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physical edu & sports science

contents

Editorial

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National Institute of Education

A QUOTE by Greek philosopher Plato around 2,500 years ago describes the importance of Physical Education (PE). “Lack of activity destroys the good condition of every human being while movement and methodological physical exercise save it and preserve it”. Sports or physical activity as a way of life was an integral aspect of society in ancient civilizations.

Sporting events, like the Olympic Games, were held high in importance as they believed that the mind, body and soul had to be in sync in order for one to live up to one’s fullest potential. Athletes performed to their utmost capabilities during the Olympics. Participation also brings in the aspect of moral virtue and values.

The idea of sports and excellence has been passed down many generations with international athletes emulating the Olympics motto: Citius, Altius, Fortius (Higher, Faster, Stronger). Having the genesis of sports in mind, the importance of PE has been on the rise. PE has become an elementary foundation for most children and even adults in many countries, including Singapore. It tends to develop motor and games skills and the knowledge and attitude to pursue and enjoy a physically active and healthy lifestyle.

PE is now the basis of excellence in most sports. It has also contributed to the general health of students by improving or maintaining their physical fitness and reducing the risk of cardiovascular diseases in the future. PE and its important role in Singapore schools now live up to the motto of a Roman poet Juvenal: “A healthy mind in a healthy body”.

Sports Science is a discipline that develops a greater understanding on how the human body works during exercise which includes physiology, anatomy, psychology, biomechanics and biochemistry. The genesis of sports science was sparked by the desire for humans to boost their athletic performance. Galen, a prominent Greek physician in AD 129, influenced the development of sports science about improving health, aerobic fitness and strengthening muscles. Plato largely influenced Galen’s beliefs and this was integrated with his knowledge of sports science, mainly focusing on physiology and anatomy.

Thus, the amalgamation of PE and sports science has been emphasized very early on in human civilization and it has gained popularity over the years as an aspiration to enhance human performance and health.

The Physical Education and Sports Science (PESS) Academic Group at NIE are committed to ensuring the excellence in the amalgamation of PE and sports science. Student teachers are exposed holistically to the art and science of PE. Our talented professors facilitates them with the latest knowledge in sports science, sports studies and sports pedagogy, instilling sound values and positive attitudes in them.

In retrospect, PE is clearly vital to an individual’s overall physical health and mental well-being. Similarly to the Greeks whose foresight into physical activity was ground-breaking 2,500 years ago, we must remember to always work towards greatness so we may benefit mankind. In PESS, staff and students strive in the same direction to achieve their best for the PE and sports science in Singapore.

Enjoy reading this issue while keeping in mind that even in the discipline like PE and Sports Science, one has to “Know the past to move forward”. ■

ReEd (*Research in Education*) is a research bulletin aimed at sharing our research contributions with the global community. This is an initiative of the Office of Education Research at the National Institute of Education (NIE), Singapore.

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Re Motivating Regular Exercise

PROJECT TEAM

Principal Investigator John Wang, *National Institute of Education, Singapore*

MOBILE TECHNOLOGY is improving our lives tremendously. But as with all advances, some things have to give. As we are more connected with others and our work, there is less time to keep fit.

"It's actually a serious problem globally that many people are overweight or obese," says Professor John Wang.

He is looking into how to promote daily physical exercise by trying to get people motivated to do so.

"One of the main factors that is stopping people from doing exercise regularly is the lack of motivation," he says.

Motivating Needs From his research, John has found three fundamental needs that help motivate a person to do things. The first need is to feel that we are competent.

"Everybody seeks to show that they can do certain things. We all have this need to feel competent enough to produce a certain outcome—like running, jumping, throwing—and doing it the best you can."

To satisfy this need, John recommends a progressive set of achievable goals. "A lot of people just give up because they cannot achieve their own goals."

The second is the need for relatedness to a social group. "For example, if a child smiles, it makes the parent smile. This will, in turn, make the child smile more. Because of this feeling of attachment, people will want to do things. And they willingly do it."

The third need is to be able to make your own choices. "The more you force people to do something, the more difficult it is for you to get them to enjoy the activity," says John. "When they get a choice, they persist longer."

