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# ISPHE 2015

INTERNATIONAL SEMINAR ON PUBLIC HEALTH AND EDUCATION

**The 2<sup>nd</sup> International Seminar**  
on Public Health and Education

**PROCEEDINGS**



Semarang, April 23, 2015

BOOK 2

Public Health Department in collaboration with Sport Education Department,  
Postgraduate Program, Semarang State University

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2015 (The 2<sup>nd</sup> ISPHE 2015) PROCEEDINGS**  
Postgraduate Program, Semarang State University

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## PREFACE

Assalamu'alaikum warahmatullaahi wabarakaatuh,

Firstly, may we made our highest praise and thank to Allah The Almighty, for His bless so that we are able to continue a precious event; The Second International Seminar on Public Health and Education 2015 (The Second ISPHE 2015) in Semarang Indonesia, to share our knowledge and idea with so much warm and friendship from worldwide public health and education community.

The Second ISPHE 2015 is a continuation of The First ISPHE 2014 that had been held in Semarang, Indonesia on September 2, 2014. This second seminar is organized by Public Health Department in collaboration with Sport Education Department, Postgraduate Program, Semarang State University and supported by researcher team from Indonesia-Australia, Indonesian Health Education National Network (*Jejaring Nasional Pendidikan Kesehatan Indonesia – JNPK*), and Indonesian Public Health Association – Central Java (*Ikatan Ahli Kesehatan Masyarakat Indonesia Pengda Jawa Tengah – IAKMI*).

The Second ISPHE 2015 is aimed to gather all of experts, researchers, academicians, and practitioners in health education field in general as well as national and international level in one prestigious academic forum which to discuss the role of evidence based research in public health, health education, and health promotion decision making. This second seminar also proposed to contribute to the focus of health decision making; by considering the evidence based research, empirical data, and also local wisdom from each region, both national and regional levels as well as its relation to global health trends.

I would like to deliver our highest respect and appreciation to our honorable speakers, Prof. Donald, M.P.H, Ph.D. from Griffith University, Australia, Ross Sadler, B.Sc., Ph.D. from Griffith University, Australia, Min Jeung Park, Ners M.Sc., Ph.D. from University of Tokyo, Evaristo Soares from Department of Public Health Timor Leste, Ratha Phok from Institut de Technologie du Cambodge, Bashir Lakhal, M.Kes. from Department of Public Health, Lybia, and Dr. dr. Budi Laksono, M.HSc. from Health Department of Central Java, Indonesia. I really expect that this second seminar will be beneficial for all of us and to the development of the public health and education field.

Allow me to express my gratitude to all participants from Indonesia and other foreign countries who are enthusiastic in attending this seminar. I do hope that all participants will gain important values and collaborate it into our own fields and also able to make significant changes in the future. Besides, I also convey my appreciation to all organizing committee who have given their outstanding commitment for presenting this occasion.

Wassalamu'alaikum warahmatullaahi wabaraakatuh.

  
Sincerely yours,

Chairman of the Committee

Dr. dr. Oktia Woro Kasmini Handayani, M.Kes.





## WELCOME MESSAGE

Assalamu'alaikum warahmatullaahi wabarakaatuh,

Dear Conference Participant,

I extend my most sincere welcome to all participants of The Second International Seminar on Public Health and Education 2015, held in Semarang, Indonesia on April 23<sup>rd</sup>, 2015. Semarang State University is proud of being important part to develop public health, especially in public health education, through hosting this important event.

Semarang State University (Unnes) is one of the biggest state universities in Indonesia which was established in 1965. It is the first university that declared itself as the Conservation University in Indonesia. The idea of conservation has become its vision to be an international conservation university which is healthy, outstanding, and prosperous. Regarding the vision, Unnes determine to consistently uphold the idea of protection, preservation, utilization, and sustainable development of natural and cultural resources of Indonesia. Unnes also put conservation as a manifestation of the main duties of university, namely education, research, and community service.

In line with Unnes vision of healthy, this seminar is projected to be an international event in the field of public health education and aims to become a benchmark for decision-making in health, especially in promotion and prevention sector through evidence based research. The seminar theme, "The Role of Evidence Based Research in Public Health, Health Education, and Health Promotion Decision Making" will highlight different initiatives and projects that will help direct collective vision towards securing better health status to our nations. At this seminar, we will be able to consider application of public health research as a basic of making decision in public health area.

I am convinced that the seminar will produce valuable result for improving public health education through different presentations and discussion by our distinguished speakers and participants. I hope you find the seminar sessions and program material in framing the direction of your work. I am confident that the efforts made by all organizing committee will make it a definite success and a valuable experience for participants.

Finally, I sincerely look forward to your participation and contribution to this event.

Wassalamu'alaikum warahmatullaahi wabaraakatuh.

Sincerely yours,  
Rector of Semarang State University  
**Prof. Dr. Fathur Rokhman, M.Hum.**



## WELCOME MESSAGE

Assalamu'alaikum warahmatullaahi wabarakaatuh,

Dear Conference Participant,

On behalf of Postgraduate Program Semarang State University, we are pleased and honored to welcome you to The Second International Seminar on Public Health and Education 2015. It is a great privilege for us to be in Semarang, Indonesia on April 23<sup>rd</sup>, 2015. Postgraduate Program is proud to be working jointly with researcher team from Indonesia-Australia, Indonesian Health Education National Network (*Jejaring Nasional Pendidikan Kesehatan Indonesia – JNPK*), and Indonesian Public Health Association – Central Java (*Ikatan Ahli Kesehatan Masyarakat Indonesia Pengda Jawa Tengah – IAKMI*) at this important event.

