# IMPACT OF A BADMINTON COURSE DESIGNED FOR COMMON AND SPECIALIZED CONTENT KNOWLEDGE OF PROSPECTIVE TEACHERS

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## ABSTRACT

IMPACT OF A BADMINTON COURSE DESIGNED FOR COMMON AND SPECIALIZED CONTENT KNOWLEDGE OF PROSPECTIVE TEACHERS

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The purpose of this study was to examine the effects of badminton content knowledge intervention on pre-service teachers' common and specialized content knowledge. Quasi-experimental design with purposefully selected experiment and comparison groups was applied for this study. Experimental group comprised 38 preservice teachers from a physical education teacher education (PETE) program at a university in Turkey. The comparison group included 36 preservice teachers from another university having a similar context with the experimental group in terms of student selection process. Experimental group followed a 10-week badminton content knowledge intervention which was designed according to Ward's content knowledge framework (Ward, 2009a). Comparison group participants followed their regular badminton course at their PETE program. A validated badminton content knowledge test was developed and applied to both experimental and comparison groups before and after the badminton courses. At the end of the intervention, 12 experimental group participants were interviewed. Mixed ANOVA was used for statistical analysis of content knowledge test. Interview data were analyzed with content analysis method. Findings indicated a significant increase in common content and specialized content knowledge level of experimental and comparison group

participants from pre to posttest ($p<.05$). Moreover, experimental group participants' common and specialized content knowledge gains from pre to posttest was higher than the comparison group participants' related content knowledge levels ($p<.05$). Content analysis of interview data indicated four themes; 1) enjoyment, 2) content knowledge development, 3) learning how to teach, and 4) instructor's content knowledge level. In conclusion, designing badminton course by the Ward' content knowledge framework was effective for the PETE students common and specialized content knowledge development. Physical activity/sports courses in the PETE program should be designed according to this framework, and the professional subject matter content knowledge of the instructors of those courses should be re-visited.

Keywords: Physical Education, Content Knowledge, Badminton

# ÖZ

BEDEN EĞİTİMİ ÖĞRETMEN ADAYLARININ GENEL VE ÖZELLEŞMİŞ ALAN BİLGİSİ SEVİYELERİ İÇİN GELİŞTİRİLEN BİR BADMİNTON DERSİNİN ETKİSİ

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Bu çalışmanın amacı, badminton alan bilgisi öğretim programının beden eğitimi öğretmen adaylarının alan bilgisi seviyesine etkisini incelemektir. Bu çalışmada, amaçlı örneklem yöntemiyle seçilen deney ve karşılaştırma gruplarından oluşan yarı deneysel tasarım kullanılmıştır. Deney grubu, Türkiye'deki bir üniversitenin beden eğitimi öğretmeni yetiştirme programında öğrenim gören 38 öğretmen adayından oluşmaktadır. Karşılaştırma grubu ise deney grubuna benzer bir öğrenci alımı gerçekleştiren başka bir üniversitenin 36 beden eğitimi öğretmen adayından oluşmaktadır. Deney grubu, Ward (2009a) tarafından geliştirilen alan bilgisi kavramsal çerçevesine göre tasarlanan 10 haftalık badminton alan bilgisi öğretim programını takip etmiştir. Karşılaştırma grubu ise kendi üniversitelerindeki varolan badminton öğretim programını takip etmiştir. Öğretmen adaylarının badminton alan bilgisi seviyesi, badminton bilgi erişi testi ile ölçülmüştür. Bu test katılımcılara badminton derslerinden önce ve sonra uygulanmıştır. Badminton alan bilgisi testi genel alan bilgisi için çoktan seçmeli, özelleşmiş alan bilgisi için kısa cevaplı ve açık

