Knowledge and Use of Appropriate Instructional Strategies by Physical Education Teachers

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Abstract

This study of appropriate practices focused on the knowledge and usage of instructional strategies in K-12 physical education programs. Three hundred and eight physical education teachers from two Midwestern states participated by completing a questionnaire that consisted of 36 statements. Participants were asked to identify whether they believed the instructional strategy described in the statement was an appropriate or inappropriate strategy and to indicate how often they used the strategy during their teaching. Results showed that a high majority of the physical education teachers were knowledgeable about appropriate and inappropriate instructional strategies. They study indicates that a majority of the time teachers are using appropriate strategies and not using inappropriate strategies. Results also suggest that there is a direct association between how the teachers identified each statements and how often they practiced them.

The ultimate purpose of any physical education program is to help students gain the skill and knowledge to be physically active for a lifetime (National Association for Sport and Physical Education [NASPE], 2001, 2004a). In order to provide this opportunity to learn, qualified physical education teachers must implement appropriate instructional practices into their programs. These practices are taken from both research and experience. It is through this research and experience that we know physical education contributes to students' academic and intellectual growth (Eveland-Sayers et al., 2007, Grissom, 2005, Podulka et al., 2006). It is also important that physical education provide students with knowledge and understanding of their physical and emotional growth. It is this physical and emotional growth that brings about the concerns of this study.

As physical education teachers begin, or continue, their quest for a quality physical education program, there are certain guidelines they strive towards. NASPE has numerous documents to assist physical education teachers in their quest for a quality physical education program. As a guide for teacher educators in colleges and universities, NASPE published the *National Standards for Beginning Physical Education Teachers* (1995a, 2004b, 2009a). *Moving Into the Future: National Physical Education Standards: A Guide to Content and Assessment* (1995b, 2004c) serves as the basis for what students should know and be able to do in various subject areas throughout their school physical education program (Senne & Housner, 2002).

In 1992, NASPE's Council on Physical Education for Children (COPEC) published a position statement titled *Developmentally Appropriate Physical Education Practices for Children* (COPEC, 1992). This document recognized age and individual differences and addressed instructional appropriateness (Stork & Sanders, 1996). This document was updated and published as *Appropriate Practices for Elementary School Physical Education* (NASPE, 2000, 2009b). NAPSE also published *Appropriate Practices for Middle School Physical Education* (NASPE, 1995c, 2001, 2009c), and

Appropriate Practices for High School Physical Education (NASPE, 1998, 2004a, 2009d).

Many pre-service physical education teachers enter their field experiences with preconceived beliefs that have been formulated through k-12 experiences and observations (Doolittle, Dodds, & Placek, 1993; Hiebert, Morris, Berk, & Jansen, 2007). Some pre-service teachers are surprised that the teaching styles of their cooperating teachers are the same as those they experienced when they were growing up, even though their PETE faculty have identified these experiences as unacceptable. It is a concern that current physical education teachers are using inappropriate practices that are not conducive to the health and well being of their students. If physical education teachers desire to be good role models for pre-service teachers entering the teaching field, it is necessary to teach according to what is right and appropriate. One might assume that physical education teachers want their students to have a positive attitude about physical education class and their health in general. To achieve this, physical education teachers must know the difference between appropriate and inappropriate teaching practices. Physical education teachers need to know that certain games and strategies should not be used in physical education classes today, even though they may have been played for many years. All students who partake in physical education classes should have equal opportunity to participate and be allowed to achieve at any level.

The purpose of this study was twofold. First was to gain insight from current physical education teachers about their knowledge of appropriate instructional strategies in elementary, middle, and high school physical education settings as outlined by NASPE (2000, 2001, 2004a). Second was to gain insight regarding the use of those strategies.

Methods

Participants

The subjects for this study were 308 current K-12 physical education teachers from two Midwestern states. These subjects were volunteers from the state Associations for Health, Physical Education, Recreation & Dance (AHPERD) membership lists. One state had a total of 250 teachers on their list while the other had a total of 200 teachers on their list. Of the 450 teachers on the lists, 68% responded to the survey. Neither state was able to provide a listing of all the individuals who teach physical education in their states. A description of subjects is shown in Table 1.