Today is a time for change and we hope that the seminar will help us in confronting this change by bringing new opportunities for advancing public health education, nationally and globally. We are expecting the seminar to offer us with new material for improving our way of thinking and operation in confronting many public health problems. This seminar proposed to contribute to the focus of health decision making; by considering the evidence based research, empirical data, and also local wisdom from each region, both national and regional levels as well as its relation to global health trends.

Let's take advantage of this excellent opportunity and work together in strengthening our regional and national network and in sharing our interests and experience, particularly in public health education field. We are confident that the seminar will help us in building our network connections and in strengthening relationship.

We would like to thank each of you for participating in The 2<sup>nd</sup> ISPHE 2015 and bringing your knowledge and skills to this event. We expect you to be engaged in the sessions and to be proactive and inquisitive. Hopefully, all of you would enjoy your stay in Semarang, Indonesia. Finally, we would like to say thanks to all the organizing committee, who made this event possible be held.

Wassalamu'alaikum warahmatullaahi wabaraakatuh.

Sincerely yours,

Director of Postgraduate Program, Semarang State University  
**Prof. Dr. H. Achmad Slamet, M.Si.**



## Content

Cover .....	i
Preface .....	v
Welcome Message .....	vii
Content .....	xi

### Book 2

#### OCCUPATIONAL AND ENVIRONMENTAL BASED RESEARCH

<b><i>Determination of Environmental Health Indicator Related to Environmental-Based Diseases</i></b> Nurjazuli <sup>1</sup> , <sup>1</sup> Diponegoro University.....	299
<b><i>The Relation Between Noise Exposure and Period Of Work With Hearing Loss in Employee PT.X</i></b> Rara Marisdayana <sup>1</sup> , Suhartono <sup>1</sup> , Nurjazuli <sup>1</sup> , <sup>1</sup> Diponegoro University .....	312
<b><i>Temperature Variability and Bionomics of Anopheles in Endemic Malaria Area of District Purworejo Central Java Province Indonesia</i></b> Mursid Raharjo <sup>1</sup> , <sup>1</sup> Diponegoro University .....	321
<b><i>Preparing Future Evidence Based Occupational Health Practitioners : Students Initiated Program</i></b> Vitri Widyaningsih <sup>1</sup> , <sup>1</sup> Sebelas Maret University.....	331
<b><i>Involvement in Farming Activities and Personal-Protective-Equipment Use on Childbearing-Age Women in Farming Area</i></b> Arum Siwiendrayanti <sup>1</sup> , <sup>1</sup> Semarang State University.....	338
<b><i>The Risk Factor Which Lungs Vital Capacity in Work in Rice Milling</i></b> Herry Koesyanto <sup>1</sup> , Wahadi <sup>1</sup> , <sup>1</sup> Semarang State University.....	348
<b><i>Spasial Analysis of Environmental Conditions and The Spread of Filariasis Disease in Pekalongan City</i></b> Siska Candrawati Anggraeni <sup>1</sup> , Rudatin Windraswara <sup>1</sup> , <sup>1</sup> Semarang State University.....	355

#### SPORT AND NUTRITION BASED RESEARCH

<b><i>The Effect of Physical Activity Trough Senam Lansia on Elderly Muscle Tone in The Working Area of Spondol Public Health Center of Semarang Municipality</i></b> Arwani <sup>1</sup> , Purnomo <sup>1</sup> , Rodhi Hartono <sup>1</sup> , <sup>1</sup> Semarang Health Polytechnic .....	365
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<b>Physical Fitness Profile Related to Gateball Player Health of Bantul Regency</b> Fatkurahman Arjuna <sup>1</sup> , Ahmad Nasrulloh <sup>1</sup> , <sup>1</sup> Yogyakarta State University .....	373
<b>Effect of Aquarobics Exercise on Adiponectin and Il-6 Level in Obese Women</b> Siti Baitul Mukarromah <sup>1</sup> , Hardhono Susanto <sup>2</sup> , Ign. Riwanto <sup>2</sup> , Tandiyo Rahayu <sup>1</sup> , Chia-Hua Kuo <sup>3</sup> , <sup>1</sup> Semarang State University, <sup>2</sup> Diponegoro University, <sup>3</sup> Taipe Physical College Taiwan .....	385
<b>Food Security and Nutritional Status of Under The Age of Five Children in Low Income Family in Sukarame Tasikmalaya</b> Lilik Hidayanti <sup>1</sup> , Sri Maywati <sup>1</sup> , <sup>1</sup> University of Siliwangi .....	394
<b>Effects of High Protein Diets on Body Mass Index, Percentage Body Fat and Muscle Strength and Speed</b> Anies Setiowati <sup>1</sup> , <sup>1</sup> Semarang State University .....	401
<b>Correlation of Food Consumption Containing Sucrose With The Incidence of Dental Caries On 11-12 Years Old Children (Research of SD Bandarjo 1 Ungaran Students)</b> Endah Aryati <sup>1</sup> , Denny Setyo Kusdiantoro <sup>2</sup> , Diyah Fatmasari <sup>1</sup> , Ani Subekti <sup>1</sup> , <sup>1</sup> Semarang Health Polytechnic, <sup>2</sup> Sultan Agung University Semarang .....	413
<b>Playing as a Means to Develop Movement Skills and Physical Fitness of Preschool Children</b> Yudanto <sup>1</sup> , <sup>1</sup> Yogyakarta State University .....	421
<b>Behavior and Motivation Aerobic Gymnastics Mother</b> Isti Mulyawati <sup>1</sup> , Ranu Baskora Aji Putra <sup>1</sup> , <sup>1</sup> Semarang State University .....	428
<b>Total Number of Bacteria and The Acceptance of Chicken Nugget With Galangal Addition</b> Ika Ella Fitriyana <sup>1</sup> , Galuh Nita Prameswari <sup>1</sup> , <sup>1</sup> Semarang State University .....	436
<b>Physical Fitness and Asthma</b> Hanik Liskustyawati <sup>1</sup> , Imran Agus Nurali <sup>2</sup> , <sup>1</sup> Sebelas Maret University, <sup>2</sup> Indonesian Sport Medicine Association .....	442
<b>Effect on Quality of Life Gymnastics Postpartum Mother in Normal Postpartum Hospital City Semarang</b> Heny Prasetyorini <sup>1</sup> , Nuring Pangastuti <sup>2</sup> , Wenny Artanty Nisman <sup>1</sup> , <sup>1</sup> Gadjah Mada University, <sup>2</sup> Sardjito Hospital .....	449
<b>The Relationship Between Prepregnancy BMI and Weight Gain During Pregnancy with Low Birth Weight Incident in The Working Area of Cirebon City Health Office in 2014</b> S.A. Nugraheni <sup>1</sup> , Sheila Mahardini <sup>1</sup> , <sup>1</sup> Diponegoro University .....	460
<b>Outbound Game Models as an Extracurricular Material Development of "Penjasorkes" in Primary School</b> Niken Fatimah, <sup>1</sup> Diponegoro University .....	465