uçlu sorulardan oluşmaktadır. Testin geçerliliği ve güvenilirliği pilot çalışma bulgularına göre değerlendirilmiş ve bulgular testin geçerli ve güvenilir bir ölçüm aracı olduğunu göstermiştir. Deney grubuna uygulanan badminton öğretim programının etkililiğini incelemek için 12 deney grubu katılımcısına yapılandırılmış görüşme uygulanmıştır. Alan bilgisi testinin istatistiksel analizleri için karışık ölçümler için ANOVA testi kullanılmıştır. Görüşme verilerinin analizi için içerik analizi yöntemi kullanılmıştır. Çalışmanın bulgularına göre her iki grup katılımcının ön test ve son test sonuçları arasında anlamlı fark bulunmuştur. Her iki grubun son test bulgularına bakıldığında, deney grubu katılımcılarının anlamlı düzeyde karşılaştırma grubu katılımcılarından daha iyi oldukları saptanmıştır ($p<.05$). Görüşmelerin içerik analizleri sonucunda 4 tema ortaya çıkmıştır. Bu temalar; 1) eğlenme, 2) alan bilgisi gelişimi, 3) nasıl öğreteceğini öğrenme, ve 4) öğretim elemanının alan bilgisi seviyesidir. Sonuç olarak, Ward'ın alan bilgisi kavramsal çerçevesine göre tasarlanan badminton öğretim programı, beden eğitimi öğretmen adaylarının genel ve özelleşmiş alan bilgilerinin gelişimi açısından etkili bulunmuştur. Beden eğitimi öğretmen yetiştiren kurumlardaki fiziksel aktivite/spor derslerinin bu kavramsal çerçeveye göre tasarlanması ve bu derslerin öğretim görevlilerinin mesleki alan bilgileri tekrar gözden geçirilmesi önerilir.

Anahtar Kelimeler: Beden eğitimi, Alan Bilgisi, Badminton

To My Wife and My Family

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| | |
|---|---|
| CK | Content Knowledge |
| CCK | Common Content Knowledge |
| SCK | Specialized Content Knowledge |
| PCK | Pedagogical Content Knowledge |
| PETE | Physical Education Teacher Education |

# CHAPTER 1

# INTRODUCTION

## 1.1. Research Problem

Teachers' professional responsibility is to ensure student learning by planning, implementing, assessing and evaluating the instruction with the aim of education (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Siedentop, 2002). However, there are plenty of evidences that student learning in many subject areas is far from the intended level. For example, after the thousands of hours math, science, literature, foreign language, art and music education in compulsory education years, many students could not even comprehend the basics of that subject-matter (Berberoğlu & Kalender, 2005; Cheung & Chan, 2008; Weiss, 2009). Specifically, in physical education, most students could not learn the health-related physical activity/fitness knowledge and skills which are the main intended outcome of the course during the compulsory education years (Keating, Harrison, Dauenhauer, Chen, & Guan, 2009; Thompson & Hannon, 2012). Current research evidence clearly indicated that student learning crisis mentioned above had been directly associated with the level of professional knowledge of those students' teachers (Hunuk, Ince, & Tannehill, 2012).

The link between the student learning and the teachers' professional knowledge level makes the stakeholders in education question the quality of teacher education. However, in order to examine the quality of teacher education, firstly current professional knowledge base of teachers should be identified. During the late 1980's Shulman identified seven main categories of teachers' professional knowledge. These were teachers' a) general pedagogical knowledge, b) learners' knowledge and their characteristics, c) knowledge of educational contexts, d) knowledge of educational ends, purposes, and values, and their philosophical and historical

grounds, e) content knowledge, f) curriculum knowledge, and g) pedagogical content knowledge (Shulman, 1987).

Furthermore, Grossman (1990) stated that those professional knowledge categories were not independent of each other; in other words, they were interrelated. Like Grossman (1990), others also emphasized that if teachers have the weak content knowledge, it will influence the teachers' knowledge in other categories in a negative way as well. (Iserbyt, Ward & Li, 2015; Hunuk, Ince & Tannehill, 2013; Siedentop 2002). Moreover, content knowledge aspects are subject-matter specific; for instance, a math teacher needs to have math content knowledge while an English or physical education teacher needs to have their own subjects' content knowledge (Shulman, 1986).

What is more, there have been plenty of studies dealing with teachers' content knowledge in the last 30 years. First of all, Shulman (1986) defined teachers' content knowledge in his seminal study as "*the amount and organization of knowledge per second in the mind of the teacher*" (Shulman, 1986). Then, Grossman (1990) elaborated content knowledge as the "*knowledge of content and knowledge of substantive and syntactic structures in subject area*" (p.25).

After the Shulman's and Grossman's conceptualization of teachers' content knowledge, next generation of educational researchers concentrated on examining the content knowledge level of in-service teachers, and its relation to their students learning (Grossman, Schoenfeld, & Lee, 2005; Ma, 1999). Those studies found out that teachers have weak content knowledge in general, and student learning is better in classes of teachers with adequate content knowledge (Ma, 1999; Millsaps, 2005). Then, Grossman et al., (2005) expressed the weaknesses of teacher education programs in developing content knowledge of prospective teachers for elementary, secondary and high school setting and recommended the re-design of content knowledge coursework in teacher education programs.

