

# Using Content Maps to Measure Content Development in Physical Education

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# Topics

- ✓ Purpose
- ✓ Definitions
- ✓ Content maps
- ✓ New content development categories
- ✓ Formulae
- ✓ Establishing validity & reliability
- ✓ Results, discussion, limitations

# Purpose

- ✓ Extending the conceptual understanding of content development in physical education
- ✓ Examining new categories of instructional tasks to describe content development

# Purpose

- ✓ Validating content maps as a measurement tool
- ✓ Validating formulae that can be used to evaluate depth of content development

# Content development

Selection and sequencing of instructional tasks to meet a specific instructional outcome

Critical skill for physical education teachers because it provides essential knowledge for a teacher to draw upon as she implements instruction

(Rink, 1979; 2014; Ward, 2013)

# Specialized Content Knowledge

- ✓ SCK is the knowledge for teaching CCK
- ✓ SCK includes knowledge of instructional tasks and representations as well as knowledge of student errors
- ✓ Improving a teacher's SCK resulting in improved PCK and improvements in student learning and performance

(Iserbyt et al., 2015; Sinelnikov et al., 2015; Ward et al., 2015)

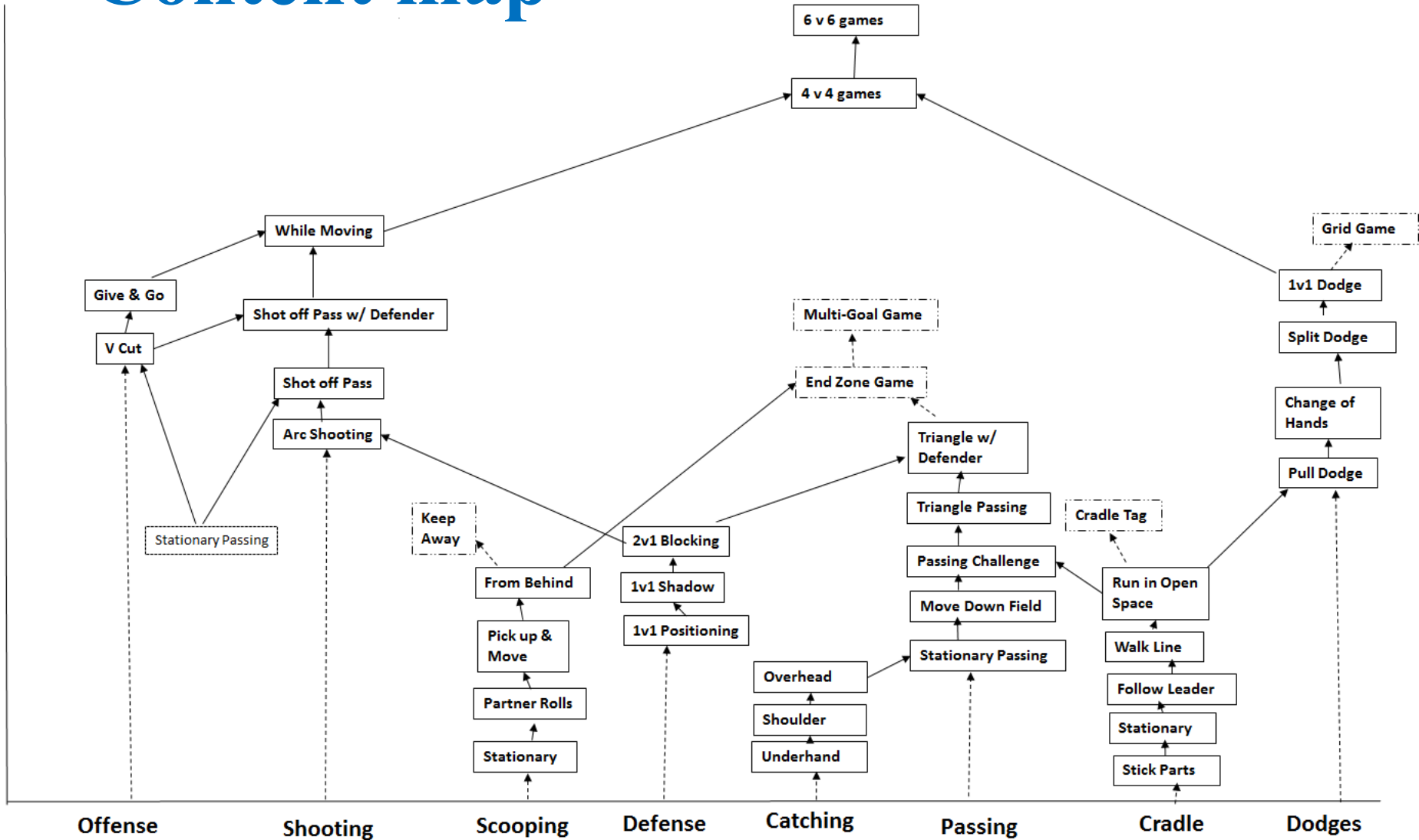
# Content map

A graphic organizer that describes the SCK to be taught and its relationship to other SCK

Illustrates the complex thinking of a teacher and provide insight into how teachers structure their understanding of SCK

(Ward, Lehwald & Lee, 2015)

# Content map





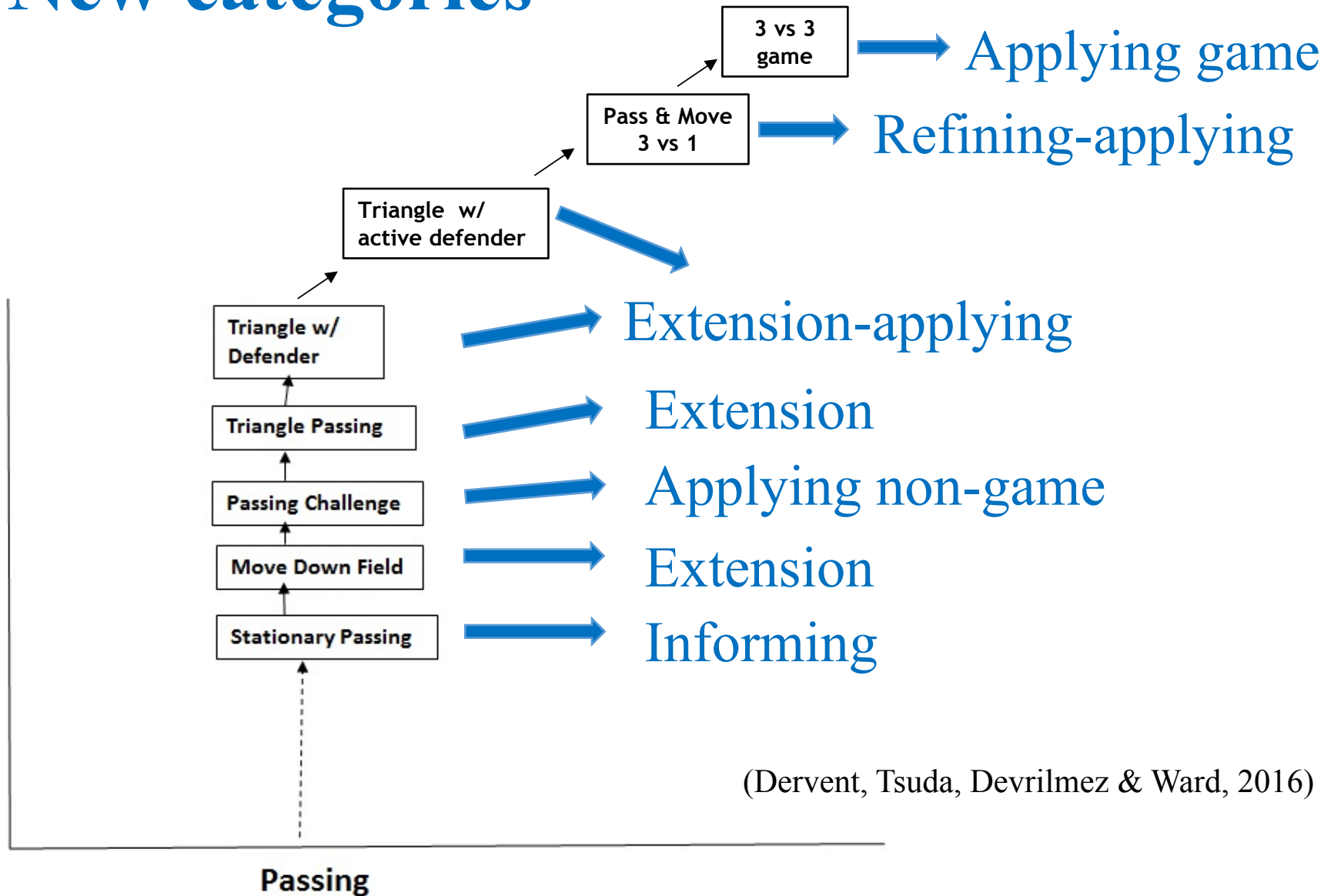
## Content Development Rink (1979)