<b><i>Physical Fitness as A Potential Modality Elderly Pilgrims in Fulfilling Our Worship in The Holy Land of Mecca</i></b> Yudik Prasetyo <sup>1</sup> , Muchsin Doewes <sup>1</sup> , Noer Rahma <sup>1</sup> , Sapja Anantanyu <sup>1</sup> , <sup>1</sup> Yogyakarta State University .....	474
<b><i>Effectiveness of Nutrition Counseling to Improve Knowledge, Attitude and Mother's Feeding Practices among Malnutrition Children</i></b> Etika Ratna Noer, Desi Sofiyana <sup>1</sup> , <sup>1</sup> Diponegoro University .....	480
<b><i>The Importance of Physical Exercise of Competition Periode</i></b> Devi Tirtawirya <sup>1</sup> , <sup>1</sup> Yogyakarta State University .....	489
<b><i>The Standardization Urgency of Martial Arts Kicking Technique for Beginner Fighter on The Match Category</i></b> Awan Hariono <sup>1</sup> , <sup>1</sup> Yogyakarta State University .....	494
 <b>THE MAKING OF PUBLIC HEALTH DECISION</b>	
<b><i>Factors Affecting the Participation of Independent Workers in National Health Insurance (JKN) at Outpatient Unit, Semarang Hospital</i></b> Indriati <sup>1</sup> , Mugi Hartoyo <sup>1</sup> , Sri Widiyati <sup>1</sup> , <sup>1</sup> Semarang Health Polytechnic .....	509
<b><i>A Study on The Quality of Health Services to Hospital Patients in The Assisting Hospital 07.08.06 Polewali Mandar West Sulawesi 2010</i></b> Patmawati <sup>1</sup> , Umar Wirahadi Kusuma <sup>1</sup> , <sup>1</sup> Al Asyariah Mandar University .....	517
<b><i>Implementation Evaluation of Provider Initiated HIV Testing and Counseling (PITC): A Case Study at Balai Besar Kesehatan Paru Masyarakat (BBKPM) Surakarta</i></b> Julia Pertiwi <sup>1</sup> , Intan Zainafree <sup>1</sup> , <sup>1</sup> Semarang State University .....	521
<b><i>Companie's Perception about BPJS in Health Insurance Implementation for Worker at Medan</i></b> Eka Lestari Mahyuni <sup>1</sup> , <sup>1</sup> Sumatera Utara University .....	531
<b><i>The Role and Impact of Traditional Health Services in Indonesia</i></b> Rindra Eriska Hidayat <sup>1</sup> , <sup>1</sup> University of Indonesia .....	536
<b><i>Midwife Duties in Stand by Village Related to Authority by Kepmenkes No 900/Menkes/SK/VII/2002 about Midwife Registration and Practice (Case Study in Tuntang District Semarang Regency)</i></b> Ambar Dwi Erawati <sup>1</sup> , <sup>1</sup> STIKES Widya Husada .....	542
<b><i>Budgeting Participation : A Solution for BPJS Kesehatan Deficits which Represent Budgetary Slack</i></b> Nugroho Wisnu Murti <sup>1</sup> , <sup>1</sup> STIE AUB Surakarta .....	548

<b><i>Performance and Competence Analysis to Dental Nurse Reorientation (Studies on Dental Nurse Performance and Competence in Puskesmas of Central Java)</i></b> Bedjo Santoso <sup>1</sup> , Hari Kusnanto <sup>2</sup> , Al Supartinah <sup>2</sup> , Niken Sriyono <sup>2</sup> <sup>1</sup> Semarang Health Polytechnic, <sup>2</sup> Gadjah Mada University .....	553
<b><i>Intensification Strategy of Mother Class: Efforts to Reduce Maternal Mortality Through Early Detection and Awareness-Raising of The Target Group in Blacanan Village Pekalongan District</i></b> Rr. Vita Nur Latif <sup>1</sup> , <sup>1</sup> Pekalongan University .....	564
<b><i>Qualitative Study of Maternal Mortality in JAMPERSAL Financing Era</i></b> Dewi Sari Rochmayani <sup>1</sup> , <sup>1</sup> STIKES Widya Husada.....	567
<b><i>Description of Knowledge and Perceptions of Family Planning Methods IUD in Non-IUD Acceptors in Gunungpati Subdistrict, Semarang District</i></b> Fitri Indrawati <sup>1</sup> , <sup>1</sup> Semarang State University .....	574
<b><i>Single Server Queuing Model for Outpatients at The RSUD Toto Bone Bolango of Gorontalo Province</i></b> Herlina Jusuf <sup>1</sup> , <sup>1</sup> Gorontalo State University .....	580