With these in mind, John is tirelessly working on how to motivate others to exercise more. In fact, he found that motivation can affect lives, especially his own.

Motivational Change John is particularly interested in this area. His own life was transformed because he was motivated to make things better for himself.

"Through effort, I think we can change a lot of things. I didn't do very well in my academic studies," he recalls. "But I discovered at a very early age, it is actually our own motivation that will result in whatever success we have."

In addition to motivation, people also need the mental capability to overcome obstacles, to re-focus on important goals, and maintain a high level of confidence.

"So when a person fails, he will go through a deeper thought process to analyse the reasons for failing, compared to when he wins. However, this will only happen when a person has the correct mind-set of not giving up."

Even though it's not easy to change behaviours to get others to exercise more, John is not about to get discouraged. Rather, it is fuelling his drive to further his research.

"It's very important for us to research more into what is the most effective way of getting people to exercise in the right way so they can gain health benefits," he says.

John is looking into how to get people more motivated to exercise regularly.

Learning More by Sitting Less

PROJECT TEAM

Principal Investigator Michael Chia, *National Institute of Education, Singapore*
Co-Principal Investigator Swarup Mukherjee, *National Institute of Education, Singapore*

OUR CONCERN about academic achievement is reasonable. And so is our hope that our children are healthy. Professor Michael Chia is making a stand to get kids to be more physically active, even when learning.

"We spend a lot of time on academic performance and that's good," he says. "But we need to strike a better balance."

A Healthy Combination Singapore schools have a good amount for Physical Education (PE) classes but Mike feels more can be done. He is heartened to see such efforts being done at Beacon Primary School.

Beacon not only integrates Health Education into their PE classes, but it also has a 5-day activity-based timetable. It recognizes the need to be physically fit as well as the need to have proper knowledge on how fitness leads to other healthy living benefits.

"The idea of PE is not just to get the pupils fit, but also to cultivate total health which has different facets beyond the physical," elaborates Mike. "So when one speaks of total health, it includes the social, mental and emotional health."

This increased number of PE classes may be a worry for parents that their children do not have enough study time. But Mike conducted a research showing that children with more exercise time did just as well as children with the normal timetable.

"If anything, the feedback from these pupils is that they are actually energized!"

Walking Tall Emergent research from the World Health Organization suggests that sitting is the new smoking, says Mike.

In their findings, they estimated that 5 million Americans die from smoking-related diseases. Even more worrisome, an estimated 5.3 million Americans die from sitting-related diseases, such as heart failures due to lack of exercise.

Monitoring student heart rates, Mike found that many children in Singapore do not get enough physical activity 90% of the time. During study time, children are sitting down and not moving much.

Mike hopes to see children learn academic, social and emotional resilience through sport and games.

In his 40-week research where he measured the number of steps Beacon pupils took, he also found that though they were more active during school time, they compensated for this by being less active at home.

"That tells us that human behaviour is very complex," says Mike. "We have to do a lot more."

Changing for the Better The research now is looking into how pupils' behaviour can change.

Mike tells us that in Scandinavian countries, children lead a physically active life after school. "But in Singapore, the outside school life can be very constructed—like enrichment classes or homework. It's still sedentary."

It is reassuring that he found there is no academic downside if children are more active. In fact, the more children are involved in physical activities, the more holistically they can develop.

"If we can get people to get involved with activities for the activity's sake, it'll help them socially and emotionally," he encourages.

Hopefully, this change will happen soon. ■

Ed Starting the Day Right

PROJECT TEAM

Principal Investigator Stephen Burns, *National Institute of Education, Singapore*
Co-Principal Investigator Masato Kawabata, *National Institute of Education, Singapore*
Collaborator Kerry Lee, *National Institute of Education, Singapore*

MOST PARENTS know the importance of breakfast and exercise for their children's physical well-being. But the effect on academic performance is not immediately clear to some.

There is good evidence that children who eat breakfast and exercise regularly do not just gain benefits to their health in terms of weight management or cardiovascular health, but they also perform better in schools, says Assistant Professor Stephen Burns.