- (1) **Informing tasks** - An initial task in a sequence of instruction
- (2) **Extension tasks** - Tasks that make the initial task more difficult or easier.
- (3) **Refining tasks** - Tasks that focus on improving the technique or tactics
- (4) **Applying tasks** - Games and assessment tasks.

## Content Development Dervent, Tsuda, Devrilmez, & Ward (2016)

- (1) Informing tasks
- (2) Extension tasks
- (3) **Extension-applying**  
Extension tasks that occur in games
- (4) Refining tasks
- (5) **Refining-applying**  
Refining tasks that occur in games
- (6) **Applying games** Tasks  
as games
- (7) **Applying non-games**  
Tasks for assessment

# New categories



(Dervent, Tsuda, Devrilmez & Ward, 2016)

# Hypotheses of Formulae

Content development can be measured in terms of relationship between tasks that are designed	Formulae
1.To extend and refine it relative to those tasks that do not.	$\frac{E+EA+R+RA}{I+AG+AN}$
2.To extend and refine it apply it relative to those tasks that do not.	$\frac{E+EA+R+RA+AG}{I+AN}$
3.To extend it relative to informing and games.	$\frac{E+EA}{I+AG+AN}$
4.To extend it and relative to the informing tasks	$\frac{E+EA}{I}$
5.To refine it and relative to the informing tasks	$\frac{R+RA}{I}$
6.To extend, refine, and apply it and relative to the informing tasks	$\frac{E+EA+R+RA+AG+AN}{I}$

# Reliability of coding

✓ 6 observers

✓ 5 stages coding training

1. Written test of definition of codes - 100%
2. Coding the description of instructional tasks - 100%
3. Coding lessons plans in pairs - 90%
4. Coding 10 lessons - 90%
5. Coding 15 tasks - 90%

✓ 90% to 100% criteria met or exceeded by all six coders

# Face validity

- ✓ 5 PE graduate students created CM of their strongest content area w/ no information beyond instructions
- ✓ 17 PE undergraduates enrolled in volleyball course created CM

# Face validity

- ✓ 7 expert PE elementary and middle school teachers created CM of their weak content area w/ instructions
- ✓ 5 elementary, 6 middle school, & 2 high school PE teachers created CM of their strong content area w/ instructions

# Face validity

- ✓ Participants completed a content map without additional instructions,
- ✓ Organized their content map in terms of instructional tasks
- ✓ Demonstrated hierarchical and relational connections in their content maps.

# Concurrent Validity

Preservice PE teachers enrolled in 6 content courses: Lacrosse (n=17), soccer (n=17), basketball (n=24), volleyball, (n=24), tennis (n=17), and badminton (n=17).

- ✓ created precourse content maps for all sports and again at the end of each course, compared with expert's content map.



# Concurrent Validity

- ✓ The precourse mean for all content maps was 23.8%.
- ✓ The post course means were in lacrosse and soccer 100%; basketball 91.6%; volleyball 87.5%; tennis and badminton 82.4% respectively.
- ✓ Interobserver agreement was calculated on 41.2% of data with 88.8% of agreement.