## POSTER PRESENTATION

<b><i>Differences of Knowledge and Attitudes Public Health Students of Diponegoro University Before and After Intervention Module Integrity of Anti-Corruption in The Health Sector</i></b> Yulia Septi Damayanti <sup>1</sup> , Septo Pawelas Arso <sup>1</sup> , Sutopo Patria Jati <sup>1</sup> , <sup>1</sup> Diponegoro University .....	589
<b><i>Application of Software Interactive Education Media in Improving Dental Health Knowledge of Children</i></b> Ani Subekti <sup>1</sup> , Subinarto <sup>1</sup> , Bambang Sutomo <sup>1</sup> , Endah Aryati Ekoningtyas <sup>1</sup> , <sup>1</sup> Semarang Health Polytechnic .....	597
<b><i>The Effect of Nursing Care Quality to Patient Satisfaction in Inpatient Unit</i></b> Indriati <sup>1</sup> , Sugiarto <sup>2</sup> , Wahyu Hidayati <sup>2</sup> , <sup>1</sup> Semarang Health Polytechnic, <sup>2</sup> Diponegoro University .....	605





**ORAL  
PRESENTATIONS**

**SPORT AND NUTRITION BASED RESEARCH  
PAPERS**



**THE STANDARDIZATION URGENCY OF MARTIAL ARTS KICKING TECHNIQUE FOR  
BEGINNER FIGHTER ON THE MATCH CATEGORY  
(Perspective of Sport Biomechanic)**

**Awan Hariono**

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**Abstract**

There are some technique of kicking, first stage and last stage. First stage include take off, forward and impact, the last stage are backward and readiness. The problem that is faced by the trainer is the complexity of the movements in kicking technique, especially for the beginner fighter. The problem is caused by there is no technical based for the movements, it means that the movements are basically come from the culture or athlete's experience.

Generally, the common mistakes in kicking technique of martial arts lies on torso position, hip, knee and footing. Those mistakes happened because the trainer does not know the clear standard for the movements. The effectiveness of the kicking technique become valuable on the scoring system and ignore the efficiency of the movements. The subjectivity on the scoring are still very dominant. The arrangement of the techniques should be arrange so the beginner fighter will be easier to master the technique itself. The arrangement should be based on the science and technology estándar, it will help the trainer to learn and teach their students. Therefore, the movements of kicking technique are done in the rythm eksplosive movements to reduce the common mistakes when kicking.

**Keywords** : Standardization, kicking, match category, beginner fighter.

**Introduction**

Basic principles of martial arts sparring category is to attack, counter attack and either dropping technique using the arm or leg on a target which has been determined to get as many points. In order to gain points with attack and counter attack, as far as possible into the target area and not blocked by the opponent defense. To be able to carry out attacks and defense the mastery of motor skills basic techniques of martial arts that are urgently needed. The basic techniques in martial arts include: (1) the horses; (2) the attitude of pairs; (3) the pattern of steps; (4) belaan techniques (defense and evasion); (5) attack techniques (punches, and kicks sikuan); (6) technical dings / dropping (Kotot, 2003).

In the martial arts sparring category, not all movements basic techniques taught in the exercises can be used to obtain the value during the game. However, all the basic techniques of motion still needs to be taught because it has relevance to the development of motion other techniques. The motion of the basic techniques that can be used to obtain the value is the technique of punch, kick techniques, and techniques fallout (kickback). For novice fighter was not



possible three techniques are taught simultaneously, but taught sequentially based on priorities usefulness of each technique.

Kick technique is an attempt or process performed by using either defend or attack by using the legs to gain as much score as long as the game progresses. Kick technique is often used as the main weapon to attack and defend to get the score in the match. Given its importance, the implementation kick technique in a match must be effective and efficient.

During the match, the effectiveness and efficiency of the technique can be seen from the kick towards goal (impact) and the effect of the results of impact. That is, kick technique that can generate score in the game is the kick technique included in field goal defense unhindered by using power (causing loud noise) and kicks that can change the position of the opponent. But in fact, differences in perceptions and viewpoints of the judge to kick technique that uses the power often result in a different assessment. Thus, the hardness of sounds and effects after the impact of kick techniques when the target can be used as an indicator that the kick is done already using the power. To that end, in addition to the necessary ability biomotor good also needed the ability to do good movement and correct technique.

The process of studying the kick techniques need to be considered carefully in its implementation. The coach has an important role in providing the correct motion technique to train children. In order to get the effective and efficient learning, they must be accompanied by guidance and evaluation of the mistakes made and notified ways of doing the right moves. Thus the child is always under controlled circumstances and in the minds of children trained to have an idea of motion-kick technique to be performed.

Good mastery of the technique will affect on the level of energy efficiency for the fighters, so as to perform the activity repeated in quite a long time without experiencing physical exhaustion and psychological. In addition, the fighter who mastered the technique properly can minimize the possibility of injury either during training or competing, because every sequence of motion can be carried out by fighters anatomically on the axis and field gestures. Good mastery of the technique will also facilitate fighter in developing techniques to support the appearance of emergency at a higher level. This is in accordance with the opinion of Bompa and Haff (2009), which states that the correct technique has a very high level of efficiency (good techniques = high efficiency). The ability to perform the correct movement in every technique shown during practice and games is very important for any fighter, in addition must be based on the needs of the energy required, the rhythm of motion, the duration of the motion carried and the amount of load received by the muscles and joints as well as anatomical whether or not the motion is carried.