As shown in Table 1, there were 155 males and 153 females participating in the survey. Participants were divided relatively even throughout the years of teaching experience, with the most participants in 1-5 years (24.7%). A majority (52.3%) of those educators taught in the elementary grades. Most of the participants taught in a public school (96.4%), and a majority taught in class B schools (70.5%). Most of the participants were teaching with a physical education major (78.2%), with a lower percentage teaching with a minor in physical education (10.4%). With these two combining for a total of 88.6%, it appeared that 11.4% of the teachers in the study were teaching without a physical education major or minor. The majority of participants were not affiliated with their state or national associations. Most of the participants (78.9%) were teaching with a bachelor's degree while some (21.1%) had obtained a graduate degree.

Instrumentation

The instrument used in this study had been used in previous research that addressed knowledge and use of appropriate practices in physical education (Senne & Strand, 2009). The list of statements used in the questionnaire was developed from NASPE's appropriate practices documents. This instrument was comprised of 36 statements (Table 2) related to instructional strategies in physical education. Twenty-one of the statements were considered appropriate and 15 inappropriate.

Table 1. Demographic Data

Variable	N	%
Gender		
Male	155	50.3
Female	153	49.7
Years of Teaching Experience		
1-5	76	24.7
6-10	56	18.2
11-15	42	13.6
16-20	49	15.9
21-25	30	9.7
26 or more	55	17.9
Predominant Grades Taught		
Elementary School	161	52.3
Middle School	50	16.2
High School	97	31.5
Type of School Taught In		
Public	297	96.4
Parochial	11	3.6
Class of School Taught In		
Class A	91	29.5
Class B	217	70.5
Physical Education Major		
Yes	241	78.2
No	67	21.8
Physical Education Minor		
Yes	32	10.4
No	276	89.6
Association Affiliation		
State #1 AAHPERD	82	26.6
State #2 AHPERD	17	5.5
AAHPERD	68	22.1
Highest Level of Education		
BS	243	78.9
MS	64	20.8
PhD	1	.3

N = Total number of participants.

Table 2. Survey Statements

1. Student learning should be characterized collectively and teachers should use a teaching style they are familiar and comfortable with. (Inappropriate)

2. Groups should be limited to low numbers so activity produces maximum contact with equipment, learning and participation. (Appropriate)

3. Teachers may move to game play and competition before all students have had adequate time to practice/learn the skills, strategies, and tactics of the sport or activity. (Inappropriate)

4. Teachers should plan, monitor, and evaluate class activity and reorganize as necessary to maximize participation. (Appropriate)

5. Teachers should have students warm-up on their own, possibly without supervision. (Inappropriate)

6. In high school physical education, out of class assignment should be designed by the teacher to extend class activities and provide practice and reinforcement of skills and knowledge. (Appropriate)

7. Teachers should use technology in many phases of their programs. (Appropriate)

8. Teachers should maintain low student to equipment ratios, making lines and wait time minimal and maximizing practice trials per student. (Appropriate)

9. Competition in high school and middle school should be celebrated in a way to increase student motivation and interest. (Appropriate)

10. The focus of activities should be on having “winners” and “losers”. (Inappropriate)

11. Groups and squads should be formed by allowing student “captains” to publicly select one student at a time, separating by gender or, according to fitness level. (Inappropriate)

12. High school and middle school teachers should give specific instructional feedback that provides the student with information with his/her performance relative to instructional goals and skill improvement. (Appropriate)

13. Teachers should use a variety of teaching styles depending on the lesson objectives and content and the varied learning styles of the students. (Appropriate)

14. To maximize teaching effectiveness, teachers should deliberately plan to use different instructional formats. (Appropriate)

15. When possible, high school and middle school students may be allowed to select between equivalent activities, such as two-team sports, different aerobic workouts/activities, tumbling or apparatus, etc. (Appropriate)

Table 2. continued

16. Instructional strategies should provide for the inclusion of all students regardless of skill or fitness levels, gender, race, or ethnic group. (Appropriate)

17. Teachers should provide safe warm-up activities that are to prepare students for the activities that will follow. (Appropriate)

18. Correct procedures should be taught to high school and middle school students for developing each component of fitness, and students should know several safe exercises for each component and muscle group. (Appropriate)

19. The same warm-up exercises should be use every day, regardless of the upcoming activity. (Inappropriate)

20. High school and middle school students should be encouraged to participate in physical activity and exercise outside of the physical education setting for enjoyment, skill development, and health reason. (Appropriate)

21. Physical education facilities should only be available to students during physical education class. (Inappropriate)

22. High school and middle teachers may use technology by monitoring heart rates electronically, using pedometers, videotaping students, building a website, using current software for recording fitness data, or providing impedance readings on body fat. (Appropriate)

