



The Learning to Teach Physical Education Research Program  
URL: <https://u.osu.edu/ltpel/>

# Examining the impact of a content development workshop and a knowledge packet on a teacher's instruction and student learning in an upper elementary tennis unit

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THE OHIO STATE  
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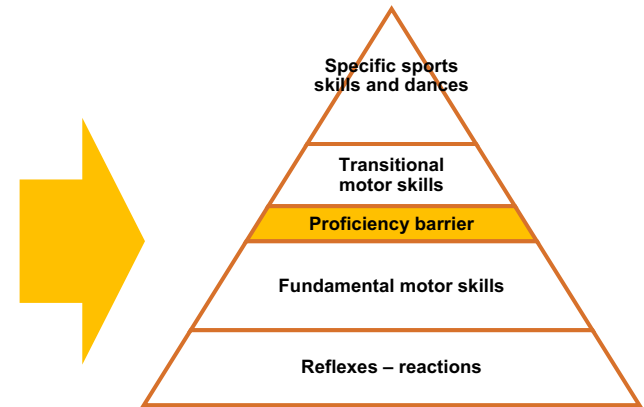
# Developmentally Appropriate Learning Outcomes are Identified for Each Age-Band and Grade Level

**Lower elementary:** Fundamental motor skills (FMS)

**Upper elementary:** Combinations of FMS beginning to put these skills in sport and game-like contexts.

**Middle school:** Applying skill in various sport and PA contexts.

**High school:** Acquire and hone specialized physical skills and knowledge they use in their adulthood.



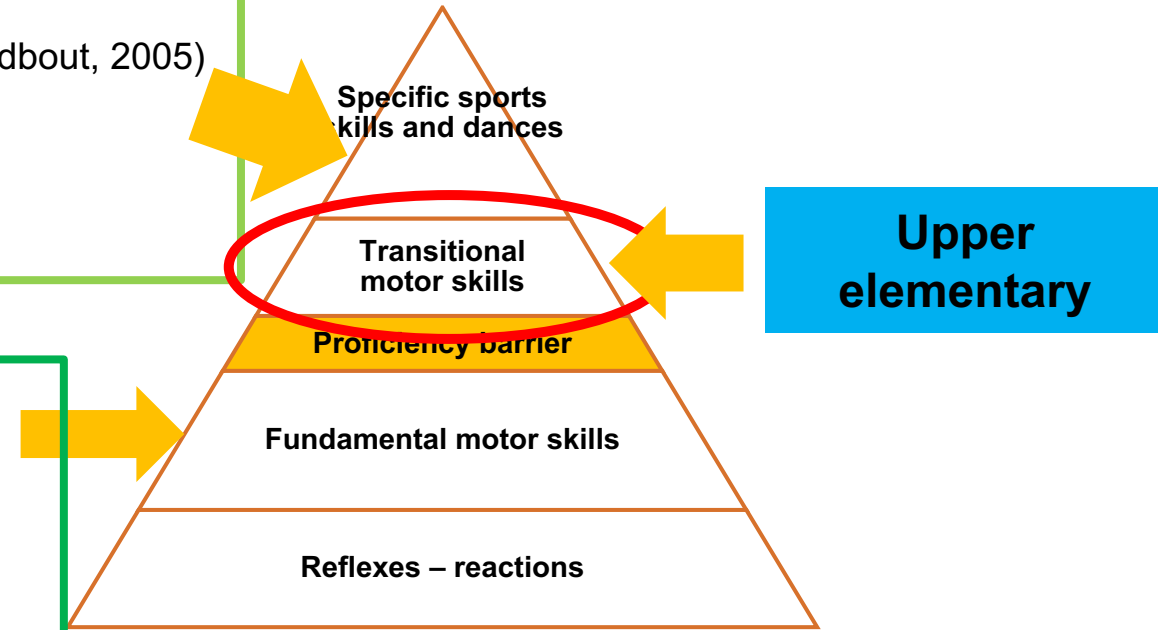
Seefeldt (1980)

(SHAPE America, 2014)

# Lack of Studies in the Transitional Motor Skill Phase

- TGfU (Butler, Griffin, Lombardo, & Nastasi, 2003)
- Tactical-Decision Learning model (Grehaigne, Wallian, & Godbout, 2005)
- Game Sense (Den Duyn, 1997; Light, 2006)
- Tactical Games (Metzler, 2005)
- Play Practice (Lauder, 2002)

- Stages
- SKIP program  
(Brian, Goodway, Logan & Sutherland, 2016; Goodway & Savage, 2001; Hamilton, Goodway & Haubenstricker, 1999; Robinson & Goodway, 2009; Robinson, Rudisill, & Goodway, 2009).



## Lower Elementary

Fundamental motor skills

## Upper Elementary



## Secondary

Specific Sports Skills

# The Stages of Game Development Model has not been Studied

## Rink (2006): Four stages of game development

**Stage 1:** Development of control of the object.

**Stage 2:** Complex control and combinations of skills.

**Stage 3:** Beginning offensive and defensive strategies.

**Stage 4:** Complex game play.

No research based evidence on Rink's model.

Stage 2 & 3 are neglected (Belka, 2013)