# Content Validity

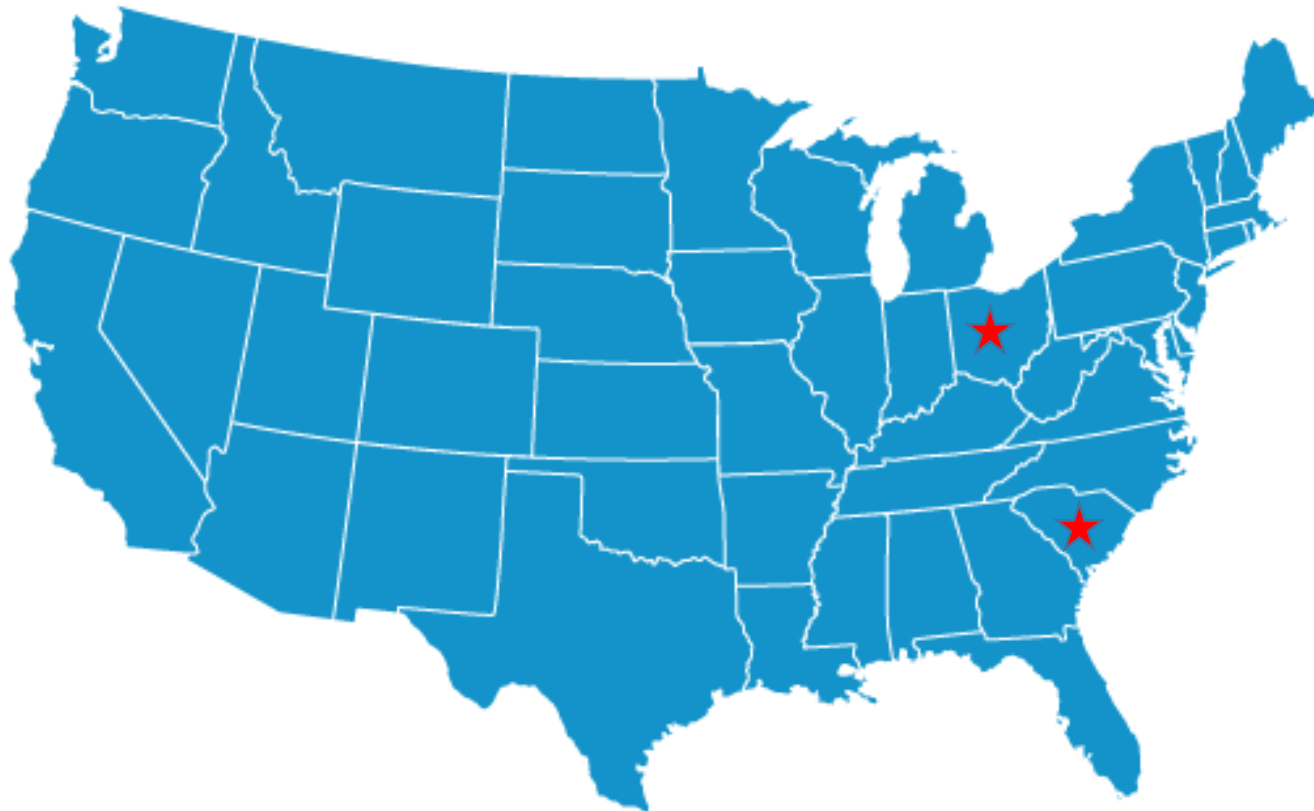
- ✓ The criterion content maps also served as content validity because the SCK were created by an expert.

# Levels of SCK

Investigation of content development in two groups differentiated by content expertise, pedagogical expertise, and experience.