Better Performance Stephen is conducting a study to examine the effect of breakfast and exercise on the academic and cognitive performance of students aged 15–18.

With today's focus on a more all-rounded and holistic education, this is an area of research which may spark off some interest among the education policymakers and parents.

"There seems to be an effect of breakfast on academic performance probably because feeling fuller allows one to concentrate better, and raised blood sugar levels from eating breakfast in turn improves brain functioning," says Stephen.

Besides breakfast, the effect of exercise on academic and cognitive performance can be rather telling too.

"Exercise stimulates certain areas of the brain to be more active, and certain types of exercise might even build pathways in the brain, particularly exercise that makes you think, and which involves coordination of the hands and legs in some way," shares Stephen.

Stephen is looking for the "perfect" start to a school day for students.

Power of Health For Stephen, the idea for this research was inspired by his daily travels to work and a keen eye for his surroundings.

"A lot of the motivation came by just sitting in the train in the morning to work," shares Stephen.

He observed that many students get up very early in the morning just to travel to school.

"I am just amazed," exclaimed Stephen. "A kid that is travelling at 6am must be travelling for about 2 hours to get to school."

In such cases, one must wonder whether the student has time to eat breakfast.

To Stephen, exercise also plays a major role. Previously, it was thought that exercise is not good for children's academic performance. But it is the opposite, he says. He's even a prime example of its benefits.

"When I come to work in the morning, I instinctively feel more alert when I have done my exercise, and that effect can last a couple of hours."

Reaching Out Stephen hopes that if the concept studied in his project eventually works out, it will impact the school curriculum and convince parents about the importance of breakfast and exercise.

He also believes in the benefit of introducing breakfast clubs in our schools, which is currently practised in some schools in the US.

"I hope to see practical action taken to change the current norms," shares Stephen, "whether it be seeing students walking to school rather than taking the bus, breakfast clubs implemented in our schools, or for schools to adopt half an hour exercises in the morning to kick start the day."

Through efforts like these, we can hope for a more energized Singapore in the future. ■

PROJECT TITLE Effect of Breakfast and Exercise on Academic and Cognitive Performance in Junior College Students
PROJECT NUMBER OER 1/13 SFB
START DATE Jan 2014

PROJECT NUMBER RI 9/13 GB
START DATE Mar 2014

PROJECT TITLE
Comparison of Cross-Modal OMNI Scale of Perceived Exertion at Ventilatory Breakpoint and Self-regulated Exercises in Male Adolescents in Singapore

Creating an Awareness for Safe Exercise

Re

PROJECT TEAM

Principal Investigator Govindasamy Balasekaran, *National Institute of Education, Singapore*
Co-Principal Investigator Dianna Thor, *National Institute of Education, Singapore*

Even in sports, we may ask our children, "How well did you do in the lesson?" But how often do we ask them, "How do you feel?"

It is an important question that a research team at NIE led by Associate Professor Govindasamy Balasekaran and Ms Dianna Thor is looking into.

Educating Athletes In most Physical Education (PE) classes, we are more focused on whether the kids can meet the lesson objectives. Conventional thinking says we need to train them hard in order to make them fit.

Bala says training is good, but training hard all the time may not be beneficial. It could well be dangerous for some.

"What we should remember is that in schools, we have to have safe regulations of exercises," he states. "We cannot just think harder is good."

As a former competitive runner who has won several distinguished international and local medals, Bala knows the importance of training safely.

"If you train at a high intensity all the time, you're going to injure yourself," he says. "We have to educate our kids in safe regulations of exercise."

Children Perceptions In order for schools to make sure their children are exercising at safe exercise intensities, they have to have a good lesson plan and good tools, like heart-rate monitors, to help.

These, however, may not take into account the subjective perceived levels of exertion the children really feel. Also, these tools can be financially taxing.

Dianna and Bala introduced a simple yet useful and cost-effective tool called the Rating of Perceived Exertion (RPE) Scale to two primary schools.