Recently, Ball, Thames & Phelps (2008) made a significant contribution to the conceptualization of teachers' content knowledge in the field of mathematics. Beyond the previous conceptualizations (Shulman, 1987), they identified two main categories of content knowledge including a) common content knowledge (CCK) and b) specialized content knowledge (SCK) (Ball et al., 2008). CCK defines an educated person's math knowledge and skills which are necessary for solving daily problems (what to teach). On the other hand, SCK defines the knowledge and skills that represent mathematical reasoning and error analysis (how to teach CCK) (Ball et al., 2008).

Following the study of Ball et al. (2008), Ward (2009a) adapted the Ball's conceptualization of content knowledge into the physical education field. According to Ward (2009a; 2011), a physical education teacher should have the knowledge of physical activity/sports in four domains including a) rules, etiquette and safety, b) technique and tactic, c) student errors, d) instructional task and representation. Ward (2009a; 2011) stated that a) rules, etiquette and safety, and b) technique and tactic knowledge are the parts of CCK, and c) student errors and d) instructional task and representation are the parts of SCK.

Ward (2011) specifically concerned with teachers' physical activity/sports content knowledge because physical education teachers use it as an instruction tool in their classes. For example, new physical education curricula stress the importance of the optimum student learning of skill, knowledge, and attitude through participating in various types of physical activities and sport such as team, individual, outdoor, dance/rhythm, racquet and aquatic activities (MoNE, 2012; NASPE, 2004). Therefore, physical education teachers need to know the content knowledge of those physical activities and sports (Educational Testing Service, 2016; MoNE, 2012; NASPE, 2004).

Ward's (2011) conceptualization of physical education teachers' content knowledge in physical activity and sport related topics has increased the number of research

focusing on the amount of time and content devoted to developing CCK and SCK in physical education teacher education (PETE) programs (Ward et al., 2013; Ward, Li, Kim & Lee, 2012; İnce, Ward & Devrilmez, 2012). For example, a study analyzing PETE curricula of different countries' (USA, China, South Korea, England, Belgium, and Turkey) physical activity courses (gymnastics, athletics, basketball, badminton, etc.) indicated that PETE programs provide insufficient time for SCK (Ward et al., 2013).

In Turkish context, İnce, Ward, and Devrilmez (2012) also indicated the percentage of content devoted to the components of CCK and SCK domains. According to their findings, content dedicated to a) rules, etiquettes & safety, b) technique & tactics, c) student errors, and d) instructional task & representations were 12.5 %, 77.1 %, 5.3 % and 4.5 %, respectively. These findings indicated that technique & tactics which are sub-domain of Ward's (2009a) conceptualization seem more dominant in physical activity/sports courses in Turkish PETE programs. Content devoted to rules, etiquettes & safety part was relatively satisfactory. However, the percentage of allocated time to student errors and instructional task & representations, which are sub-domains of SCK in PETE programs, was very limited.

Recent studies examined the effects of SCK interventions on the physical education teachers' pedagogical content knowledge (PCK; how to teach the subject matter) and the learning of those teachers' students (Ward, Kim, Ko & Li, 2014; Kim, 2015; Iserbyt, Ward & Li, 2015). Studies indicated that students learned easier and better if teachers improved their SCK level after SCK interventions. However, these studies had certain limitations in terms of sample size and data collection. Ward, Kim, Ko & Li (2014), Kim (2015), Iserbyt, Ward & Li (2015) examined only four, one and one teacher and their students, respectively. In studies above, teachers' content knowledge levels were evaluated by observation and interview methods. Data collection methods used for these studies can be appropriate for small sample size studies. However, evaluating teachers' SCK level in studies with larger sample size is not practical and affordable. Therefore, there is a need to find a valid, efficient and

affordable method for evaluating teachers' content knowledge level, especially in larger sample studies. According to Ayvazo, Ward, & Stuhr (2010), development of a knowledge test may be a good option in order to measure teachers 'content knowledge level.

In summary, the studies indicated that there was a weakness in teachers' content knowledge level, especially in SCK domain (Ward, Kim, Ko & Li, 2014). Allocated time for SCK was insufficient in PETE programs (Ince et al., 2012; Ward et al, 2013). Professional development programs focusing SCK domain enhanced teachers' PCK level and their students' learning outcomes. (Iserbyt, Ward & Li, 2015; Kim, 2015). In literature, there are few studies focusing SCK development of PETE students. Moreover, available SCK evaluation tools are not practical to use in studies with large sample size.