1

N=32



2

N=14

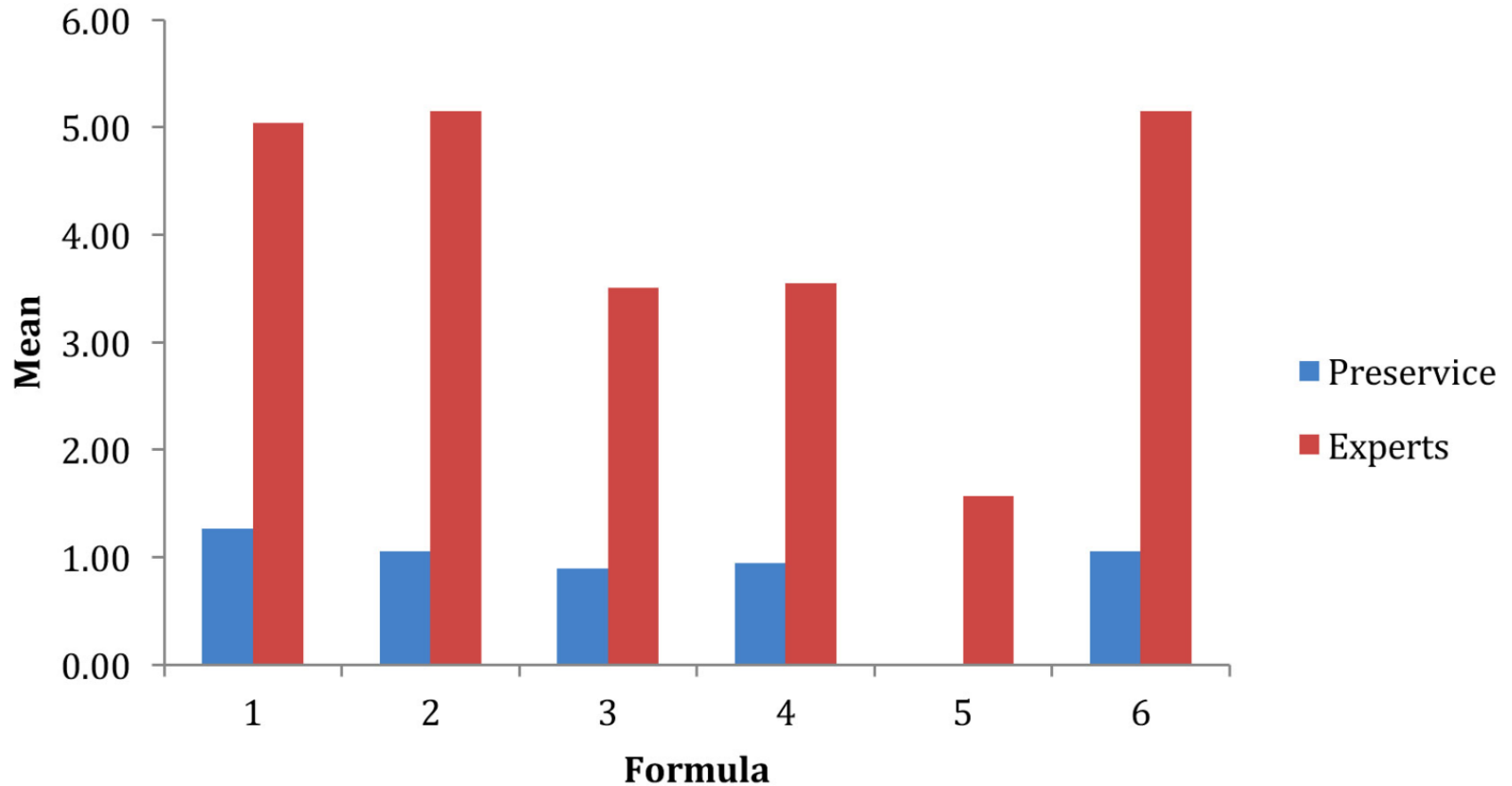
## Level of SCK

- ✓ Lesson plans created by each of the participants that was used in their teaching.
- ✓ The teachers taught a variety of content such as court games, invasion games, and fitness in 4<sup>th</sup> to 8<sup>th</sup> grades.
- ✓ Interobserver agreement was conducted on 100% of the lessons, where the mean agreement was 90.6% (range, 89.1-93.3%).

# Means of each task

	Preservice Teachers	Expert Teachers
Informing tasks	<b>Mean: 3.88 (53.5%)</b>	Mean: 1.6 (19.4%)
Extension tasks	Mean: 1.34 (17.9%)	<b>Mean: 3.27 (39.6%)</b>
Refining tasks	Mean: 0.03 (0.4%)	<b>Mean: 1.73 (20.9%)</b>
Extension-applying tasks	<b>Mean: 1.69 (23.3%)</b>	<b>Mean: 1.73 (20.9%)</b>
Refining-applying tasks	Mean: 0 (0%)	Mean: 0.27 (3.3%)
Applying game tasks	Mean: 0.31 (4.3%)	Mean: 0.07 (0.8%)
Applying non-game tasks	0 (0%)	0 (0%)
Total instructional tasks	Mean: 7.25	Mean: 8.26