23. Teachers should have the necessary equipment to provide effective, modern instruction. (Appropriate)

24. Middle school students may supervise/spot high risk stations, and several high-risk activities may take place simultaneously. (Inappropriate)

25. All students should be required to do the same fitness activities regardless of their fitness levels. (Inappropriate)

26. Elementary school children should be taught the purpose of exercise, correct procedures for exercise, and the different exercise categories-stretching, strength, etc. (Appropriate)

27. Exercise may be used as a punishment for misbehavior and/or lack of participation. (Inappropriate)

28. Teachers should involve all students in activities that allow them to participate actively, both physically and mentally. (Appropriate)

29. Teachers may use large groups in which student participation is based on individual competitiveness. (Inappropriate)

30. Teachers may use activities such as relay races, dodgeball, and elimination tag since they provide opportunities for everyone in the class. (Inappropriate)

Table 2. continued

31. Teachers should limit participation of students with special needs to activities that don't facilitate learning, such as keeping score or counting repetitions for other students. (Inappropriate)

32. Teachers should modify the rules, regulations, equipment, and playing space to facilitate learning by students of varying abilities or to focus learning on particular games or skill components. (Appropriate)

33. Elementary teachers may use games with a learning purpose or goal of keeping children "busy, happy, and good." (Inappropriate)

34. Official, adult rules of sports should govern the activities in elementary physical education classes. (Inappropriate)

35. Teachers should organize small games, e.g., 2-3 per team, which allows numerous practice opportunities for students while also allowing them to learn the various aspects of the game being taught. (Appropriate)

36. Equipment should be provided to permit active participation and practice for every student. (Appropriate)

Content validity had been established by Senne & Strand (2009).

Subjects were asked to respond to each statement two times. First they indicated if they believed the statement was an appropriate or inappropriate instructional strategy in physical education. The second response was based on how often they used the instructional strategy. They had four choices: never, sometimes, often, or always.

Procedure

An email explaining the intent of the study with a link to the questionnaire was sent to all individuals on the membership lists described previously. By clicking on the "I agree" section of the email respondents gave their informed consent to participate in the study. The surveys were sent out by email three times with the second email sent out as a reminder three weeks after the first. The third was sent out three weeks after the second.

Written permission to use the membership lists was obtained from the state AHPERD executive directors. The University Institutional Review Board approved the study.

Analysis of Data

Data from SurveyMonkey were converted to an Excel spreadsheet and then placed into a SPSS (version 17) statistical package. Percentages, means, and frequencies were reported for each statement and by each demographic variable. Statistical significance was set at $p < .05$. Crosstabs were used to make comparisons by gender, years of experience (1-10, 11- 20, 21- or more), predominant grades taught (elementary, middle, high school), type of school (public or private), class level (In one state the cutoff between class A and B schools was 400 students in grades 9-12 and in the second school the cutoff was 450 students in grades 9-12), physical education degree, member of an association, and level of education (BS, MS, Ph.D.). Chi-square was used to make comparisons of participants' knowledge with their frequency of use of appropriate instructional strategies.

Results

The percentage of current K-12 physical education teachers who correctly identified appropriate practices related to instructional

strategies in school physical education is shown in Table 3. As can be seen, participants answered a total of 10,261 statements about appropriate instructional strategies in physical education. As shown at the bottom of the table, the N column indicates the total number of participants answering each statement. The difference in N is because some participants failed to answer all the statements. The correct response to each statement is indicated in the correct response column. Of the 10,261 statements, 8,702 (84.9%) were identified correctly. The percentage of teachers who correctly identified statements ranged from 26.0% for statement #1 to 100% for statement #28. Of the 36 statements, four (#1 at 74.0%, #29 at 58.1%, #30 at 70.0%, and #33 at 61.6%) were identified incorrectly by a majority of the participants.

The percentage of correct responses for each of the demographic variables was determined and Crosstabs was used to make statistical comparisons. Results revealed that a greater percentage of females than males identified 24 of the 36 statements correctly and that there were significant differences in correctly identifying the strategies as appropriate or inappropriate for 11 statements (1, 10, 11, 14, 19, 21, 24, 27, 29, 30, 33) with a greater percentage of female respondents identified each of the statements correctly.