Current primary and secondary school physical education curricula in Turkey cover the physical activity forms, including individual, team, racquet, outdoor, aquatic sports and dance. As many other developed countries (England National Curriculum for PE, 2000; NASPE, 2004; MoNE, 2012), school education curricula in Turkey was designed to develop knowledge of physical activity, skill, and activity-specific strategies. In other words, a student completing secondary school education in Turkey should reach a certain level of competency in physical activity knowledge, skill and activity-specific strategies. Even though there are many sports (for example, athletics, gymnastics in individual sport group; basketball, volleyball in team sport group; badminton, tennis in racket sport group) described within each of the activity groups, instructional design experts suggest that physical education teachers should focus on at least one sport from each cluster. The reason behind this knowledge, skill and activity-specific strategies in the same activity group can be transferred more easily to other activities within the same activity group (MoNE, 2012).

PETE programs should be able to support the PETE students with having high level of content knowledge. Therefore, if the purpose of PETE programs is to educate

PETE students well and prepare them to real school settings, PETE should provide sufficient and profound content knowledge opportunities including CCK and SCK for PETE students.

## 1.2 Purpose of the Study

The purpose of this study was to examine the effects of badminton content knowledge intervention on PETE students' common and specialized content knowledge level.

## 1.3 Research Questions

1.3.1 How does the badminton course intervention influence CCK levels of PETE students?

1.3.1.1. What is the effect of the intervention on PETE students' knowledge of rules, etiquette & safety in badminton?

1.3.1.2. What is the effect of the intervention on PETE students' knowledge of techniques & tactics in badminton?

1.3.2 How does the badminton course intervention influence SCK levels of PETE students?

1.3.2.1 What is the effect of the intervention on PETE students' knowledge of student errors in badminton?

1.3.2.2 What is the effect of the intervention on PETE students' knowledge of instructional tasks & representations in badminton?

1.3.3. How do the PETE students perceive the badminton content knowledge intervention?

## 1.4 Limitations of the Study

There were some limitations in this study. Sample selection process was the first limitation. Experimental and comparison groups were purposefully selected.

Generalization of the results of this study through population was limited because of purposive sampling. Second limitation was the duration of badminton achievement test while students were performing it. Achievement test includes 133 multiple-choice questions and 34 short answer and open-ended questions. The test duration was almost 90 minutes which may affect the concentration of participants. Representation of CCK and SCK domains in achievement test could be considered as third limitation of this study. As mentioned above, CCK questions were much more than SCK questions. Assessing and evaluating participants' badminton content knowledge levels might be affected in terms of CCK and SCK domains. The fourth limitation was about qualitative data collection methods. Researcher only used two data collection methods which were interview and field notes. The last limitation was about interviewer. Researcher who was the experimental group lecturer performed the interviews. Answers of experimental group students could be affected because interviewer and lecturer was the same person.

### 1.5 Significance of the Study

To date, studies showed that increasing teachers' content knowledge level enhanced teachers' PCK and student learning outcomes. Recent studies also indicated that teachers' content knowledge have had two components: CCK and SCK.

However, studies also indicated that allocating time for SCK domain in content of physical activity and sport was limited at PETE programs (Ince et al., 2012; Ward et al, 2013). Moreover, there are weaknesses in teachers' SCK level (Ince et al., 2012; Kim, Lee, Ward, & Li, 2015; Ward et al, 2013). Studies showed that If PE teachers were provided with well-designed interventions focusing on SCK, those teachers' PCK level would also improve. However, there is not sufficient number of knowledge tests to evaluate content knowledge level of the physical education teachers.

This study has contributed to literature in the following ways;

a) A validated knowledge test is developed to measure PETE students' badminton CCK and SCK levels. This test can be used for evaluating PETE students' content knowledge level according to the new content knowledge framework of Ward (2009a) for physical education field.
b) An intervention is designed according to Ward's (2009a) content knowledge framework. The intervention emphasises on both CCK and SCK domains. It also focuses on not only how to play but also how to teach badminton sport. It provides a good model for instructional designers and instructors in physical education field. The design of this intervention can be transferred to other physical activity/sports courses in PETE programs.

In summary, this study is significant to see the missing parts of PETE programs and to re-design badminton content knowledge courses according to the up to date teachers' content knowledge conceptualization in the literature.

### 1.6 Definition of Variables

**Content Knowledge**: The subject matter knowledge one needs to teach a subject (Ward, 2009a).

**Common Content Knowledge (CCK)**: Knowledge that one must possess to simply perform an activity or do a sport including basic rules, etiquette, safety and also technique and tactics (Ward, 2009a).

