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Implications of Multidisciplinary Research on the Physical Education Curriculum and the Development of Fitness Equipment in the Context of a Prolonged Pandemic

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Executive Summary

In the field of graduate teacher education, it has been pointed out by David et al. (2020) that there seems to be a paucity of research in Physical Education relative to other teacher education programs. While strategies are required to address this gap, the COVID-19 virus changed everyday life through its relentless virus evolution which necessitated Work from Home (WFH) schemes and flexible delivery of teaching and learning in schools to keep the population safe through physical isolation. In the context of online teaching and learning in Physical Education, many of the school-based, outdoor or placed-based (e.g., gymnasium) activities that are required of Physical Education subjects and courses were relegated to the house-space. Concomitantly, exercises and workouts were subjected to the spatial limitations of the house as gyms and fitness shops were closed due to the pandemic. In this light, this policy brief aims to discuss how multidisciplinary research in Physical Education can provide inputs in enriching the Physical Education curriculum and fitness equipment product development, as well as its impetus for academe-industry collaboration in the context of a prolonged pandemic.

In the recent study by David et al. (2020) on graduate teacher education programs in the Philippines, it has been revealed that there is a low number of doctorate students and graduates in the Physical Education (PE) graduate program. Such low turnout is a reflection of how the potential of PE research and its implications to product development are not maximized by colleges and universities offering this program. Multidisciplinary research offers promising knowledge outcomes if utilized in juxtaposition with research in PE because it may yield innovative PE pedagogies and inputs for the development of new fitness equipment. Sports science (Bishop et al., 2006), engineering and medicine are some examples of academic disciplines that have a lot to offer to enrich the PE curriculum as well as catalyze product development of fitness devices. Also, research-based instruction in PE is important in ensuring that learners receive up to date physical fitness knowledge as well as develop in them the motivation towards a healthy and active way of living (Gonzales et al., 2018).

Teaming up with specialists in particular disciplines can help create new pedagogies for both PE and the discipline. For instance, in the field of Mathematics, a Math teacher can team up with a PE teacher in enriching an integrated class of Mathematics in Sports or vice versa. Geometry can be taught through demonstrations of actual billiards games. The importance of knowing the right or closest approximation of an angle is crucial in shooting the balls in the billiards table's pockets. Physics or science teachers on the other hand can co-create with a PE teacher a special PE class infused with scientific explanations of particular exercises and/or sports. Resistance or weight training can be utilized as scaffolding for introducing the concept of weight. Archery may illustrate how tension in a specific material can create force or energy for an arrow to shoot. Shotput can serve as an illustration of potential and kinetic energy. Various ball sports are classic examples that may describe Isaac Newton's Laws of Motion.

Discussions about particular physics, chemistry or science concepts as applied in sports can enrich the PE curriculum through the integration of applied or multidisciplinary research findings. The concept of luminescence (Peng et al., 2020), friction (Hale et al., 2021) and traction (Clarke & Carre, 2017), velocity (Crouch et al., 2017, Houwelingen et al., 2018), and kinematics (Gatt et al., 2020) are examples of scientific concepts explored alongside sports. Constructs in the field of medicine such as those pertaining to physiology (Khanna & Manna, 2006) and anthropometry (Manna et al., 2010; Mohan et al., 2019; Sammoud et al., 2021) are significant in understanding the implications of biological and physical dimensions in improving sports performance or athletic endurance. Much concern about the importance of science in preventing or treating exercise or sports injuries has also been explored by researchers (Papagiannaki et al., 2020; Ribeiro & Pascoal, 2012; Stewart, 2021).

Instructors who teach topics about health and nutrition or medicine can team up with PE teachers to co-create classes that utilize biofeedback (He 2020). For example, the use of heart rate monitors in the form of a wristwatch can be one way of teaching learners how to monitor their heart rate during exercises (Konukman and Qabarry, no date; Suriya and Arumugam 2020). Learners with blood pressure monitors at home can also use these to monitor their blood pressure after doing endurance training or exercises as well as compare their blood pressures across various forms of exercises or training. Mobile applications and readily downloadable computer programs that measure the nutritional status of students and other relevant measures (e.g., Body Mass Index) can also be utilized for teaching (Suriya and Arumugam 2020).