For membership affiliation a greater percentage of association members than non-members identified 29 of the 36 statements correctly and there were eight statements (6, 7, 15, 19, 22, 24, 30, 33) with a statistical difference with a greater percentage of respondents with association membership choosing the correct response for all eight statements. By degree a greater percentage of physical education majors/minors than non-PE major/minors identified 22 of the 36 correctly and there were six statements (8, 12, 18, 20, 22, 34) with a statistical difference with a greater percentage of respondents with a major or minor in physical education choosing the correct response for all six statements.

By class level a greater percentage of Class A respondents than Class B identified 33 of the 36 statements correctly and there were five statements (7, 15, 30, 33, 34) with a statistical difference with a greater percentage of respondents from Class A schools choosing the correct response for all five statements. By grade taught a greater percentage of middle school teachers answered 15 statements correctly while elementary teachers answered eight and high school teachers answered six correctly with six of the statements tied. There were four statements (1, 3, 9, 29) with a statistical difference with a greater percentage of elementary and middle school teachers choosing the correct response for all four statements than did high school teachers.

By years of experience a greater percentage of those with 20 plus years identified 11 correctly, 11-20 years identified ten correctly, 1-10 years identified seven correctly and eight were tied. There were three statements (3, 24, 25) with a statistical difference with a greater percentage of respondents with 1-10 years of experience choosing the incorrect response for two (24, 25) of the three statements than did the more experienced teachers.

By degree status a greater percentage of those with a graduate degree identified 24 of the statements correctly and there was one statement (14) with a statistical difference with respondents with a graduate degree choosing the correct response. Comparisons were not made for the variables comparing public versus private schools since the N for private schools was so small.

The percentage of current K-12 physical education teacher's frequency of use of appropriate instructional strategies in school physical education is shown in Table 4. Of the 21 appropriate statements, 34.5% are used always, 40.4% are used often, 17.4% are used sometimes, and 7.7% are never used. Of the 15 inappropriate statements, 42% are never used, 31.4% used sometimes, 18.8% used often, and 7.8% used always. More specifically, four of the appropriate statements (6, 7, 15, 22) are never or sometimes

Table 3. Number and Percentage of Correct Responses

Statement	Correct Response	Total N	n	%
1.	Inappropriate	304	79	26.0
2.	Appropriate	302	283	93.7
3.	Inappropriate	304	170	55.9
4.	Appropriate	302	301	99.7
5.	Inappropriate	305	281	92.1
6.	Appropriate	299	238	79.6
7.	Appropriate	304	261	85.9
8.	Appropriate	300	291	97.0
9.	Appropriate	301	250	83.1
10.	Inappropriate	306	292	95.4
11.	Inappropriate	287	268	93.4
12.	Appropriate	282	270	95.7
13.	Appropriate	284	282	99.3
14.	Appropriate	287	265	92.3
15.	Appropriate	280	243	86.8
16.	Appropriate	284	278	97.9
17.	Appropriate	280	279	99.6
18.	Appropriate	277	273	98.6
19.	Inappropriate	283	245	86.6
20.	Appropriate	280	277	98.9
21.	Inappropriate	280	234	83.6
22.	Appropriate	276	264	95.7
23.	Appropriate	280	276	98.6
24.	Inappropriate	275	228	82.9
25.	Inappropriate	279	208	74.6
26.	Appropriate	276	271	98.2
27.	Inappropriate	277	239	86.3
28.	Appropriate	279	279	100.0
29.	Inappropriate	272	114	41.9
30.	Inappropriate	280	84	30.0
31.	Inappropriate	273	231	84.6
32.	Appropriate	274	268	97.8
33.	Inappropriate	271	104	38.4
34.	Inappropriate	272	237	87.1
35.	Appropriate	272	267	98.2
36.	Appropriate	274	272	99.3
Total		10261	8702	84.9

N = Total number of participants answering each question.