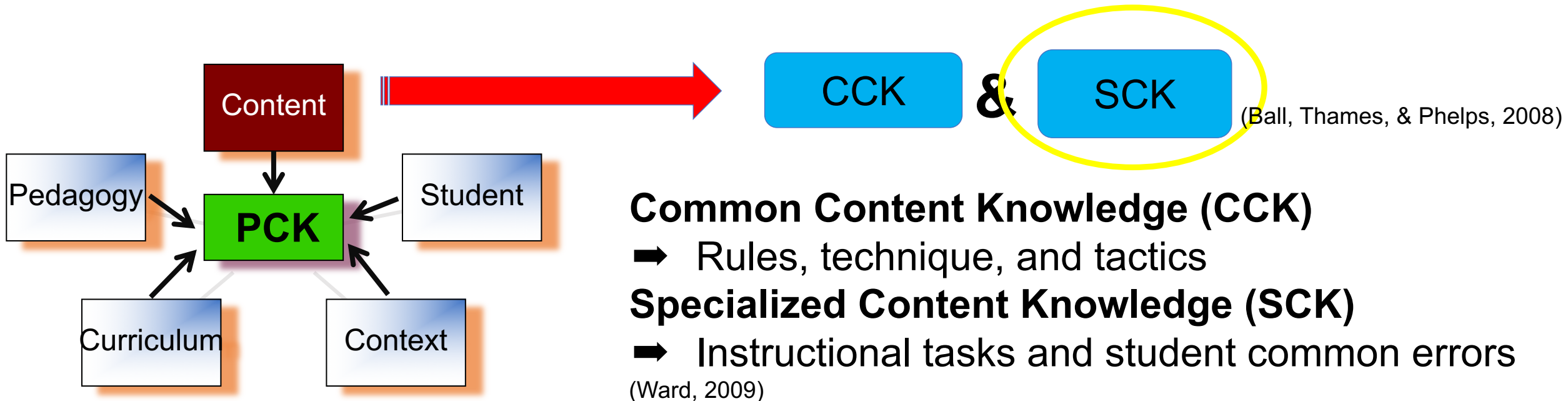
**Stage 2 and 3 are critical** (Belka, 2004; Hopper, 2002)

Practicing skills in isolation does not allow players to learn a large number of variables associated with implementing several combinations of the skills in a constantly changing game situation.

**Need for research**

# Content Knowledge is Critical for Pedagogical Content Knowledge

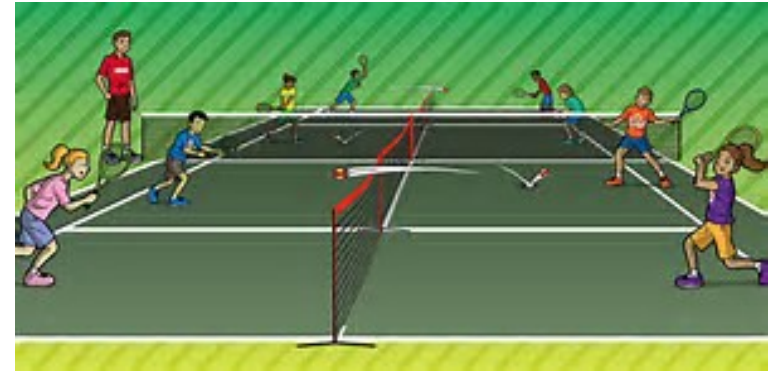
What tasks and how those tasks are delivered are critical  
= Pedagogical Content Knowledge (PCK)



(Shulman, 1987; Rovegno, 1995; Ward, 2009)

Need to examine relationships between CK and PCK.

# Tennis is Selected as the Content of interest



- Lifelong Physical Activity (NASPE, 2014).
- Becoming common content to be taught in elementary PE (Greater Columbus Tennis Association, 2014).
- The top 10 activities taught in secondary schools in the US (Corbin, 2002).
- No. 1 sport played by adults in the US (Corbin, 2002).

Lack of evidence-based teaching approaches in tennis.

# Purpose

1. To examine the impact of a teacher training focused on content knowledge (CK) on teacher's task selection and instruction.
2. To investigate the changes in teacher behavior and the impact on student learning in an upper elementary tennis unit as compared to the teacher's typical instruction and student learning.

**RQ1.** What is the impact of the CK teacher training and knowledge packet on the teacher's CCK, SCK, and their performance of upper elementary tennis?

**RQ 2.** To what extent is the teacher's teaching (i.e., task selection, task sequences, clarity of instruction, demonstration, cues, and feedback) aligned with the content taught in the teacher training?

**RQ 3.** What are the differences and similarities in the depth of content between the comparison condition and the experimental condition?

**RQ 4.** What are the student pre-post differences of tennis performance between the comparison and experimental conditions?



# Method

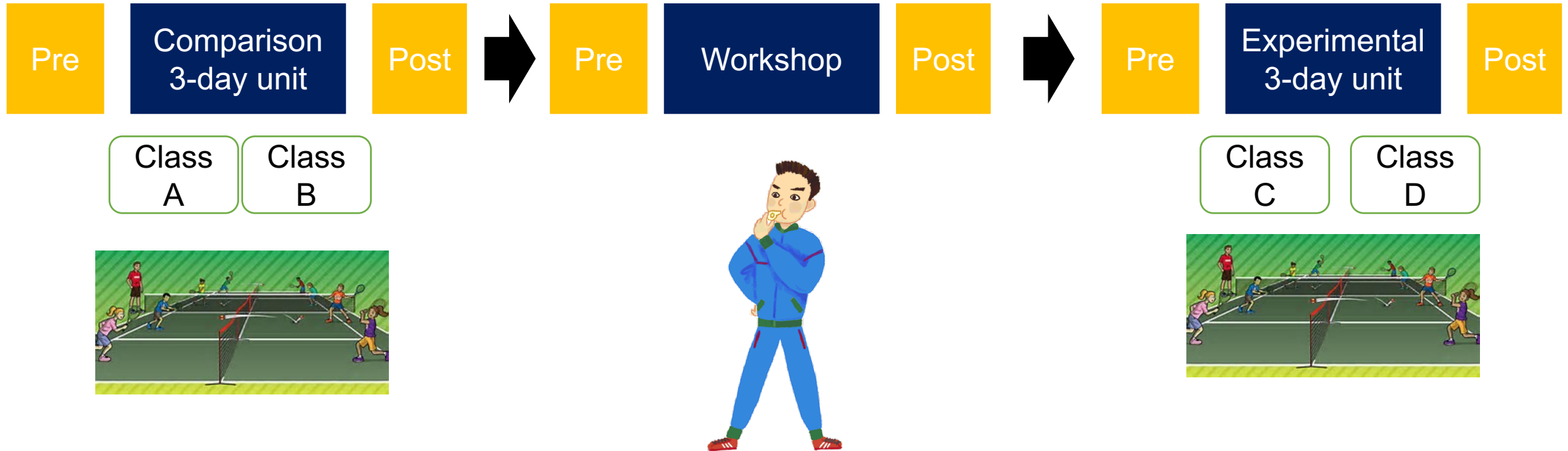
## Research design:

A randomized experimental design with a comparison condition with students nested within intact classes.