In fact, it is rarely found that a martial arts coach justifies the techniques during the training process. Most coaches only give the material through demonstrations or just giving an example based on the ability of the coach. That is, the learning process tends to be done in the classical so that individual principles are not applied during the training process. As a result many children who have motion training technique is not perfect though trained from an early age. In addition, the



trainer obsessions impose training children to attend the match although not perfect mastery of the technique of motion is a problem that during this need attention in the process of practicing martial arts training. Therefore, it causes a fighter can not do motion techniques effectively and efficiently during the match, and hampering the achievement.

At the time of kick techniques, there are several steps that must be carried out movements starting from the initial attitude (pairs), implementation (take off, forward, and impact), and the attitude of the end (backward and ready stance). See the complexity of the movement should be done at the time of kick techniques, is one of the problems that have become obstacles for trainers in delivering learning to the fighters, especially for novice fighters. This is due to the lack of reference in the implementation of each phase of motion kick technique that is based on science and technology. That is, the learning process has a tendency based on the hereditary at each university or coach experience when they became an athlete.

In general, errors that often occur during the kick technique in martial arts is in the direction of view, the position of togok, hips, knees, and feet fulcrum. This happens because the coaches do not yet have clear standards for the implementation of motion-kick technique of attitude beginning to end manner. That is, an assessment of the results of the kick techniques based only on the effectiveness of the action performed during the game so it ignores the values of the efficiency of motion

Efforts to improve the quality of martial arts kick technique in sparring category can be obtained by improving the quality of learning and training and assessment. Both are interlinked with each other, because of good teaching will produce good judgment. Further, good judgment will encourage coaches to determine the program, strategy and a good learning approach and increase the motivation of fighters to learn better. Therefore, during the training process the coach plays a very decisive in order to master the technique with good fighters, the coach needs to have knowledge of the elements of motion of the branch of specialization and is able to describe each technique properly and clearly to be easily understood by fighters. For the coach, they must make observations, analysis, and evaluation of each movement displayed by the fighters in order to know the extent to which the results of the exercises that have been carried out and the impact of the results of the exercise has been done (feedback). As stated by Wilkinson (2000) "*... the challenge of preparing your-self (coach or teacher) to Observe performances in order to give feedback to the learner ...*".

Coaches also need to have the ability and skills when delivering training materials taking into account the player's ability and level of difficulty of the training materials will be provided. During the training process progresses, the coach should be able to inventory the mistakes made by the players as the evaluation material either individually or in groups so as to facilitate the coach to make any corrections to the mistakes made by the players. For that coaches should understand the keys of motion of all techniques trained based on sport biomechanics knowledge to analyze the motion carefully and precisely and able to perform a systematic approach.



During this assessment of the level of mobility fighters kick technique, it is based only on observations of the coach during the training process of training takes place. As a result, the element of subjectivity in determining the standard of truth motion technique performed by fighters are still very dominant. For that, it needs to standardize the implementation of each motion drafted kick technique so as to facilitate and accelerate the training of children to master. The standardization of the implementation of motion-kick technique that is based on science and technology is expected to facilitate trainers in delivering the learning process. Therefore, movements in martial arts, particularly kick technique carried out with an explosive rhythm of movement, so it does not seem to be clearly errors during a kick technique.

In the martial arts there are many different types of kick techniques taught in training, including: kick scoundrel, *jejag* kick, side kick, rear kick, swivel kick, *kepret* kick, *celorong* kick, and *dengkulan*. Not all of the kick variety techniques can be used effectively in the match. For that we need to identify the kind of technique that can be used in martial arts sparring category, so that the training process can take place more efficiently.

Results of the observation of several national and international events from 2010 through 2014 via videotape, demonstrate that the kick technique used in martial arts sparring category is the front kick, crescent kick, side kick (T), and kick back. Thus, not all kicks are taught at school of martial arts can be used in martial arts sparring category. To that end, the need for standardization of the implementation of motion-kick technique used in martial arts sparring category, which is based on the study of science and technology, especially for novice fighters. Standardization of motion kicks in martial arts techniques are expected to provide a clear picture for coaches in the learning process, so that the ultimate goal of any training program can be evaluated the level of success and provide benefits for the next coaching. Moreover, standardization can be useful for the coach kick in providing training for novice fighters, and can be used as a yardstick for coaches in making judgments relating to the mastery of basic techniques kick well and properly.

## Discussion

### Standardization Definition

The standard is derived from Old French, which means point gathering place, in Old English is a combination word meaning standan which means stand and or (also Old English) means that the next point is absorbed in the English language as a standard word (Introduction to Standardization, 2009). The standard is a technical specification or something standardized including procedure and method which is based on consensus of all parties concerned with the terms and conditions of safety, security, health, environment, development of science and technology, and experience, development of present and future will come to benefit as much as possible (Government Regulation, 2000).

The ISO (International Organization for Standardization) gives the standard limit as .... a document, established by consensus and approved by a Recognized body, that Provides, for



common and repeated use, rules, guidelines or characteristics for activities or Reviews their results, Aimed at the achievement of the optimum degree of order in a given context ". In addition, the standards should be based on the results of science technology and experience that has been consolidated with the objective of optimum community benefits increase (ISO / IEC, 2004). Starting from the standard words, it appears the word standardization that has a meaning as a process to formulate, establish, implement and revise standards implemented in an orderly manner through cooperation with all stakeholders (Government Regulation, 2000).

Basically, the standard serves as a guide or benchmark and often only applied to the important aspects of a product or process so that the user can adjust. Although the standard only covers a small part of the scientific and technical information, but it can not be denied that the lack of standardization has its advantages such as saving time, money, and energy. This is consistent with the description of the book "The aims and principles of Standardization" published by the ISO, that the purpose of standardization among which are: 1) suitability for a particular use (fitness for purpose), 2) Being able to exchange (interchangeability), 3) Control diversity (variety reduction), 4) Compatibility (compatibility), 5) Increase the resources empowerment, 6) communication and a better understanding, 7) Maintaining the security, safety and health, 8) Protecting the environment, 9) To ensure the interests of consumers and society , 10) Reduce barriers to trade. Based on the definition and standardization purposes above it shows that the implementation of motion-kick technique in martial arts sparring category also need to have clear standards. With the standardization of the implementation of motion-kick technique, it can facilitate the movement of fighters beginners in learning the techniques. In addition to the standardization kick technique can facilitate the movement of coaches in making an objective assessment of the ability of motion fighter kick technique.