Table 4.Usage of the Appropriate and Inappropriate Practices

Statement	Correct Response	Never		Sometimes		Often		Always	
		n	%	n	&	n	%	n	%
1.	Inapp	15	5.0	84	27.7	152	50.2	52	17.2
2.	App	12	3.9	56	18.2	144	46.9	95	30.9
3.	Inapp	52	16.9	154	50.0	80	26.0	22	7.1
4.	App	11	3.6	23	7.5	112	36.6	160	52.3
5.	Inapp	220	71.4	51	16.6	17	5.5	20	6.5
6.	App	812	27.5	107	36.3	71	24.1	36	12.2
7.	App	29	9.6	150	49.7	101	33.4	22	7.3
8.	App	9	3.0	26	8.5	156	51.1	114	37.4
9.	App	35	11.7	66	22.0	130	43.3	69	23.0
10.	Inapp	171	56.1	99	32.5	21	6.9	14	4.6
11.	Inapp	205	71.4	58	20.2	10	3.5	14	4.9
12.	App	27	9.6	43	15.3	141	50.2	70	24.9
13.	App	8	2.8	36	12.5	147	51.2	96	33.4
14.	App	12	4.2	71	24.7	149	51.9	55	19.2
15.	App	58	21.1	108	39.3	95	34.5	14	5.1
16.	App	10	3.5	16	5.6	95	33.0	167	58.0
17.	App	8	2.8	10	3.5	96	33.9	169	59.7
18.	App	19	6.9	30	10.9	119	43.3	107	38.9
19.	Inapp	103	36.1	109	38.2	53	18.6	20	7.0
20.	App	19	6.8	16	5.7	90	32.3	154	55.2
21.	Inapp	100	35.8	89	31.9	58	20.8	32	11.5
22.	App	58	21.2	88	32.2	83	30.4	44	16.1
23.	App	16	5.7	77	27.5	116	41.4	71	25.4
24.	Inapp	188	69.9	48	17.8	20	7.4	13	4.8
25.	Inapp	88	31.5	107	38.4	61	21.9	23	8.2
26.	App	17	6.1	27	9.7	107	38.6	126	45.5
27.	Inapp	174	61.9	82	29.2	14	5.0	11	3.9
28.	App	9	3.2	6	2.1	90	32.0	176	62.6
29.	Inapp	62	22.8	101	37.1	91	33.5	18	6.6
30.	Inapp	43	15.5	104	37.4	98	35.3	33	11.9
31.	Inapp	169	61.9	64	23.4	24	8.8	16	5.9
32.	App	6	2.2	34	12.4	120	43.8	114	41.6
33.	Inapp	69	25.7	94	35.1	75	28.0	30	11.2
34.	Inapp	129	48.3	96	36.0	27	10.1	15	5.6
35.	App	10	3.7	35	12.8	145	53.1	83	30.4
36.	App	9	3.3	27	9.9	116	42.3	122	44.5

used by more than 50% of the respondents. Similarly, two of the inappropriate statements (1 and 30) are often or always used by more than 50% of the respondents. None of the appropriate statements were always used 100% of the time and none of the inappropriate statements were never used 100% of the time. In fact, only two of the appropriate statements were always used more than 90% of the time and two of the inappropriate statements were never used more than 90% of the time.

Chi-square was used to make comparisons for each variable from the demographic information on the survey. Results revealed that there were

significant differences in the frequency of usage for 20 statements by gender, 16 statements by association membership, 13 statements by physical education degree, 13 statements by grades taught, five statements by class, two statements by years of experience, two for education, and one statement each for school type.

When measured by the two extremes of always for appropriate strategies and never for inappropriate strategies a greater percentage of females compared to males answered always or never for 35 of the 36 statements, a greater percentage of middle school and elementary school teachers than high school teachers answered always or never for 35 of the statements, a greater percentage of association members answered always or never for 33 statements, a greater percentage of Class A teachers answered always or never for 30 statements, and a greater percentage of those with a graduate degree answered always or never for 20 statements.

Table 5 shows a comparison of how the participants answered each statement and how often they use each practice. The responses of the physical education teachers are significantly associated with how often they use the practices. Results suggest that participants responded to survey statements based on how they used each practice. In essence, if a participant uses a practice often or always they answered the question as appropriate, even though the correct answer may have been inappropriate. For example, in statement #1, 74% of the participants incorrectly identified the instructional strategy as appropriate, and 84.3% of those participants indicated they practiced it often or always.

Discussion

Seventeen years ago, the *Journal of Physical Education, Recreation, and Dance* published the first in a series of articles on appropriate practices in physical education (Williams, 1992, 1994, 1996). The intent of the articles was to help physical education teachers better understand what games and activities were appropriate and how those that were inappropriate could be modified to become appropriate. Similarly, NASPE first published its appropriate practices documents in 1995. The documents have been updated with the most recent revisions in 2009 (NASPE, 2009b, 2009c, 2009d).

