injury can vary for each patient, depending on the severity, location of the injured bone or muscle, and age. Therefore, the healing process cannot be estimated how

fast it will be to recover. The healing process also varies, some take 2-3 months, and the longest is 7 months. Young patients have a faster healing process. Several Sangkal Putung clinics provide inpatient care for patients who are unable to go home, thus facilitating healing therapy. The facilities provided include bathrooms, meals 3 times a day, medicine, and control every 3 days.

How much does traditional Sangkal Putung treatment cost compare to medical treatment?

Patients who have had Sangkal Putung treatment say that the costs incurred during treatment are much cheaper than going to health services. In this treatment, the patient can provide a down payment in advance and can be paid in installments, the payment process is also light because it can be paid at the end of the entire treatment process, even less able patients can pay willingly or are not even charged. This is one of the economic factors that makes many patients still go to Sangkal Putung for treatment.

What is the reason for the patient to treat fractures to the Sangkal Putung?

There are 5 factors that influence patients to treat fractures at the Sangkal Putung clinic, namely social, economic, cultural, psychological factors, and convenience for patients. The existence of a communication process between the patient and the therapist is one of the factors that influence where the patient goes for treatment. Communication that is equally high and easy to understand makes patients tend to be more comfortable coming to the Sangkal Putung treatment. Patients who have a low economic level tend to feel embarrassed and do not understand the terms spoken when communicating with health workers. Most incidents of fractures are caused by traffic accidents, so that patients are in a position of powerlessness when they are brought to traditional treatment by donors. The existence of limitations in social interaction so that one cannot distinguish which one is better or more comfortable seeking treatment at alternative or modern medicine is also one part of the social factor. Most people think that going to traditional treatment has a faster recovery rate compared to medical treatment. Usually, people who seek treatment at Sangkal Putung are due to the relatively expensive cost of treatment and orthopaedic/bone surgery, besides that it is also due to the lack of public knowledge about medical science and the first steps to take when experiencing a fracture. It turns out that people's reasons for coming for a treatment are not just medical issues, but there are socio-cultural issues which include a person's behaviour when they seek treatment, including socio-cultural factors, namely regarding compatibility and patient trust (suggestions). There is a "meeting of minds" between the therapist and the patient. Both parties believe in the existence of supernatural powers and abilities possessed by the therapist. This is what makes patients happier to come for treatment to alternative treatment than health services

Psychological factors are factors related to a person's

experience of various sources of treatment such as treatment without a cast. People still think that when they come to the traditional treatment they do not need to use a cast and they can recover. The factor regarding convenience for patients is that in traditional treatment patients can be treated immediately without having to need X-rays.

Traditional treatment is still used by the majority of people, not only because of the lack of affordable formal health care facilities, but rather because of Indonesian cultural factors which still have a strong belief in traditional treatment. The culture attached to the individual influences how the individual thinks and acts. In Indonesia, there are many types of traditional treatment available, making it easier for people to use these medical services. The phenomenon that occurs is not blaming the traditional treatment, because the traditional treatment is already a culture in Indonesian society and it gives quite good results and there are some patients who recover with traditional treatment. People's thoughts about health costs in hospitals are quite expensive and ignorance about the impact of wrong management has resulted in people still choosing traditional treatment as the first choice before visiting health services.

Where do patients get information about the traditional Sangkal Putung treatment?

Patients who come to Sangkal Putung have great faith and hope for the healing they will get. This belief is influenced by advice and information regarding the treatment Sangkal Putung from colleagues, relatives and connections. Apart from that, the information that they received was also supported by the success of their friends, relatives and connections who recovered when they received treatment at Sangkal Putung. It is also known that some patients have previously undergone medical treatment for fractures both in hospitals and also at private doctors. However, in the end, they chose a shortcut by doing alternative treatment for broken bones in the Sangkal Putung.



Figure 1. interview with sangkal putung therapist



Figure 2. Interview with patients at the Sangkal Putung clinic



Figure 3. The massage oil used by sangkal putung therapist



Figure 4. Drugs taken by the patient



Figure 5. Treatment of a patient with a broken bone using the sangkal putung technique

Sangkal Putung traditional treatment is a local culture that can be implemented through STEM. STEM education is very important where the use of technology in everyday life has been used to help complete work. Details of STEM Education regarding the culture of traditional Sangkal Putung treatment can be explained as follows:

Table 1. Ethno-STEM integrated traditional Sangkal Putung treatment

Sangkal Putung	Ethno Medicine	STEM
Explains the origin of a therapist doing traditional treatment of broken bones	The expertise of a Sangkal Putung therapist is obtained by learning and participating in Sangkal Putung training. There are also those who do not study because the science of Sangkal Putung is passed down from generation to generation through the inheritance of skills from offspring or family. The treatment of fracture grafting is done without surgery. The therapist uses different techniques such as massage, rubbing, pressure, and pulling, accompanied by prayer. The broken bone is smeared with oil and then covered with a wooden board and covered with bandages. Patients are given medicines containing calcium such as herbal medicines from China or sinse medicines and medicines from cursed fish.	<b>Science:</b> 1. Factual: Observing Sangkal Putung therapy 2. Conceptual: Understanding the origin of the therapist having the ability in Sangkal Putung 3. Procedural: Steps in performing a fracture grafting.
Describes the technique a therapist uses in joining broken bones	The broken bone is smeared with oil and then covered with a wooden board and covered with bandages. Patients are given medicines containing calcium such as herbal medicines from China or sinse medicines and medicines from cursed fish.	<b>Technology:</b> Introducing fracture grafting techniques without going through surgery/medical treatment
Explains the reasons why people prefer traditional Sangka Putung treatment.	The community prefers traditional Sangkal Putung treatment compared to medical/modern treatment for fracture grafting because it is treated immediately without the need for X-rays, without surgery, has suggestions or beliefs that it will heal faster and costs less.	<b>Engineering:</b> Making a model for the treatment of fractures through traditional Sangkal Putung treatment  <b>Mathematics:</b> Calculating the advantages of treating fractures through traditional Sangkal Putung.

## CONCLUSION

From the results of the foregoing explanation, it can be inferred that Ethno-STEM integrated inquiry learning can develop students' critical thinking abilities in comprehending and analyzing data on therapist behavior in the techniques of the Sangkal Putung treatment and the reasons why people prefer traditional Sangkal Putung treatment, as well as provide them with practical learning experiences and active.

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