Evaluating movement analysis skills through a series of mastery-learning online modules: A pilot study

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Introduction
In physical education (PE), teachers must observe, assess, analyze, and facilitate enhancement of gross motor skills. Gross motor development is critical for the development of physically literate children. As children grow and learn to move more efficiently, children go through various stages of motor development. In order for PE teachers to encourage children to become physically literate, it is crucial that teachers develop the ability to analyze basic movement skills. Consequently, pre-service teacher education programs must include experiences where teacher candidates learn the knowledge and skills required to be able to provide specific feedback to children and enhance their physical literacy skills.

Purpose
The objective of the study was to analyze the effects of an online supplement that assesses the movement analysis abilities of teacher candidates within the physical education program at SUNY Cortland. The online supplement included a pre and post-test as well as three modules detailing three gross motor skills specifically: horizontal jumping, ball rolling, and dynamic balance.

Research Questions
What are the differences between the pre- and post-test scores of control and experimental groups?

Methods
Participants: 77 physical education teacher education students in second, third and fourth years within 3 different classes created a control group (n=37) and experimental group (n=40).

Instrumentation: The pre- and post-test was comprised of various questions where participants analyzed the movement of children in an attempt to demonstrate their ability to identify movement patterns.

Data Analysis:
Q1/2: A paired samples t-test was used to determine whether there was a statistically significant difference between the test score on the pre-test compared to the post-test in the control group (n = 37) and experimental group (n = 40).

Q3: A change score (D) was calculated by subtracting post-test scores from pre-test scores. D was retained as the dependent variable. An independent samples t-test was run to determine if there were differences in change scores between the control (n = 37) and experimental (n = 40) groups.

Results
1: For the control group, are there differences in test scores between the pre- and post-tests?

Students in the control group scored better on the post-test (M = 66.76, SD = 20.01) compared to the pre-test (M = 60.81, SD = 19.35), a marginally statistically significant increase of 5.95 points, 95% CI [0.041, 11.851], t(36) = -2.042, p = .049, d = .335.

2: For the experimental group, are there differences in test scores between the pre- and post-tests?

Students in the experimental group scored better on the post-test (M = 93.50, SD = 19.29) compared to the pre-test (M = 67.50, SD = 24.78), a statistically significant increase of 26.00 points, 95% CI [18.693, 33.307], t(39) = 7.197, p < .0005, d = 1.14.

3: Are there differences in pre-post change scores (D) between the experimental group and control group?

There was homogeneity of variances in the sample, as assessed by Levene’s test for equality of variances ($p = .135$). The experimental group demonstrated greater change scores ($M = 26.00, SD = 22.85$) than the control group ($M = -5.95, SD = 17.71$), a difference that was statistically significantly different, $M = 20.05, 95% CI [10.72, 29.39], t(79) = 4.280, p = .0005$.

**Note: A negative change score is indicative of better performance on the post-test than on the pre-test. It is indicative of improvement over time.**

Discussion

Question 1: Students in the control group scored better on the post-test compared to the pre-test. There was a statistically significant increase of 5.95 points from pre-to-post testing. We can infer that this increase was due to the fact that the pre-test could have had a learning effect and may have inspired some students to review materials.

Question 2: Students in the experimental group scored better on the post-test compared to the pre-test. There was a statistically significant increase of 26.00 points. We can infer that this increase was due to having been exposed to the instructional effect from the three mastery based learning modules on dynamic balance, rolling, and jumping. The highest score possible was 120. While there was a significant increase, we must review the content within the modules to encourage final grades of higher than 95 points (>80% or mastery).

Question 3: The experimental group demonstrated greater change scores compared to the control group. The control group completed only the pre-test and post-test. The experimental group completed a pre-test, three mastery based learning modules, three quizzes between each module where they needed to achieve 80% or higher to move onto the next module, and a post-test. This shows that the modules had a positive effect on their ability to analyze movement skills.

Implications For Practice
In Physical Education Teacher Education Programs (PETE), it is important for teacher candidates to identify fundamental movement patterns successfully and to gain knowledge on how to make children proficient movers. As children grow and learn to move more efficiently, children progress through various stages of motor development. In order for physical education teachers to encourage children to become physically literate and competent movers, they must develop the ability to analyze basic movement skills. PETE Programs must include experiences where teacher candidates learn the knowledge and skills required to be able to provide specific feedback to children. Consequently, teacher candidates could benefit from a course where they are provided with more practice in skill analysis. Online educational resources using mastery-based learning can provide opportunities for all teacher candidates to learn and achieve mastery.

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