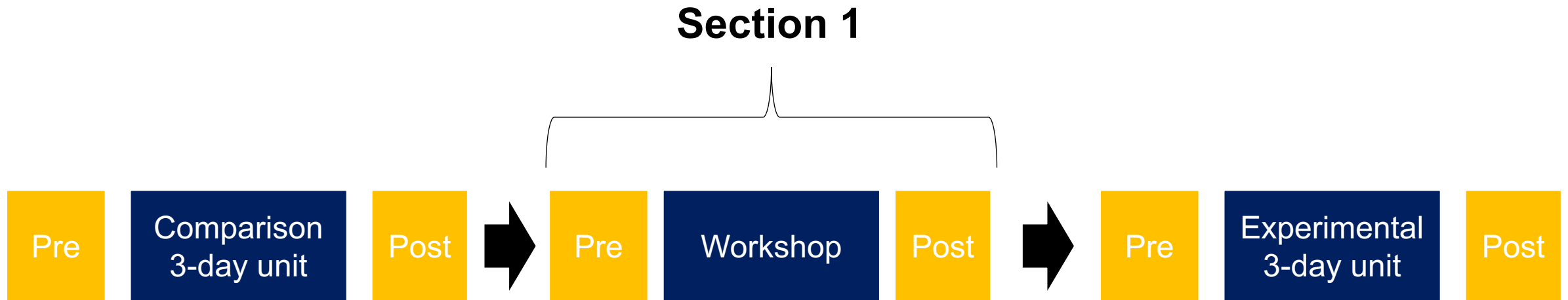
## Participants:

- **Teacher:** 1 male and Caucasian, 47 years old, taught tennis 5 years in elementary PE, 19 years of teaching elementary PE.
- **Students:** A total of 43 students.
  - Comparison – C1-4<sup>th</sup>  $n = 9$ ; C2-5<sup>th</sup>  $n = 17$
  - Experimental - E1-4<sup>th</sup>  $n = 7$ ; E2-5<sup>th</sup>  $n = 10$

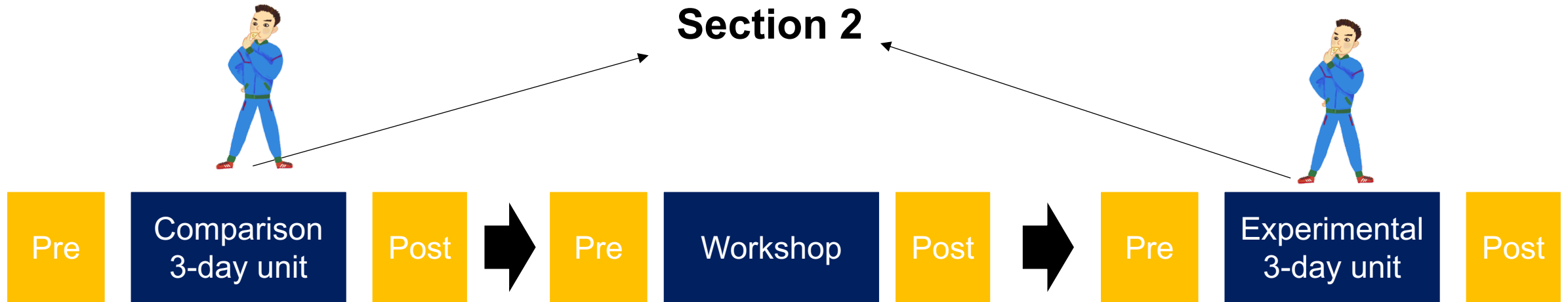
# Timeline of the Study



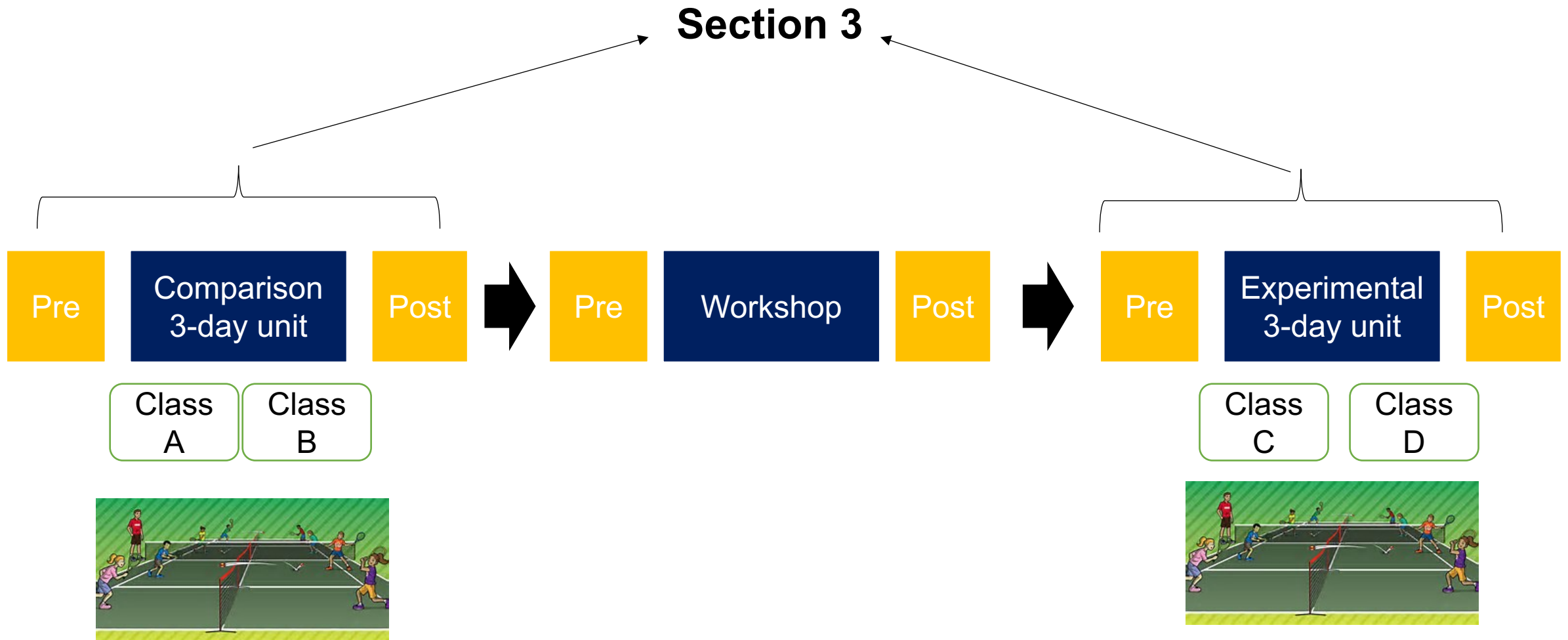
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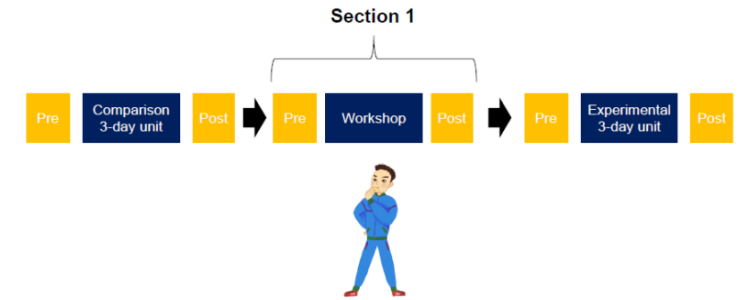
# Timeline of the Study