### **Kicking Techniques in Martial Arts at Sparring Category**

Martial arts sparring category is a category that featured two (2) people fighters from different angles, both facing each other using the techniques of defense and attack, such as punches, kicks, blocks, dodgery, catch and falling against the opponent; using the techniques and tactics to compete, stamina and high morale, using the rules by leveraging the wealth of techniques and tactics (Persilat, 2012). Attack techniques in martial arts sparring category can be done by using punches, kicks, and dings. Agung Nugroho research results (2005), shows that the percentage of the types of techniques used fighter during the game (3 innings) in order are as follows: (1) 44% kick techniques, (2) stroke technique by 33%, (3 ) dropping technique with a catch of 14%, (4) techniques dropping by 5%, (5) with a kick technique belaan by 3%, and (6) with a punch technique belaan 1%. Thus kick a dominant martial arts techniques was used during the game.

Kick technique is an attempt or process performed by using either defend or attack by their legs to earn as much as possible during the game. In addition, a kick can be defined as an attack carried out by using the legs and feet as a component of the attacker. In the martial arts sparring



category, kick technique is often used as the main weapon to attack and survive to get score. The score obtained through the technique of kicks is 2 or 1 + 2. Two points of score obtained when a fighter can perform kicks and get in on specific targets using power. While the vscore of 1 + 2 obtained when a fighter can do evasion, dodgery, or subsequent defense can conduct counter (reply) by using the technique of kicks and enter the desired target using the power (Persilat, 2012). In addition, a kick technique can also obtain a score of 3 when a fighter can perform kicks techniques on the target, resulting in a fall opponent in the arena.

In the martial arts sparring category, a fighter who has a good kick technique will have many advantages on the pitch. Although the technique of kicks as important as stroke technique, the kick has greater power than the force of the blow. In addition, the legs have a longer range than the sleeve so that it would be beneficial if used to carry out attacks. Given the magnitude of benefit during the game, then kick technique is very important to teach in fighters sparring category. To that end, in order to kick technique can be done effectively and efficiently, the coaches and fighters need to know and understand each characteristic of kick technique to be learned and taught.

Johansyah (2004) classifies kick technique in several types, including: a straight kick, stab kick, *kepret* kick, *jejag* kick, scoundrel kick, T kick, *celorong* kick, back kick, kick horse, spurs kicks, crescent kick, kick baling, under kicks, and *gejig* kicks. Meanwhile, Agung Nugroho (2001) divides kick into 4 types based on the leg hit with goals, namely: 1) the front kick, the kick is using your back, palms, soles of the tip and heel of the foot; 2) side kick (T), is a kick using the legs, feet and heels; 3) Kick back, is done by way of kick backs opponent and use your foot and heel of the foot at the time of impact; and 4) Kick arc (sickle), is a kick with the back, the rear end of the arc foot using the heel of the foot.

### **Application of the Principles of Biomechanics On Kick Techniques**

Each motion activity will always involve muscle contractions in an attempt to obtain a force to move the limbs, moving the equipment used and the opponents get it difficult to maintain a balance so difficult to adjust the position of the body in the field. An athlete who can not maintain balance during sports activities will have difficulties to obtain the efficiency and effectiveness of motion, even can get injured during the activity. It is necessary for the ability of a coach to analyze each movement performed and equipment used by athletes pertaining to the laws of mechanics such as gravity, inertia, mass and acceleration, balance, leverage, force, impulse and momentum as well as action and reaction. Given the importance of understanding the laws of mechanics for sports coaches in an attempt to analyze and improve the skills, the knowledge of sports biomechanics need to be mastered by all coaches and sports trainers.

Biomechanics is the study of internal and external force acting on the human body as well as the effects caused by the force in sports activities and training (Hamill and Knutzen, 2009). Additionally, biomechanics can be interpreted as an assessment that uses the concept of mechanics and machine to efficiently express human motion (Nordin 2012). The definition



suggests that exercise biomechanics can be interpreted as a study of internal and external force acting on the human body and the effects produced by the force in the sport activity.

On the sports activities, knowledge of biomechanics has enormous benefits for a coach to resolve the problems that are directly related to the objective conditions in the field. Through knowledge of biomechanics, the trainer can examine and put the motion as the main element in sport. In addition, by understanding the biomechanics, it is expected to further facilitate the trainer coaches in an effort to: 1) analyze the technique properly and carefully, 2) develop new techniques, 3) selecting appropriate equipment, and 4) improve the appearance (Payton and Bartlett, 2008).

Implementation of motion-kick technique in martial arts is a combination of a complex series of movements that must be done quickly and simultaneously. This resulted in a kick technique is relatively difficult to do, especially for novice fighters. For that the motion train-kick technique should be done gradually from easy to difficult and from a simple movement to the movement of the complex. That is, the ability of coaches to analyze each movement techniques are very necessary so that the learning process which is carried out is not difficult for the fighter in developing motion-kick technique. Thus the training process can take place effectively and efficiently.

One advantage of a coach who understands the science of biomechanics is, they can be more confident in providing exercises, because it can determine the efficiency of each motion technique will be taught. Thus the coach in teaching skills motion techniques are not only based on the experience gained during an athlete, but can choose the method that is more appropriate based on scientific reasons why the motion should be done. This is in accordance with the opinion of McGinnis (2005) which states that: *"an analysis of technique deficiencies of an athlete can assist the coach or teacher in identifying the type of training of the athlete requires to improve"*.