**Rules, Etiquette and Safety:** Knowledge that one has and understands the game rules (e.g., a touchdown versus a field goal in football), etiquette (e.g., not to argue with referee decisions), and safety (e.g., the blade of the hockey stick must be kept below the knee) (Kim, Lee, Ward, & Li, 2015).

**Technique and Tactic:** Knowledge that someone needs to know about technique (e.g., how to grip racket in forehand) and tactic (e.g., knowing how to draw a defender in an invasion game) (Kim et al., 2015).

**Specialized Content Knowledge (SCK):** Knowledge that is necessary for someone to teach the activity, including error analysis and proper selection of tasks (Ward, 2009a).

**Student Errors:** Knowledge that one must detect students' errors (Ward, 2009a).

**Instructional Task and Representation:** Knowledge about the actual task and the representation of that task (e.g., instructions and demonstrations of how to perform the forward roll) (Ward, 2009a).

# CHAPTER 2

# LITERATURE REVIEW

This chapter is organized into four parts. First part reviews content knowledge of teachers. Content knowledge in general education is reviewed in the second part. Third part reviews content knowledge in physical education and physical education teacher education (PETE). Last part describes current status of content knowledge in physical education.

## 2.1 Content Knowledge of Teachers

Content knowledge was originally conceptualized by Shulman (1986) as the core knowledge for teaching subject matter. Shulman categorized content knowledge for teachers as; (a) subject matter knowledge, (b) pedagogical content knowledge (PCK), and (c) curricular knowledge (Shulman, 1986). One year later, Shulman (1987) changed and extended his theoretical framework as seven categories for teacher knowledge bases. The categories were: (a) content knowledge (b) general pedagogical knowledge: "Broad principles and strategies for classroom management and organization that transcend subject matter", (c) curriculum knowledge:" Particular grasp of the materials and programs as tools for teacher", (d) pedagogical content knowledge: "Special amalgam of content and pedagogy" , (e) learners' knowledge and their characteristics, (f) knowledge of contexts: " Working group or classroom, the governance and financing of school districts, to character of communities and cultures", (g) knowledge of educational ends, "Purposes, and values and their philosophical and historical grounds" (p. 8) **(**Figure 1**).** In Shulman's study, content knowledge was explained as one of the seven components of teacher knowledge bases. Content knowledge was important for teaching. Shulman defined content knowledge as the core knowledge of PCK, and it was the knowledge which teachers should have in order to teach subject matter in school (Shulman, 1987). Two studies of Shulman have contributed to teacher and teaching literature in following

ways; a) Importance of content knowledge, b) differences of content knowledge from other teaching knowledge bases, and c) Effects of content knowledge on the profession of teaching (Ball, et al. 2008). Although the importance of content knowledge was obvious, few empirical studies were conducted to investigate the effects of sufficient content knowledge level. More empirical studies and practical information are required in order to demonstrate effectiveness of content knowledge on teaching (Ball, et al. 2008).

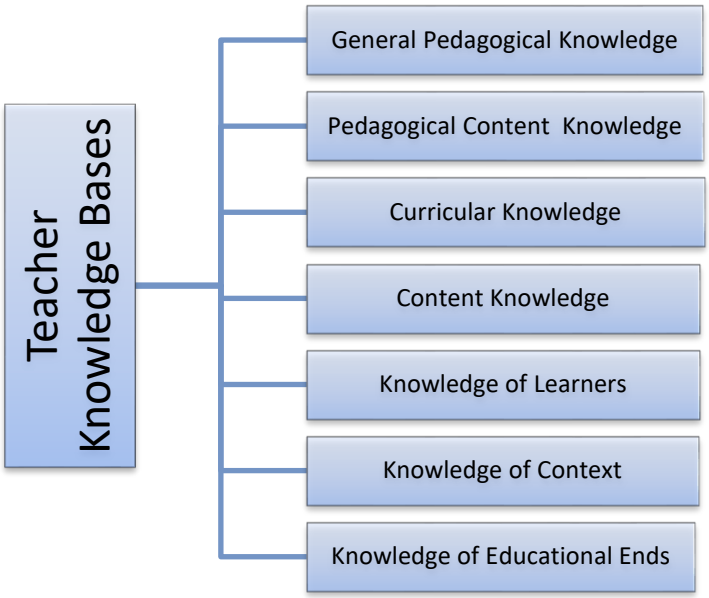



*Figure 1.* Teacher Professional Knowledge Bases (Shulman, 1987)

Previously, teacher knowledge bases and their categorizations have been studied in the literature. For example, Magnusson, Krajcık, and Borko (1999) studied on the knowledge for science teaching according to Shulman's (1987) categorization. The study focused on how science teachers shaped and used their PCK. They examined two teachers. The results of first teacher showed that PCK level was dominantly influenced by content knowledge. The results of second indicated that pedagogical knowledge was dominantly influenced by PCK.