In the context of a prolonged pandemic, the integration of technology and gamification in teaching Physical Education is surmised as the way forward. Aside from watching dances, exercises and other sports demos on YouTube and other open access video repositories available to the public through the internet, simulation games such as Dance Dance Revolution or other similar dance simulation games can be fun and exciting ways of learning new dance forms (Kretschmann, 2015; Suriya & Arumugam, 2020). Games and/or simulations are empirically found to have a positive effect on learning (Vlachopoulos & Makri, 2017). Philippine PE teachers can collaborate with game developers and computer programmers to develop a local or folk-dance game simulation wherein wrists and ankles can be tied or equipped with sensors that will allow a computer screen to give points or scores to steps that are correctly done. It can be applied to local or folk dances that are individual in nature in terms of performance (e.g., *Pandanggo sa Ilaw*, *Subli*). This can also be accompanied by an electronic mat which also serves as a sensor. These points or scores may automatically translate to a specific percentage grade point. Hence, this can serve as a new and more accurate way of doing a PE practical exam

on dance and reduces the complexity of watching a student do the dance through the confines of a small webcam, mobile camera or recorded video which may limit the student observation capacity of the PE teacher.

The potential of integrating the ideas of PE teachers into the creation of fitness equipment which can be used pedagogically and/or for home fitness in the context of a prolonged pandemic is relatively untapped. Concomitantly, Addolorato et al. (2020) stated that fitness equipment and accompanying software devices must be readily used or easily applied to the majority of consumers regardless of geographic location. These amenities must also be inclusive in nature – must have fewer hardware barriers and must include easily wearable but firmly put connectors (Addolorato et al., 2020).

Play is an essential part of the experience of education (Dyson, 2014) and play resonates in PE. And since learning is lifelong, play is considered important even in adulthood, which makes PE all the more significant in the long run. The imperative for PE in the context of a prolonged pandemic calls for an improved PE curriculum and the development of new fitness equipment as online modes of teaching and learning for students and the sedentary nature of Work from Home (WFH) schemes become the norm for the majority of the population.

The following are the policy recommendations that are derived from the literature review:

- 1) The integration of concepts from sports science, engineering, medicine and other fields into the PE curriculum will enrich the content knowledge and practical aspect of PE as an academic discipline (instruction, research and extension) and as a professional endeavor (sports coach, fitness trainer, dance instructor).
- 2) Multidisciplinary research of PE with other disciplines is necessary to create inputs that will improve the PE curriculum.
- 3) A physical fitness and nutrition agenda for schools of various levels is necessary given the imperatives of a prolonged pandemic. PE teachers can collaborate with school clinicians to conceptualize physical fitness schemes in the context of utilizing the house-space and other house paraphernalia available.
- 4) A physical fitness and nutrition agenda for the general public that the government can integrate in the human resource development of government workers (through the Civil Service Commission) and private employees (through a private corporation's Human Resource and Development Office) is essential as an early intervention to prevent the onset of diseases arising from a sedentary and unhealthy lifestyle brought about by a prolonged pandemic.
- 5) Collaborative research of PE teachers with sports science specialists and game developers can serve as inputs to product development in the context of creating localized gamified pedagogies (e.g., *Pandanggo sa Ilaw* game/simulation).
- 6) Academe-industry collaboration is highly encouraged to be able to develop fitness equipment that uses local or cheap materials that can be used for PE pedagogy, for home-training of athletes, or for the use of the general public. The development of wearable technology to measure biometrical data that the people can buy at a relatively affordable price is highly encouraged. This can be used as a PE pedagogical tool and/or as an apparatus for monitoring one's health in order to minimize hospital visits during a pandemic context.

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