An understanding of the principles of biomechanics are applied to the structure and function of the human body, it is very important for sports coaches to get way-the most effective way to reduce the likelihood of sports injuries. Although injuries in sports activities is difficult to avoid, but basically can be reduced through improved design tools and sports facilities, improvement and maintenance of appropriate physical conditions and improving the quality of training processes associated with basic concepts such as biomechanics, style, impact, kinetic energy, reflection, balance and range of movement of each joint. Zatsiorsky (2000) states *"... the seven factors combine to Determine the nature and severity of injury, These are: the magnitude (how much force is applied?), Location, direction, duration, frequency, and rate variability"*.

Although the discovery of the technique in the field of sport was originally based on the effort of *"trial and error"*, but the reality on the ground shows that the development of new techniques in the world of sport is always in line with the theories of motion. That is, that the change and development of the technique of motion is always based on the efficiency and effectiveness of motion that are tailored to the rules, safety, aesthetics, as well as tools and



facilities owned. McGinnis (2005) states that: *"eachers and coaches may use qualitative biomechanical analysis methods in their everyday teaching and coaching to Affect changes in techniques"*. The further opinion reinforces that the use of biomechanical analysis of qualitative methods in teaching and coaching will make it easier for teachers and trainers in order to transform and develop the techniques taught motion.

The success of an athlete in motion to show the skills are not solely influenced by a mastery of technique that is based on knowledge and analysis of biomechanics. Accuracy in the application of strategies, courage in deciding any motion to be carried, and the accuracy of the implementation were directly related to experiences and models of practice also greatly affect the appearance of an athlete. However, athletes who understand the laws of mechanics will be easier to learn and master the skills that can be trained and allow for faster movement and better fit with the quantity and quality of exercise (Bartlett, 2007). Further, More in Hughes and Franks (2008) states *"A primary function of every coach is to provide athletes with the opportunity to acquire, refine and learn skills that will produce a successful performance in competition"*. That is, the primary function of any coach is to provide athletes with the opportunity to acquire, improve and learn skills that will result in successful performance in the competition.

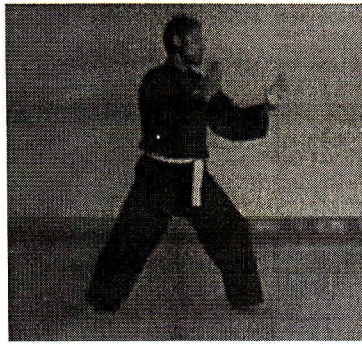
In the martial arts sparring category, the success of the kick is determined by fighter's ability to perform a series of movements simultaneously. To that end, coaches and fighters must have the ability to identify and analyze every stage motion kick technique to be carried out. The stages range of motion of the kick techniques, namely: the initial attitude (attitude pairs), execution (implementation), and the attitude of late.

### **1. Initial Attitde**

Initial attitude in martial arts sport is often referred to as a gesture of pairs. Initial attitudes (post) is the basic attitude to do every movement techniques in martial arts. Agung Nugroho (2001), defines the attitude of post as a standby attitude to defend or attack patterns and performed at the beginning and end of the range of motion. Moreover, the attitude of pairs can also be interpreted as a gesture of tactics to face an opponent that is patterned attack or welcoming (Johansyah, 2004).

In the martial arts, there are various attitudes pairs are often used both in training and matches. To make the perception of the attitudes pairs, PB IPSI standardize motion pairs attitude into: 1) the attitude of the pair; 2) the attitude of pairs of two; 3) the attitude of the three pairs; 4) The attitude of pairs of four; 5) five pairs of attitude; 6) six pairs attitude; 7) attitude post seven; and 8) the attitude of pairs of eight. Based on a review of biomechanics of sports, eight pairs of attitude has a different function for each motion-kick technique performed by fighters. For example, the attitude of pairs of the most efficient to do a kick forward is the attitude of the pairs one. Therefore, the attitude of the plug has a shorter track distance and location of the pivot foot is in a straight line, it would be more efficient when applied to front-kick technique.





Picture 1. Initial attitude 1 (Private doc., 2015)

## 2. Executing (*Implementation*)

Judging from the movements are performed, the implementation phase can be divided into three series of motion, namely: a time before the take-off, forward, and against targets (impact). The success kicks in martial arts sparring category is determined at the implementation stage. To that end, the implementation phase should be done properly so that efficiency of motion can be obtained. The factors that affect the efficiency of motion at the implementation stage, among them: 1) predominant leg muscle performance, 2) the trajectory kick, 3) the movement of the hips, 4) position togok and head, 5) the position of the arm, and 6) impact (hitting the target with feet).

## 3. The End (Last) Attitude

The attitude of the end of the motion kick technique is divided in two series of motion, i.e backward and ready stance. On motion of the kick techniques, there is no further movement (follow through) due to a muscle contraction concentric and eccentric. In addition, the movement of kicks in training processes are cyclic, so often happens repetitions same movement. At the end of the motion attitude kick technique, the analysis preferably on foot positioning fulcrum and the point of weight. Point weight greatly affects the balance after a shot fighter, due to outside influences that can lead to weight loss point of fighters positioned outside the body. If after a shot fighter can not maintain the level of balance, it will result that the fighters will have difficulty in doing the next movement. Imam Hidayat (1999) states that an object or a person in an unstable equilibrium, if the object or the person is under the influence of the outside (little effect) equilibrium will be lost or fall.