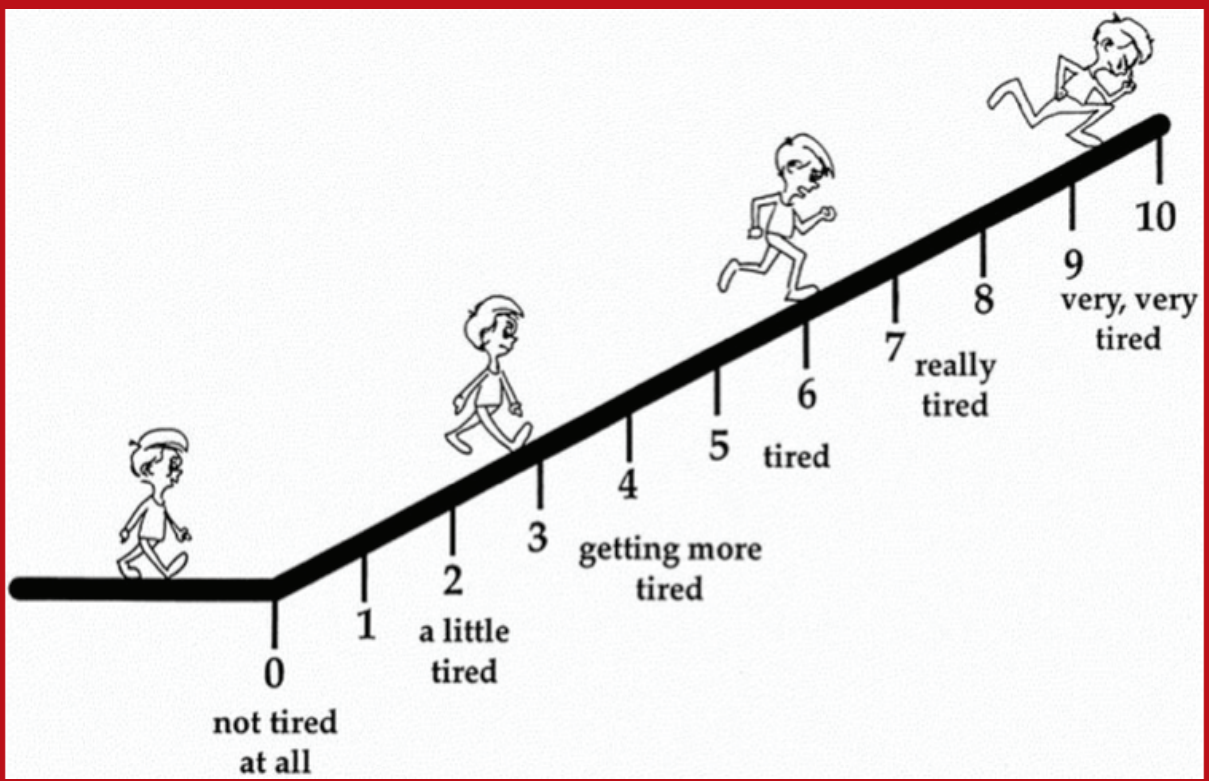

Figure 1. RPE Scale (Robertson et al. (2000). Children's OMNI Scale of Perceived Exertion for walking/running. *Medicine & Science in Sports & Exercise, 32*, 452–458).

Bala and Dianna want to create the awareness of safe training in our children.

"It charts the intensity of exercise," says Dianna, "and PE teachers can easily use this for children."

The RPE Scale is a 0 (not tired at all) to 10 (very, very tired) rating diagram where children point to the number that corresponds to how they feel after an exercise.

Dianna notes that children have different perceptions of how intense a training is and have different needs. An overweight child's RPE 4 may be another child's RPE 2.

Safe Training Children, particularly the obese, can benefit from using this scale, says Bala. "We don't want children to get any injuries or they will hate PE in the future."

"8 year olds onwards can use this scale effectively," says Dianna. "We want to introduce this into PE lessons here so they'll know how to exercise in a safe zone, which is a rating of 1 up to 6."

And asking for the child's perception of the intensity of the training is a good feedback for teachers.

"Knowing how my kids feel, I can control the intensity of the lesson accordingly," says Bala.

Moving Singaporeans As the first research group to validate the RPE Scale in Asia, the team has a lot to be proud of. They are breaking ground to include the feelings and feedback of the children rather than just following a prescribed method of becoming fit.