Anecdotal evidence would suggest that many physical education teachers are engaged in teaching practices that are considered inappropriate. For example, the following statements were made by physical education majors as they described their experiences in physical education (Bender & Strand, 2008). "In my elementary school we used to play a game called trench where about 50 balls were being thrown around at you and your teammates. I think the only thing that game prepared us for was an all out ambush in a war. Although the balls didn't hurt much I think it carried on through the attitudes and actions of the students throughout the day" (p.1). "In middle school our physical education teacher divided the class into groups for softball. One thing he said was he wanted all the studs on field A and all the nerds and girls on field B" (p. 1). "What I didn't like about physical education class was when we had to play shirts and skins. Back then I was chubby. I didn't like to take my shirt off in front of the other students" (p. 1).

The current study reveals that many physical education teachers are highly aware of instructional strategies that are appropriate or inappropriate. Results indicated that greater than 80% of the respondents were able to correctly identify the appropriate or inappropriate strategies for 32 of the 36 statements. Subject responses were also analyzed by the variables of gender, years of teaching experience, primary grade level of teaching, public and private institution, class level of A or B, type of degree, level of degree, and association membership. Based on the percentage of correct responses the following groups identified statements most correctly, females (87.2%) compared to males (82.3%);

Table 5.Comparisons of Correct and Incorrect Knowledge Responses to Usage of Practices

Statement		Never		Sometimes		Often		Always	
Response	%	n	%	n	%	n	%	n	%
1. correct***	26.0	8	10.1	56	70.9	13	16.5	2	2.5
incorrect	74.0	7	3.1	28	12.6	139	62.3	49	22.0
2.correct***	93.7	9	3.2	44	15.6	137	43.6	92	32.6
incorrect	6.3	3	15.8	11	57.9	5	26.3	0	0.0
3.correct***	55.9	50	29.4	97	57.1	13	7.6	10	5.9
incorrect	44.1	2	1.5	55	41.0	66	49.3	11	8.2
4.correct	99.7	11	3.7	22	7.4	109	36.5	157	52.5
incorrect	0.3	0	0.0	0	0.0	110	0.0	0	0.0
5.correct***	92.1	214	76.2	43	15.3	11	3.9	13	4.6
incorrect	7.9	4	16.7	7	29.2	6	25.0	7	29.2
6.correct***	79.6	43	18.5	91	39.1	66	28.3	33	14.2
incorrect	20.4	38	63.3	16	26.7	4	6.7	2	3.3
7.correct***	85.9	18	7.0	125	48.8	93	36.3	20	7.8
incorrect	14.1	11	25.6	25	58.1	5	11.6	2	4.7
8.correct	97.0	6	2.1	22	7.6	151	52.2	110	38.1
incorrect	3.0	1	11.1	2	22.2	4	44.4	2	22.2
9.correct***	83.1	15	6.1	43	17.6	122	49.8	65	26.5
incorrect	16.9	20	39.2	22	43.1	6	11.8	3	5.9
10.correct***	95.4	165	57.1	95	32.9	16	5.5	13	4.5
incorrect	4.6	4	28.6	4	28.6	5	35.7	1	7.1
11.correct***	93.4	201	75.6	49	18.4	3	1.1	13	4.9
incorrect	6.6	2	10.5	9	47.1	7	36.8	1	5.3
12.correct**	95.7	24	9.0	38	14.3	138	51.9	66	24.8
incorrect	4.3	3	25.0	5	41.7	2	16.7	2	16.7
13.correct	99.3	8	2.9	33	11.8	144	51.4	95	33.9
incorrect	0.7	0	0.0	1	50.0	1	50.0	0	0.0
14.correct***	92.3	6	2.3	60	22.8	144	54.8	53	20.2
incorrect	7.7	6	27.3	11	50.0	4	18.2	1	4.5
15.correct***	86.8	38	15.1	96	40.3	93	39.1	13	5.5
incorrect	13.2	21	58.3	12	33.3	2	5.6	1	2.8
16.correct***	97.9	6	2.2	15	5.4	94	33.8	163	58.6
incorrect	2.1	2	33.3	1	16.7	1	16.7	2	33.3
17.correct	99.6	7	2.5	9	3.3	94	34.1	166	60.1
incorrect	0.4	0	0.0	0	0.0	1	100.0	0	0.0
18.correct*	98.6	18	6.7	28	10.4	119	44.4	103	38.4
incorrect	1.4	1	25.0	2	50.0	0	0.0	1	25.0
19.correct***	86.6	99	40.6	103	42.2	31	12.7	11	4.5
incorrect	13.4	3	7.9	4	10.5	22	57.9	9	23.7
20.correct	98.9	18	6.6	15	5.5	89	32.6	151	66.7
incorrect	1.1	1	33.3	0	0.0	0	0.0	2	66.7