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# Section 1. Teacher Training



## Independent variables:

### 1. The upper elementary knowledge packet

- Sequenced tasks
- Description and goals of tasks
- Equipment needed
- Student common errors (Ward, Ayvazo, & Lehwald, 2014)

### 2. The 2-hour CK teacher training

- **Goal 1.** The teacher knows the basic rules, critical elements of techniques, and tactics in the upper elementary tennis knowledge packet (CCK).
- **Goal 2.** The teacher can perform the tennis skills needed to teach the upper elementary tennis (CCK).
- **Goal 3.** The teacher knows and can deliver the tasks and task progressions on the content map in the knowledge packet (SCK).
- **Goal 4.** The teacher can detect errors of students and correct them (SCK).

## Content Map for Upper Elementary Students

Stage 4

14) Singles/2v2 (both baseline) (A)

Stage 3

13) Friend rival game:  
forehand/backhand cross court (A)

7) Rally game 2v2 (A)

6) Rally with a group of four (E)

12) Cooperative rally with movement (3 steps) (E)

Stage 2

5) Cooperative rally with partners  
Straight/cross court (E)

10) Move – fore/backhand- go back –  
ready position (2steps) (E)

11) No racquet tennis rally/game (A)

3) Forehand with a wall  
(Focus on critical elements) (E)

4) Backhand with a wall  
(Focus on critical elements) (E)

9) Slide and move around the cones (E)

Stage 1

2) Bounce up tasks with partners (3 steps) (E)

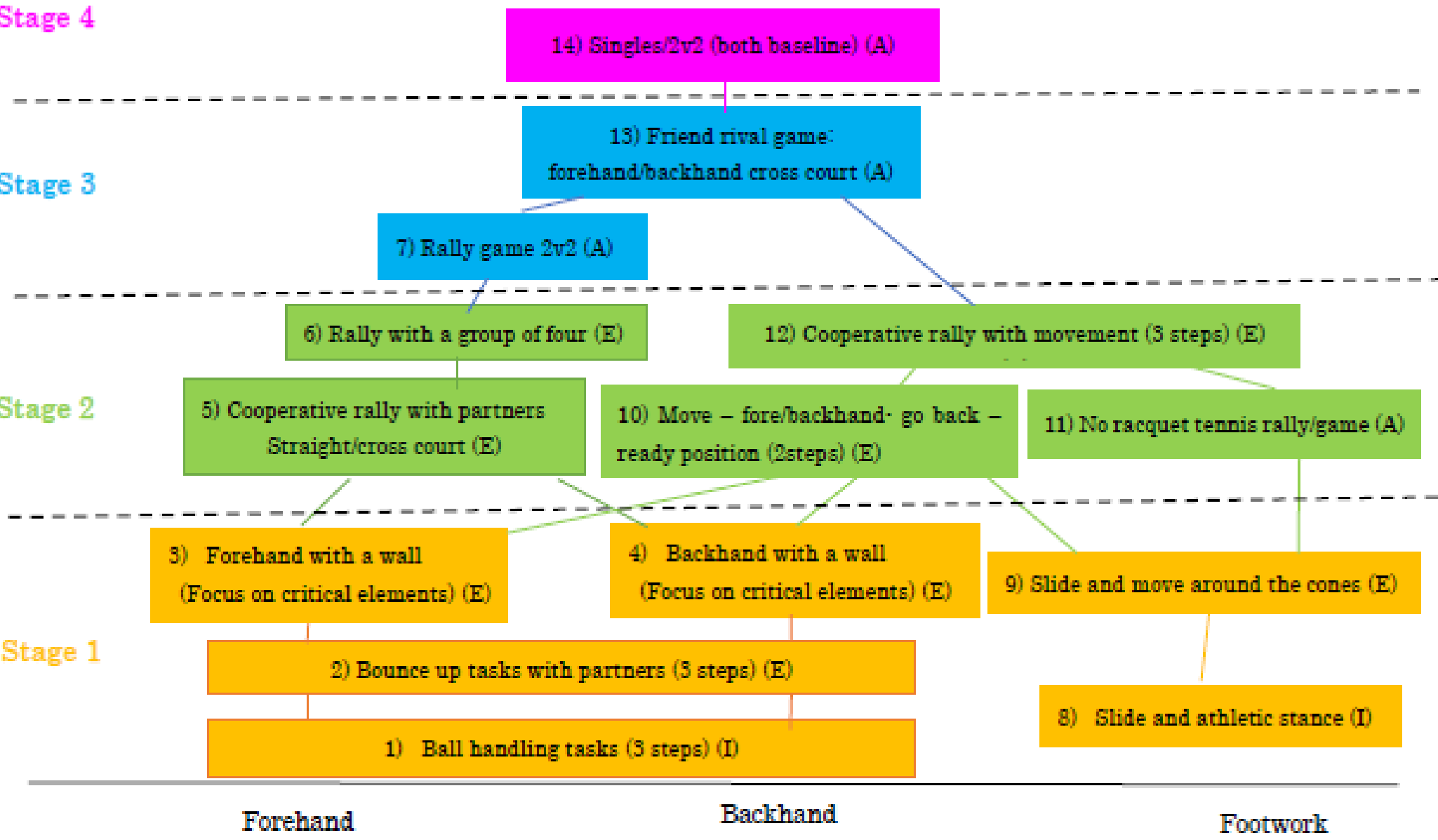
8) Slide and athletic stance (I)