"The RPE is an important concept and the scale looks simple!" says Bala. "The application is easy and the scale has comical figures so it's just nice for children."

But the scale itself is just a tool. What the team is more concerned about is the knowledge of how to exercise safely. The concept that the RPE provides is an invaluable one.

"Hopefully, our PE teachers will be well-versed in this area and it'll be something of a common language used among PE teachers and students as well," says Dianna.

If we can instil into our youth the knowledge of how to train effectively and safely, future Singaporeans may try to keep fit on their own.

"Even if the scale is not used, at least they can have the knowledge of what intensity is," adds Bala. "Through the scale, they should know they don't need to train extremely hard every day, especially for health purposes. That will help them in the overall education of the students." ■

PROJECT TITLE A Randomised Controlled Trial on Non-specific Chronic Low Back Pain Management in Runners

PROJECT NUMBER RI 9/12 KPW

START DATE Apr 2013

Impacting the Health of Runners

PROJECT TEAM

Principal Investigator Veni Kong Pui Wah, *National Institute of Education, Singapore*

Collaborator Cai Congcong, *Alexandra Hospital, Singapore*

THE TRADITIONAL APPROACHES to lower back pain therapy focused on the back and core muscles.

Given the rise in the number of young runners between the ages 20 and 30 with lower back problems, Assistant Professor Veni Kong is keen to explore an alternative mode of exercise that may help runners get back on form quicker.

"My personal opinion is that we need to look beyond the traditional therapy approaches as they may not apply as effectively to all patients, especially among runners," she says.

A New Approach Motivated by the desire to help runners with lower back pain, Veni and her collaborator—the Head of Physiotherapy at the Alexandra Hospital—conducted a study to examine how an effective recovery programme can be developed.

With the diverse profiles of patients with lower back problems, there is a need to find out what works for each person.

The team is trying out three different types of exercises, two of which are traditional that focus on the back and core muscles.

Veni believes that the third exercise will allow her to ascertain if training the leg muscles would help alleviate lower back problems.

The runners are put through an 8-week training programme, where they will train their leg muscles instead. There will be a further 6-month follow-up after the programme to track their long-term progress.

Direct Impact Any researcher hopes to make a significant contribution, not just to the academic field but also to society.

And what better way than to work with a practitioner and his patients.

"By working with the hospital, the patients benefit directly," shares Veni. "What we really want is to help people, and working with patients is the most direct way of using your research to impact someone's life."

Veni hopes to help runners with lower back pain recover quickly.

Making a Difference Veni hopes that her study will contribute towards generating a best practice among runners looking to recover effectively from lower back pains.

Although the research is still ongoing, Veni is hopeful to see some positive results from the new exercise involving the leg muscles.

"This is a new idea and so it will take some time to convince people in the field of new practices," says Veni.

In the future, she would like to explore how the younger generation, especially school athletes, can benefit from this research.

"If we do eventually get accepted into the mainstream, and the physiotherapists and patients are receptive to the new practices and therapy techniques, then we would have made a positive impact." ■

Ed Moving towards Better Health

PROJECT TEAM

Principal Investigator Swarup Mukherjee, *National Institute of Education, Singapore*
Co-Principal Investigator Karen Philomena Nonis, *National Institute of Education, Singapore*

A COMMON APPROACH to deal with obesity among children is to encourage more physical activity. Yet, the question remains how physical activity and exercise can be better encouraged in them.

To Assistant Professor Swarup Mukherjee, the key ingredient is fundamental movement skill proficiency. His team is looking into whether this proficiency can predict physical activity and health in the young.

Encouraging Activity With sedentary lifestyles becoming more widespread, obesity in children has skyrocketed in recent years. Also, global trends have shown that children are deteriorating in their movement proficiency.

"Children are not moving because they are probably more engaged in non-movement-based pursuits," says Swarup. "Gradually the youth is 'forgetting' how to move as they are not used to the feeling of moving."

Swarup aims to help children "remember" how to move and move well. But in order to do this, he first needs to know the current levels of children's movement skill and the areas to focus on.