# Preservice vs Experts

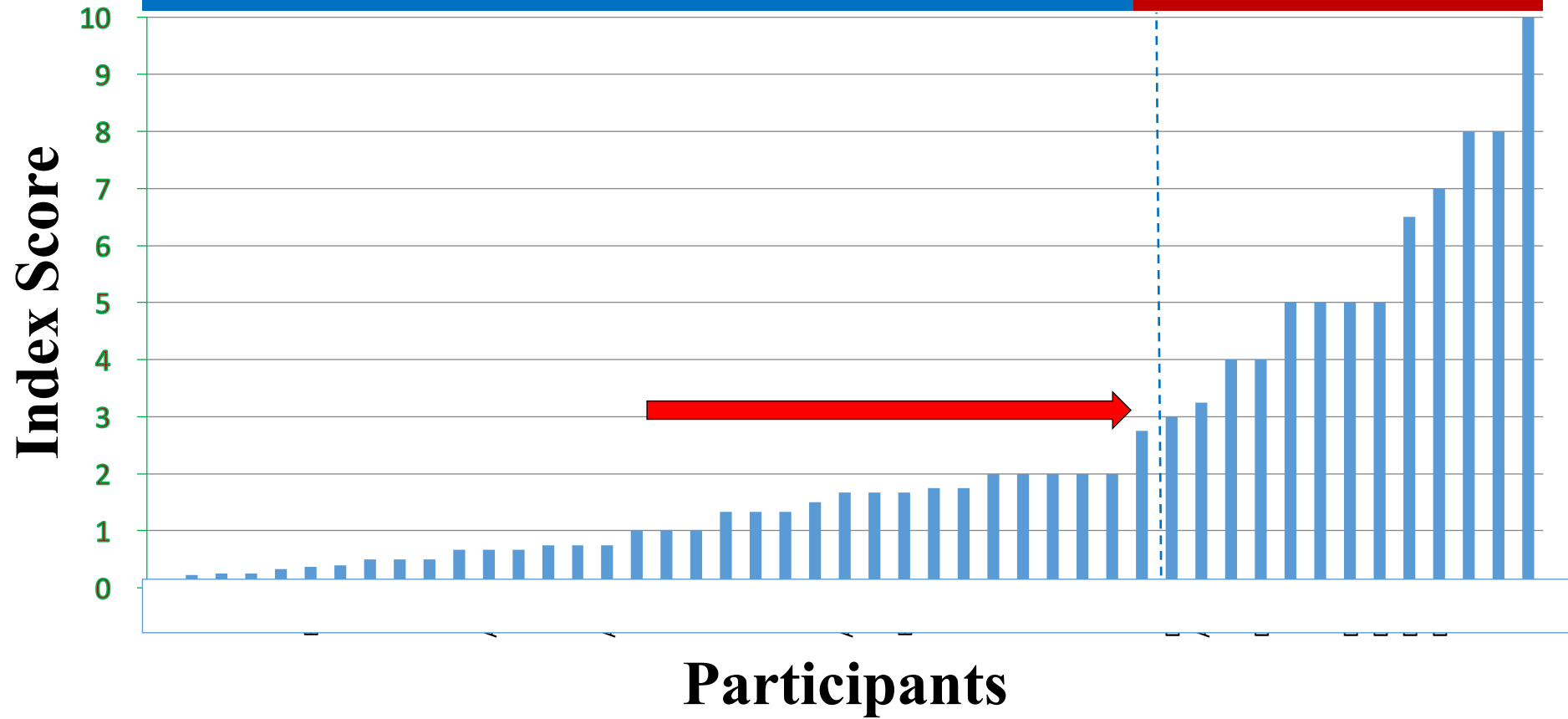


**Preservice teachers**

**N=32**

**Experts**

**N=14**



# Discussion

- ✓ New modified categories creates a more nuanced understanding of the ways that an instructional task and a sequence of tasks structured by teachers.
- ✓ Provides a mechanism that can also describe content development in instructional models



# Discussion

- ✓ Preservice teachers who attempted to use play practice had higher levels of extension-applying tasks than those who used typical instruction.
- ✓ Extension & extension-applying tasks and applying game tasks categories differentiate among the individual participants and between the preservice and expert teachers groups.

# Discussion

- ✓ Content development categories and the indices reported in this study provide a tool to allow depth of content knowledge to be developed.

# Discussion

- ✓ The new national standards for teacher education require that teacher education programs demonstrate the SCK of their preservice teachers.

# Discussion

- ✓ Content maps and formulae provide tools for programs to use to measure SCK both in terms of formative assessment and summative assessment of pre and post changes in content classes or as entry and exit measures of the degree program.

# Limitations

- ✓ Under representing of refining tasks as we used lesson plans rather than actual teaching
- ✓ Using one day rather than a unit
- ✓ Categories allow the content to be described but cannot judge the quality of the content.
- ✓ Differences we report could be the result of context variables.

# THANK YOU!



Ward, P., Dervent, F., Lee, Y.S., Ko, B., Kim, I., & Tao, W. (2017). Using Content Maps to Measure Content Development in Physical Education. *Journal of Teaching in Physical Education*, 36, 20-31.

**The Ohio State Learning to Teach Physical Education Research  
Program**

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