1) Ball handling tasks (3 steps) (I)

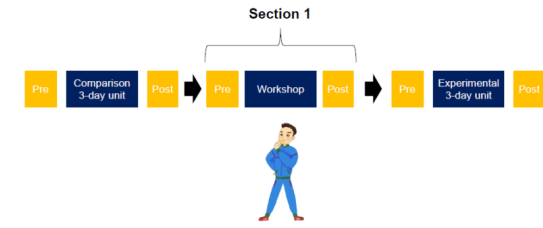
Forehand

Backhand

Footwork



# Section 1. Teacher Training



Dependent variables:

## 1. CCK: The knowledge of rules, techniques, and tactics (15 points)

➔ 15 questions on tennis rules, techniques, and tactics which is needed to teach upper elementary tennis.

## 2. CCK: The tennis skill performance (60 points)

➔ The same test as students took. It consisted of three tasks.

## 3. SCK: The knowledge of tasks and task sequences

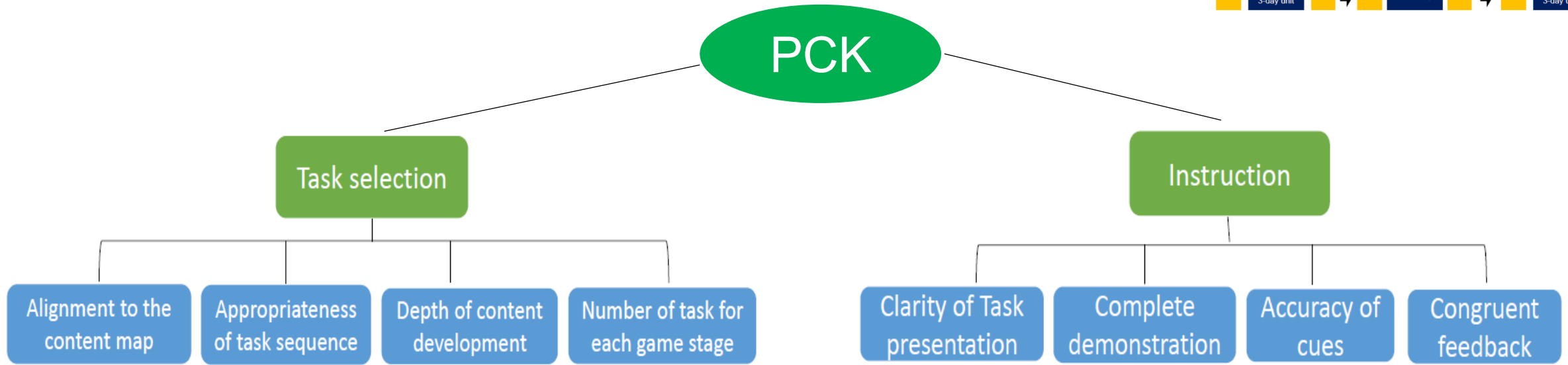
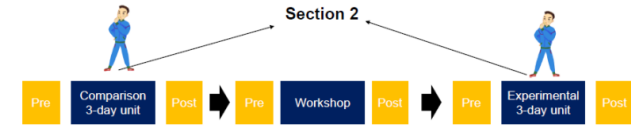
➔ Content map. Content map was analyzed in three ways ([a] depth of content development, [b] appropriateness of tasks sequences, [c] Stages of game development).

## 4. SCK: The knowledge of student errors (20 points)

➔ 10 questions and each question has 2 components (detect an error of a student & how to correct it).



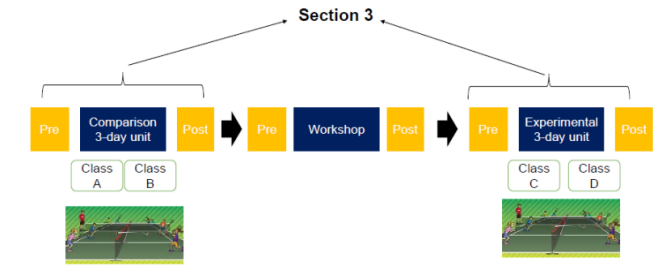
# Section 2. Comparison of Enacted Teaching



1. Alignment with the content map  
➔ Aligned, consistent, no aligned
2. Task sequence  
➔ Appropriate, inappropriate
3. Depth of content development  
➔ Informing, extending, refining, and application
4. Stage of game development  
➔ Stage 1-4

1. Clarity of task presentation  
➔ Clear, unclear
2. Complete demonstration  
➔ Complete, incomplete, no demonstration
3. Accuracy of cues  
➔ Accurate and appropriate, accurate but inappropriate, inaccurate, none given
4. Feedback  
➔ Congruent, incongruent

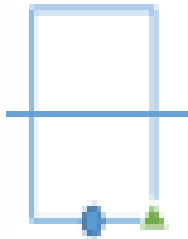
# Section 3. Comparison of Student Learning