"I want to examine where Singapore children stand today in terms of their movement proficiency, and whether movement proficiency is the precursor to physically active behaviour and health," he says.

And a good way to get this done in young kids is to get them to play.

Play Learning Swarup believes that children should play actively for at least 60 minutes each day. Since play is fun and involves movement with a purpose, it can better engage the children.

And if opportunities to play are provided on a regular basis, they will become used to being active. It can also help in the overall development of children.

"With play, children's movement skills improve, body coordination gets more efficient, physical activity level goes up, and they also become creative and self-reflective," says Swarup.

"Play-based activity also develops cognitive abilities and self-esteem, which is what we really need to instill in our children today."

To help parents and Physical Education (PE) teachers, Swarup and his team has developed an informative brochure and a home-based activity resource book, entitled *Movement Champs*.

The motto of the resource is "Move it right, be smart and bright" and outlines real-life examples of indoors and outdoors games, along with tips on play safety and good movement skills.

Parental Partnership The key to a child's holistic development lies in the shared responsibility between the school and the child's parents.

"Parental partnerships are critical in bringing out the best in each child in terms of their learning, physical development and creativity," shares Swarup.

Whilst the school is an institution of learning and a platform to develop social skills, the home is where values, behaviour and habits are imparted to the child. The two must work collaboratively to ensure the holistic development of the child.

It is important for children to keep themselves active, healthy and fit. Purposeful play can be done in school or at home. With *Movement Champs* as a guide, the family can enjoy more active and fun-filled time with each other.

To keep this idea going, Swarup regularly updates and reminds parents of children who are involved in his project to continue with the play learning programme. He is aware that behavioural change does not happen overnight and is a lifelong pursuit.

He hopes that his project will eventually be able to provide evidence-based contributions to maximize the effects of PE lessons in schools and inspire parents to actively engage with children to our youth active, creative and healthy in the future. ■

Swarup is interested to find out whether improved movement proficiency can increase physical activity.

PROJECT TITLE Is Movement Proficiency the Precursor to Physically Active Behaviour and Health? An Investigation of the Relationship between Fundamental Movement Skills, Physical Activity and Health in Singapore Primary School Children

PROJECT NUMBER OER 41/12 SM

START DATE Dec 2012

PROJECT TITLE An Investigation of Nonlinear Pedagogy and Its Application in Singapore Schools

PROJECT NUMBER OER 15/09 CJY

START DATE Sep 2009

Facilitating Flexible Learning

PROJECT TEAM

Principal Investigator Chow Jia Yi, *National Institute of Education, Singapore*

Co-Principal Investigator Clara Tan, *National Institute of Education, Singapore*

Jia Yi and Clara are looking into how learners can discover their full potential themselves.

IN SPORTS, anything can happen. While expert advice can be invaluable and practising drills can be helpful, they may not apply to every situation.

Associate Professor Chow Jia Yi and his research team say that practitioners should take on a more facilitating role in order to nurture active learners, rather than simply reactive ones. They are looking at ways players can learn sports better.

Complex Learners The research team is always questioning if there is a better and more creative way to teach novice athletes.

"It is important to understand that learners behave like a complex system where there is very close interaction between what they do and the environment, task and equipment," says Jia Yi.

As such, a prescriptive way of teaching may not be the best way for these novice athletes to reach their full potential.

"We tend to be very top-down with prescriptive directive learning, but that stifles the creativity and exploration behaviour of the learners."

The team is looking at a learning framework, Nonlinear Pedagogy, to enhance teaching and learning movement skills. "We see learning as occurring in a nonlinear sense, that means some learners learn very quickly and others not so."

Learning Discoveries In order for this type of learning to work, teachers and practitioners need to shift from giving direct instructions to playing the role of facilitators.

Rather than drilling learners in specific game scenarios repeatedly, facilitators can change their instructions, the equipment and the environment.

This change will affect how learners behave as they work within the new requirements, allowing them to discover for themselves how they can best perform.

"When you set these boundaries," explains Jia Yi, "learners can begin to explore and discover different variations of how they may achieve the task goals or acquire different game skills."