Table 5. continued

21.correct***	83.6	97	41.6	83	35.6	41	17.6	12	5.2
incorrect	16.4	3	6.5	6	13.0	17	37.0	20	43.5
22.correct*	95.7	51	19.6	83	31.9	83	31.9	43	16.5
incorrect	4.3	57	21.0	88	32.4	83	30.5	44	16.2
23.correct	98.6	16	5.8	77	28.0	115	41.8	67	24.4
incorrect	1.4	0	0.0	0	0.0	1	25.0	3	75.0
24.correct***	82.9	180	80.4	30	13.4	5	2.2	9	4.0
incorrect	17.1	8	17.8	18	40.0	15	33.3	4	8.9
25.correct***	74.6	88	42.3	93	44.7	20	9.6	7	3.4
incorrect	25.1	0	0.0	14	19.7	41	57.7	16	22.5
26.correct	98.2	16	6.0	26	9.7	103	38.4	123	45.9
incorrect	1.8	1	20.0	1	20.0	2	40.0	1	20.0
27.correct***	86.3	172	72.0	54	22.6	4	1.7	9	3.8
incorrect	13.7	2	5.3	25	65.8	9	23.7	2	5.3
28.correct	100.0	9	3.2	6	2.2	89	31.9	175	62.7
incorrect	0.0	0	0.0	0	0.0	0	0.0	0	0.0
29.correct***	41.9	58	51.8	45	40.2	6	5.4	3	2.7
incorrect	58.1	3	1.9	55	35.0	85	54.1	14	8.9
30.correct***	30.0	39	47.6	37	45.1	1	1.2	5	6.1
incorrect	70.0	4	2.1	67	34.4	96	49.2	28	14.4
31.correct***	84.6	160	69.9	52	22.7	10	4.4	7	3.1
incorrect	15.4	8	19.0	12	28.6	14	33.3	8	19.0
32.correct*	97.8	5	1.9	31	11.7	118	44.4	112	42.1
incorrect	2.2	0	0.0	3	50.0	2	33.3	1	16.7
33.correct***	38.4	57	56.4	35	34.7	2	2.0	7	6.9
incorrect	61.6	12	7.3	58	35.4	71	43.3	23	14.0
34.correct***	87.1	128	55.7	81	35.2	11	4.8	10	4.3
incorrect	12.9	1	2.9	14	40.0	15	42.9	5	14.3
35.correct***	98.2	5	1.9	34	12.8	144	54.3	82	30.9
incorrect	1.8	3	60.0	1	20.0	0	0.0	1	20.0
36.correct	99.3	9	3.3	26	9.6	114	42.2	121	44.8
incorrect	0.7	0	0.0	1	50.0	0	0.0	1	50.0

* denotes < .05,** denotes < .01, and*** denotes < .001.

those with association membership (88.1%) compared to those who do not have membership (83.2%); those with more than 20 years of teaching experience (86.2%) compared to those with 11-20 years (85.1%) and 1-10 years of experience (83.9%); those who work in middle schools (86%) compared to those who work in elementary (85.3%) or high school (83.5%); those who have a physical education degree (85.1%) compared to those who do not have that degree (82.2%); those with a graduate degree (85.6%) compared to those with an undergraduate degree (84.6%); and those who work in Class A schools (87.9%) compared to those in Class B schools

(84.6%).

Significant differences for the knowledge of strategies statements within each of the variables ranged from 11 statements for gender to one statement for level of degree with the largest number of significant differences within gender, association membership (8), type of degree (6), and level of school (5). While differences in knowledge of instructional strategies by association membership and type of degree are easy to explain, differences in knowledge by gender and school level are difficult to explain. The fact that a teacher holds membership in a state or national physical education association does appear to be related to a teacher's knowledge of appropriate instructional strategies in physical education. Being a member of an association often gives teachers more of an opportunity to attend conferences and gain knowledge in new technology and practices being used in physical education. Age appropriate games are introduced at conferences, as is current research. Access to articles and publications is also more readily available to members.

Similarly, one would expect that teachers who have a university degree in the field in which they are teaching would be more knowledgeable of appropriate instructional strategies than those who do not hold such a degree. More and more, physical education teacher preparation programs are using the NASPE documents related to appropriate strategies and pre-service students are exposed to the strategies on a more regular basis.