**Pre-Post**: Tennis skill performance test – 60 points  
- Three tasks [forehand & backhand]).

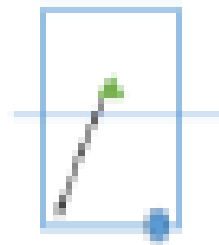
## Task 1

(Stage 1) 24 points  
An isolated skill



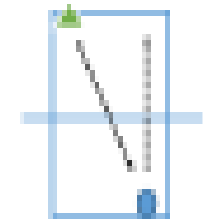
## Task 2

(Stage 2) 28 points  
Move and hit



## Task 3

(Stage 3) 8 points  
Offense and defense



# Data analyses

**RQ1 & 2.** The pre-and posttest results for CCK and SCK of the teacher.

➔ Descriptive statistics

**RQ3.** The teacher's PCK in two conditions.

➔ Descriptive statistics

**RQ4.** The impact of PCK on student tennis skill performance in the two conditions

Ensure the two conditions are the same at the pretest

➔ The Mann-Whitney test

Compare gain scores between two conditions (gain score = post – pre)

➔ The Wilcoxon signed-rank tests

SPSS ver. 22 was used to analyze the data.




# Results & Discussion



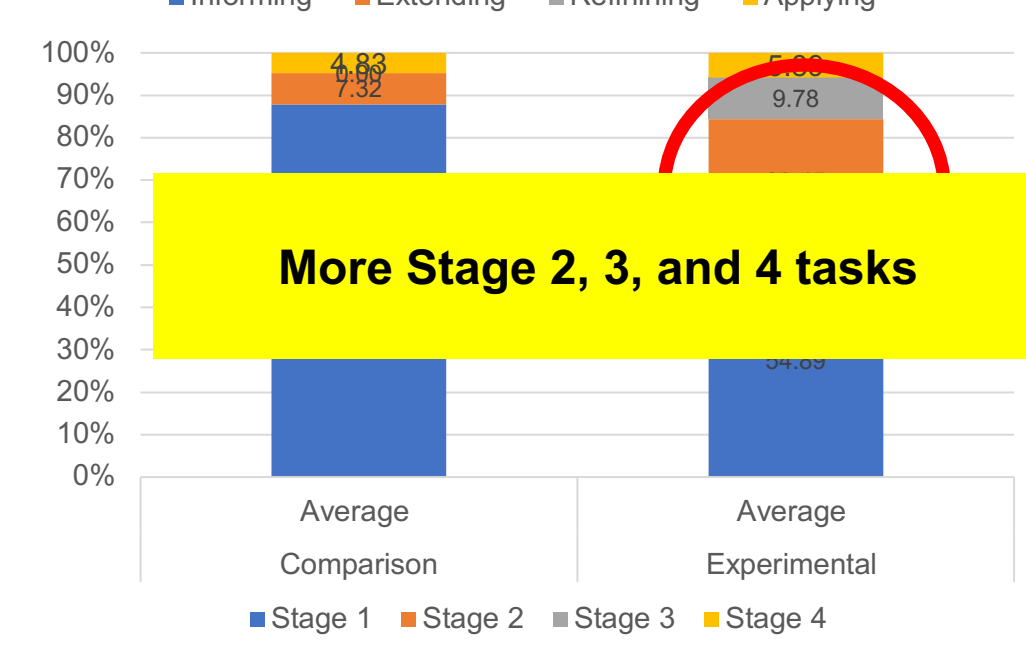
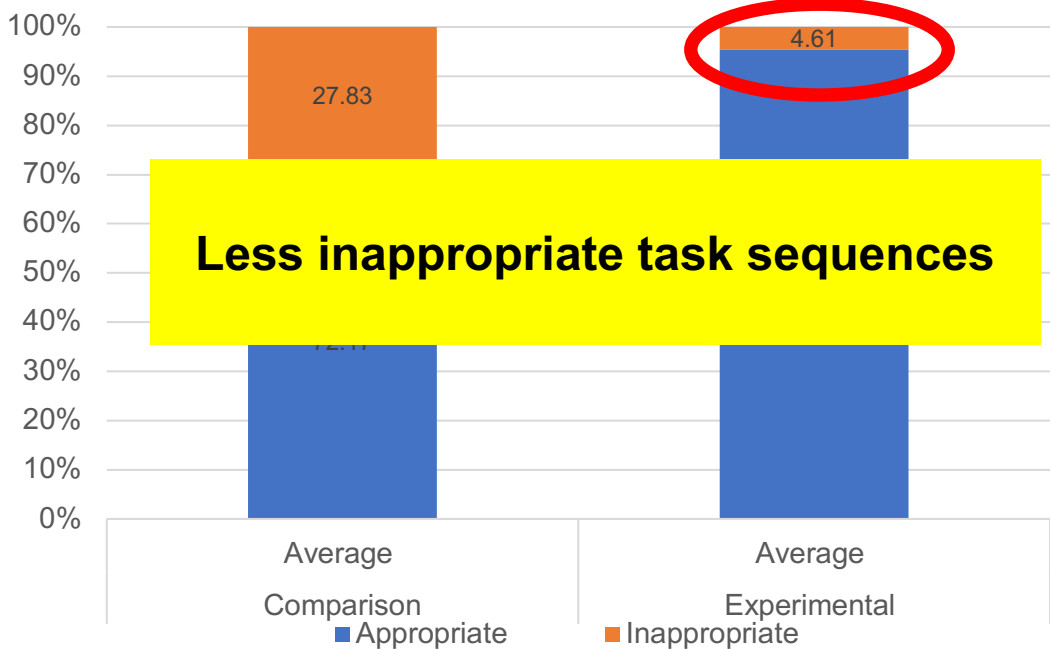
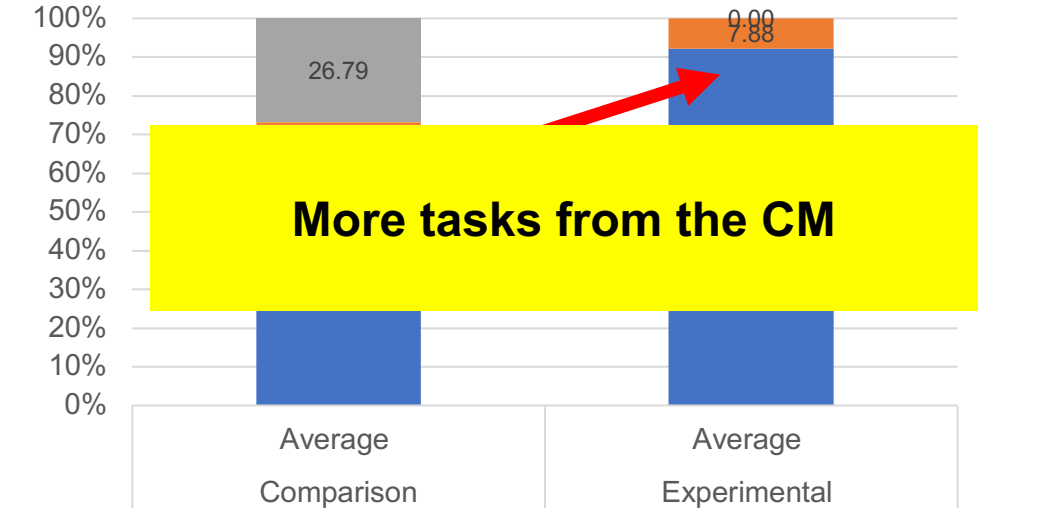
# Section 1. Teacher Training