There are huge individual differences in any learning contexts. The most optimal way decided by experts may not necessarily cut across everyone.

"Through their own individualized way of moving," he says, "they will acquire that coordination and they will move on to something that is manageable and suitable for them."

Guiding Others Recently appointed as Sub-Dean of NIE's Office of Teacher Education, Jia Yi's interest in how people learn and his desire to help students come from his time as a school teacher.

"I've always been interested to help people learn movement skills," he says. "As a teacher, I've always wanted to help my students, even the weaker ones, to pick up skills and enjoy the game, to be motivated and lead a healthy lifestyle."

An ardent athlete himself, Jia Yi has observed that everyone behaves differently in a game setting.

"Not everybody behaves the same way. So how can I make it successful for them and yet give them the room to explore further and be active learners?" he says.

By introducing Nonlinear Pedagogy into his NIE courses, Jia Yi is hopeful that newer batches of PE teachers will keep working towards a student-centred approach, giving learners the chance to discover their full potential. ■

Research Highlights

CONGRATULATIONS TO our colleagues whose research projects have been completed this year.

Project No.	Project Title	Principal Investigator
OER 21/08 CWL	Pre-Service Teachers in a Ubiquitous Computing Environment: One-to-One Technology Enhanced Learning (TEL)	Chen Wenli
OER 39/08 DH	Life Pathways Analysis Project	David John Hogan
OER 52/08 ZSH	Effectiveness of the Chinese Modular Curriculum in Singapore Primary Schools: An Evaluation Study	Zhao Shouhui
OER 27/09 GQ	Investigating Beginning Teachers' Classroom Management Using Teacher-generated Cases	Gwendoline Quek
OER 28/09 SZ	Participatory Visual Cultures In and Out of Singapore Schools	Mingfong Jan
OER 30/09 MSK	An Embodied Modeling-based Inquiry Activity Towards Participatory Learning Environments	Kim Mi Song
OER 31/09 DH	Investigating Identity Becoming Trajectories Within the Interplay of Spatial and Social Dimensions of Affinity Spaces	David Hung
OER 32/09 VC	New Media Literacy of School Students in Singapore	Victor Chen
OER 39/09 JW	Learning for Life, Learning with Fun: Igniting Students' Intrinsic Motivation to Learn in the Classroom	John Wang
OER 40/09 JE	Equipping Secondary Students with Metacognitive and Social-Emotional Competency Skills to Meet the Challenges of the 21st Century	Jessie Ee
OER 03/10 CD	Leadership and Organisational Change in Singapore Schools: A Baseline Study	Jonathan Goh
OER 07/10 LCH	Images of Practice in Arts Education in Singapore	Lum Chee Hoo
OER 08/10 LC	Arts Research on Teachers and Students (ARTS): Pedagogies and Practices, Phase 2	Tan Liang See
OER 12/10 KHL	Understanding and Profiling Teachers' Technological Pedagogical Content Knowledge (TPACK) Development Patterns	Joyce Koh
OER 15/10 HLC	Singapore Teachers' Perspectives of Diversity and Multicultural Education	Ho Li-Ching
OER 17/10 WLH	MyCLOUD—A Seamless Chinese Language Learning Environment Leveraging on Ubiquitous Technology and the Construction of Mental Lexicon	Wong Lung Hsiang
OER 20/10 TAL	Partnership for Change towards Science as Inquiry in Elementary Science Classrooms: Collective Responsibility of Teachers and Students	Tan Aik Ling
OER 24/10 ZDB	Morphology in Biliteracy Acquisition: An Intervention Study	Beth Ann O'Brien
OER 25/10 LYJ	The Work that Teachers Do	Lee Yew Jin
OER 02/11 CYS	Level Up: Enhancing Classroom Teaching and Learning with Game-Based Learning	Chee Yam San
OER 07/11 BKL	Secondary Analyses of Teacher Education and Development Study in Mathematics (TEDS-M)	Boey Kok Leong
OER 5/12 TKS	Harnessing Popular Media for Science Learning and Critical Literacy	Tang Kok Sing

The full list of projects is available on the NIE website (www.nie.edu.sg) under *Research@NIE*.

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