Seeing the performance of motion-kick technique, of attitude from beginning to end manner, it is showing that each stage of motion is influenced by internal and external forces acting on a fighter's body. That is, the principles of mechanics greatly affect the performance of the fighters at the time of the motion-kick technique. As for the mechanics principles that can affect performance in a martial arts kick technique, including: acceleration, balance, leverage, force, and momentum.



### 1. Acceleration

Application of acceleration at the time of the kick is determined by: 1) the initial acceleration shortly after take-off, 2) forces are used to kick, 3) the time when the power is generated, and 4) the length of the leg. Pecepatan is the change in velocity per one unit in a certain time. Acceleration in technique occurs when the foot fulcrum kick starts take-off until the moment before impact. Acceleration is done to obtain additional force to increase the magnitude of the momentum in the event of impact with the target.

### 2. Location of Center Gravity and Balance

At the time side kick, the location of the center of gravity of the body will change in every stage of implementation in accordance with the attitude and will affect the movement technique performed. The lower the location of the center of gravity of the body, the more balanced and stable, but will require a larger force to initiate movement. Kicks in this study is the kick technique that is used to attack that requires a high speed in order to avoid a difficult opponent. Besides the implementation of the kick motion technique requires a series of movements that must be carried out simultaneously, namely of movement stepped up to whip the feet at the target as well as to the attitude pairs. To that end, the balance of the required level fighter at the time of kick techniques motion is unstable equilibrium.

Movement on the step and swing leg kick technique implementation is crucial outcome of kick techniques. The sooner the measures taken will further facilitate the movement of fighters kick. Therefore, emphasis on field abutting is one of the keys to success in the implementation of the kick. Thus, a good balance of capability required for the fighters in order to maintain body position and no trouble for the next movement.

The level of balance in the implementation of motion-kick technique is very determined by the pose readiness conducted by the fighters. For that amount the flexi of the knee pivot foot at the implementation stage will give effect to the equilibrium level fighter at each stage of the movement.

### 2. Levers

Levers are used to gain mechanical advantage, where a small force applied would be changed to address and lift a considerable burden. The longer the swinging arm, the faster acceleration will be got. The application of the technique kick lever is when a fighter taking off, and impact on the target. The placement of the feet and legs swing as a fulcrum lever has a considerable influence on the outcome kicks performed by fighters.

### 3. Force

Force is a quantity that has direction then classified in the vector magnitude. Newton's first law states that "If the resultant force acting on the object zero then the object will move straight stationary or regularly". At the kick implementation techniques, fighters with high and great posture will give greater force to the target at the time of impact. With great posture so that the force generated body will be greater. Besides the magnitude of the force is also influenced by the speed used. The higher the speed, the greater the force applied at the time of movement.



#### 4. Momentum

Momentum is the product of the mass with velocity. The amount of momentum will affect the two objects collide, thus greatly affecting the implementation of motion momentum kick technique in martial arts sparring category. On the implementation of motion-kick technique, style is done in the direction of motion so that the body mass and velocity of motion when performing the technique will determine the amount of momentum in the implementation of the kick.

#### Closing

Type kick in martial arts is very diverse, including: a scoundrel kick, *jejag* kick, side kick, back kick, kick around, *kepret* kick, *celorong* kick, and *dengkulan*. The kick of a variety of techniques, not all can be effectively used in martial arts sparring category. Observations show that only four kicks used in martial arts sparring categories, namely: front kicks, crescent kick, side kick or a "T", and kick back.

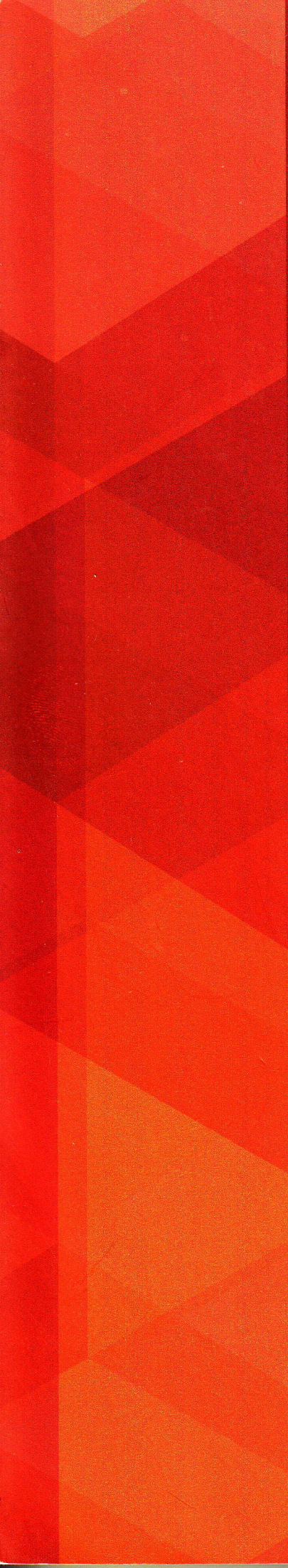
At the time of kick techniques, there are several steps that must be carried out in the movements starting from the initial attitude (pairs), implementation (take off, forward, and impact), and the attitude of the end (backward and ready stance). Seeing the complexity of the movement should be done at the time of kick techniques, it is one of the problems that have become obstacles for trainers in delivering learning to the fighters, especially for novice fighters. This is due to the lack of reference in the implementation of each phase of motion kick technique that is based on science and technology. That is, the learning process has a tendency based on the hereditary at each university or coach experience when an athlete. For that we need for standardization of the technique of motion kicks in martial arts sparring category, especially for novice fighter, we can use some theories based on the study of sports biomechanics. Therefore, standardization is based on the study of science and technology will facilitate athletes in studying and developing motion-kick technique so that the exercise can be optimized. In addition to the standardization kick technique can facilitate the movement of coaches in making an objective assessment of motor skills kick technique fighter

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