	Pretest	Posttest
CCK: Rules, techniques, tactics (15)	14	14
CCK: Skill performance (60)	38	57
SCK: Tasks and task sequences	5.33	6.00
SCK: Student common errors (20)	11	17

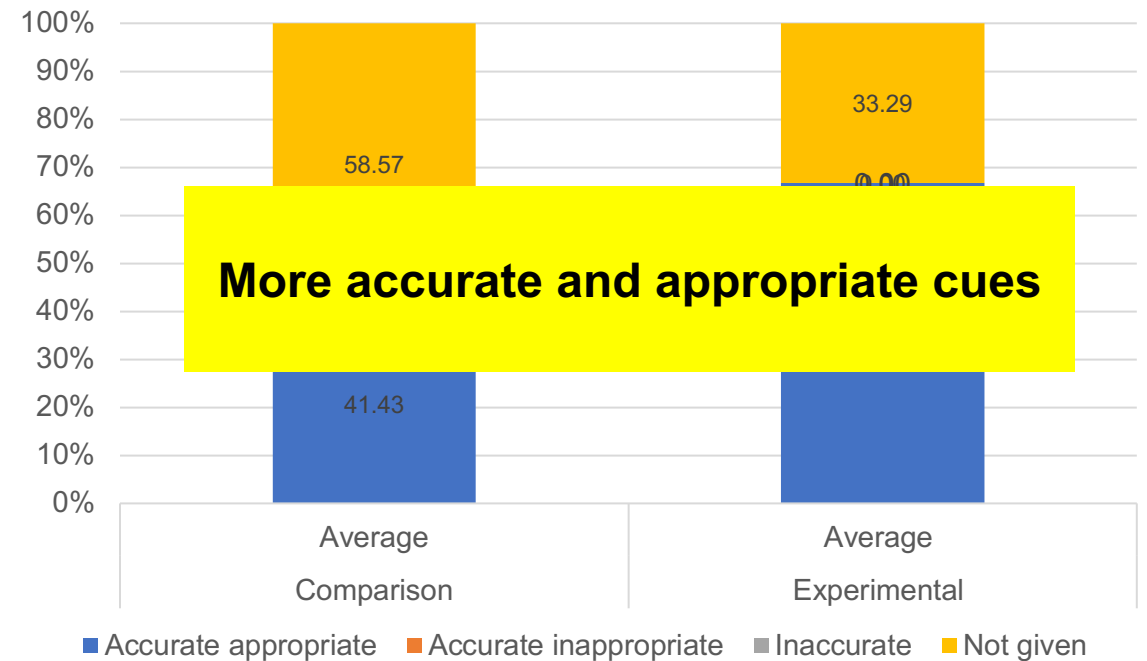
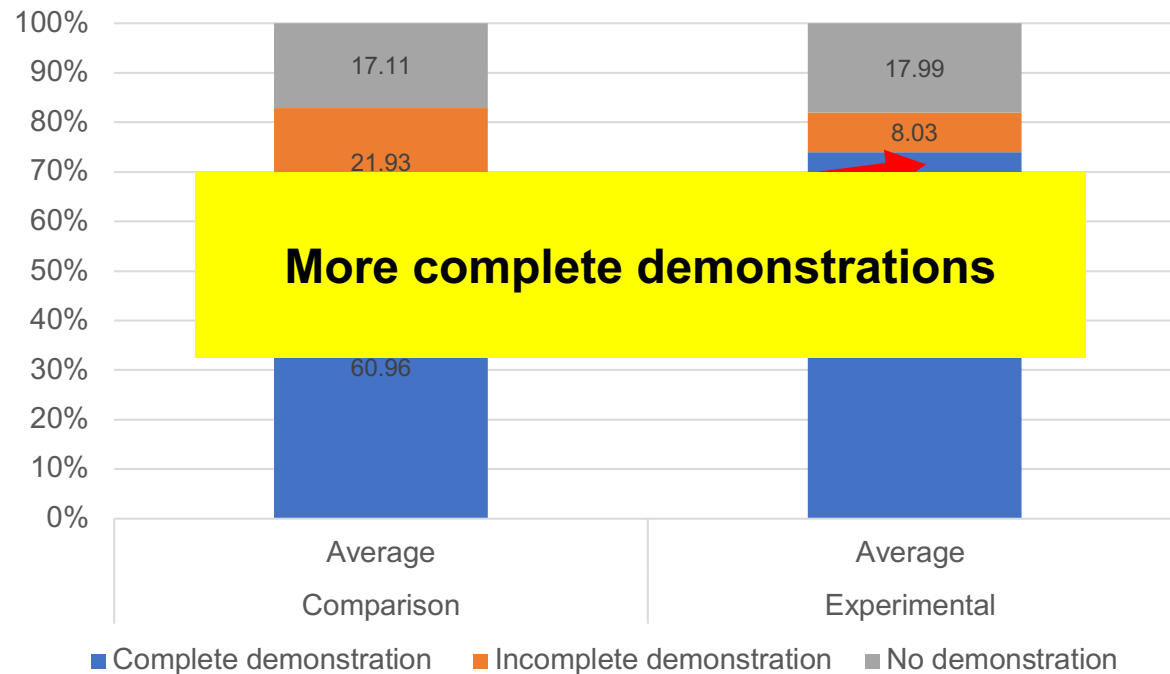
- 
- More appropriate and less inappropriate tasks in the posttest  
➔ Pre-post: Appropriate **11 – 13**; inappropriate 5 – 7
  - More Stage 2 tasks and less Stage 1 tasks in the posttest  
➔ Pre-post: S1 = **17-13**; S2 = **2-7**; S3 = 0-1; S4 = 0-0