Even though there was little significant difference, it was interesting to note that a greater percentage of experienced teachers and those with a graduate degree were able to identify appropriate and inappropriate strategies than less experienced teachers and those with only an undergraduate degree. Conventional wisdom might suggest that recent graduates would be more knowledgeable due to their recent training; however, this study does not support that wisdom. In fact, it is a bit disconcerting that more experienced teachers and those with graduate degrees were statistically not better able to identify the various instructional strategies. One would think that with experience comes knowledge and that most of the individuals with graduate degrees would be the more experienced teachers. These findings can certainly question how much a graduate degree has done to increase one's knowledge of appropriate instructional strategies in physical education.

In regard to gender, results suggest that female physical education teachers are more knowledgeable of appropriate strategies than are male teachers. This is hard to explain as all teachers have gone through teacher preparation programs and been exposed to similar course content and pedagogical training. Perhaps it simply comes down to the fact that females are more receptive to their teacher training and less likely to continue the teaching practices of their high school teachers.

The participants were also asked to identify how often they use the instructional strategies as they teach. Of the 21 appropriate statements, 75% of the subjects always or often use the practices, and of the 15 inappropriate statements, 73% of subjects indicated they never or sometimes use the practices. Significant differences for the use of strategies statements within each of the variables ranged from 20 statements for gender to one statement for school type with the largest number of significant differences within gender, association membership (16), type of degree (13), and grade taught (5). For each of these differences, females, those who hold association membership, those with a physical education degree, and those teaching elementary or middle school were most apt to appropriately use the strategies.

Any number of reasons may explain why teachers are not using the appropriate practices. First, the school may not have the equipment listed within a statement. For example, statements 7 and 22 list the use of technology. Study results indicate that for the two statements that 86% (#7) and 96% (22) of the respondents agree that

technology should be used in physical education while 59% (7) and 53% (22) report that they never or sometimes use technology. One might surmise that teachers have limited access to the technology listed. That in itself is cause for concern as how is one suppose to offer a contemporary physical education program if contemporary equipment or technology are not available?

Second, a school may not have the space or resources. For example, statement 15 states that students should be allowed to select between equivalent activities such as two team sports or different aerobic workouts. Even though 87% of the teachers recognize this as an appropriate strategy, only 40% of them use this strategy often or always with only 5% doing it always. In some schools, gym space is at a premium and multiple physical education classes share the space during a class period, thus making it difficult to provide activity options in a single class.

Third, the curriculum may not be structured to encourage certain strategies. For example, statement 6 asks about out of class assignments. Approximately 80% of the teachers indicate that as an appropriate strategy, while only 36% use it often or always. Even though schools are beginning to incorporate concepts-based fitness into their physical education curriculum many still do not offer it. One aspect of concepts-based fitness is the use of homework and labs. It is conceivable that as more schools include concepts-based fitness in their school curriculum that the use of out of class assignments will be seen more frequently.

A final aspect of this study was to compare the knowledge responses to the usage of the practices mentioned in each statement. It was found that the knowledge responses of current physical education teachers in this study are significantly associated ($p < .05$) with their usage of the practices for 27 of the 36 statements. This indicates that if a teacher believes a strategy is appropriate, he or she will likely use that strategy, even if the strategy is contraindicated. An example is found with statement 30 that questions whether relay races, dodge ball, and elimination tags are appropriate. Even though the professional literature suggests that these activities are inappropriate, 60% of the respondents indicated that they believe the activities are appropriate and 57% use them often or always.

In essence, teachers use the strategies they believe are true, even if the literature states the strategy is inappropriate and in spite of what their professors may have taught them. This may be the most significant finding of the study and if it can be substantiated by further research, has implications for teacher preparation programs. If K-12 physical education teachers are to use appropriate strategies and eliminate inappropriate strategies, physical education teacher educators must work hard to educate pre-service teachers and demand that they practice appropriate strategies while they engage in field experiences and student teach. Universities must be very selective where they place pre-service teachers and should initiate appropriate strategy workshops that all cooperating teachers are required to attend before they can serve as a supervisor.

Within the limitations of this study there are some general conclusions that can be made. First, a high majority (84.9%) of the physical education teachers in this study are knowledgeable of appropriate and inappropriate instructional strategies in physical education. Second, there does not appear to be many differences in knowledge within the demographic variables. The only variables that showed a slight difference were gender, degree, and association membership. Third, the physical education teachers in this study are using appropriate practices approximately 75% of the time and inappropriate practices approximately 25% of the time. Finally, there is a direct association between participants' knowledge responses for each statement and how often they used the stated strategy.

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