The CK teacher training was effective.

# Section 2. Comparison of Enacted Teaching

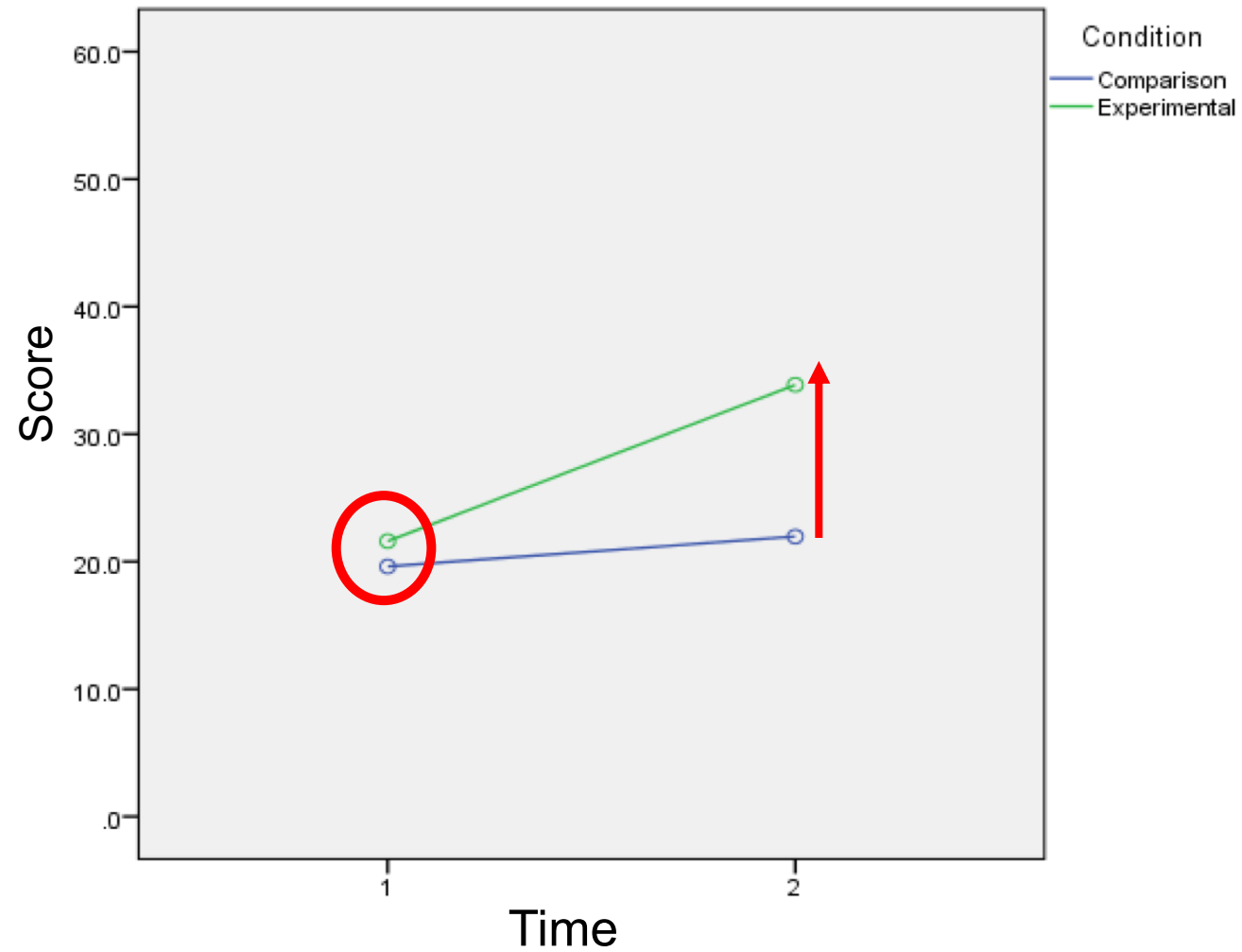


## Section 2. Comparison of Enacted Teaching



- Task presentation was 100% clear in both conditions.
- The experimental condition (**10.66**) had almost twice as much congruent feedback as the comparison condition (**5.83**).

# Section 3. Comparison of Student Learning





# Practical Implication to Pre- and In-Service Programs

1. Focus on developing teacher's CCK and SCK.
2. Use a material like a knowledge packet.
3. Teach an appropriate model, such as Rink's stages of game development.



# Limitations

1. Small sample size.
2. A short duration of the unit.
3. Assessments are only content validated.



# Contribution of this Study



- ❑ First study conducted in an upper elementary context.
- ❑ First study assessed a teacher's knowledge change.
- ❑ First study demonstrating that changing a teacher's knowledge can improve a teacher's instruction without providing coaching after the workshop.

# Conclusion



CK improves

**Important to develop teachers' CK!!**



**More student learning**



Thank you very much!



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