Grossman (1990) was another important researcher for teachers' content knowledge. According to Grossman, content knowledge was one of four teachers' professional knowledge bases: (a) subject matter knowledge, (b) general pedagogical knowledge, (c) pedagogical content knowledge, and (d) knowledge of context (Figure 2). Grossman (1990) expressed that teachers should have the content expertise to solve the problems given to students. Teachers should also know the wide range of problem-solving ways.


*Figure 2.* Professional Knowledge Components of the Teachers(Grossman, 1990)

There are studies about content knowledge and subject matter knowledge according to Grossman's teacher professional knowledge framework. Grossman et al. (2005) studied on subject matter knowledge level of teachers. The study showed that teachers had weak subject matter knowledge to teach in school. Teachers were in trouble with students who made different mistakes or performance errors. Teachers could not solve or fix mistakes. However, it is expected that teachers can see errors and find solutions to fix them. Grossman and her colleagues (2005) indicated that teacher must have specific knowledge more than subject matter knowledge. They could link this specific knowledge with PCK. Teachers having sufficient PCK recognize how students comprehend the identified tasks.

### 2.2 Teachers' Content Knowledge in Different Fields of Education

Content knowledge has been studied in math, chemistry, science, computer and literacy education fields. In math education, Ma (1999) expressed that math education had two components; a) subject matter, b) students' learning. According to

Ma (1999), knowledges of subject matter and students' learning are over each other. Teachers must know and understand this relationship. Comprehending this relationship requires experience and sufficient content knowledge. Having sufficient content knowledge increases this relationship and PCK (Ma, 1999).

Studies have shown that content knowledge is important and effective in math education (Monk, 1994; Ma, 1999; Goldhaber & Brewer, 2000; Ball and her colleagues, 2008). Some researchers have studied on subject matter knowledge and student learning in math and science teachers. For example, Monk (1994)' longitudinal study examined 2.829 math and science preservice teachers. The study focused on teachers' content preparation which was measured by their coursework and found that teachers' coursework had a positive effect on student learning. Similarly, Goldhaber and Brewer (2000) examined subject matter preparation and student achievement. They found positive effects of teachers' subject matter preparation on student learning.

The relationship between content knowledge and student learning has been defined in the math field (Hill, Rowan, & Ball, 2005). Studies investigated effects of teachers' math content knowledge on student learning. Hill and her colleagues (2005) showed that teachers' math knowledge was related to first and third grades students' achievement. The statistically significant relationship between content knowledge and student achievement had been identified. For example, Turini (2011) examined a middle school math teacher's content knowledge. She found that there was a dynamic connection between teacher's content knowledge and his/her skills before or during teaching activities. This relationship has been investigated with qualitative studies. Millsaps (2005) examined math content knowledge and its effects on PCK. She found the effectiveness of content knowledge on PCK of math teachers.

Content knowledge level of preservice math teachers has been studied on several studies (Ball, 1990; Hill, Schilling &Ball, 2004). These studies showed that content knowledge level of math preservice teachers is insufficient. Preservice teachers are

using their precollege knowledge. For example, Ball (1990) studied on 252 elementary and secondary preservice math teachers, and collected data via questionnaire and interview. Results showed that participants' content knowledge was insufficient and they used their precollege knowledge for understanding mathematical terms. Hill et al. (2004) examined preservice teachers' content knowledge and found out that they did not perform well in mathematical question test. Weak content knowledge also affects their PCK (Depaepe et al., 2015). Studies also indicated that there was a big difference between content knowledge level of the first year pre-service math teachers and fourth-year pre-service math teachers (Kleickmann et al., 2013). For example, Depaepe et al. (2015) examined content knowledge level of elementary and secondary prospective math teachers. Results were similar with the findings of Hill et al (2004). Content knowledge level of preservice teachers was insufficient and there was a gap between content knowledge and PCK of participants.

Effects of preservice teachers' content knowledge on children's play scenario were examined in another study (Oppermann, Anders, & Hachfeld, 2016). The result indicated that there was a positive relationship and if preschool teachers' math content knowledge were enough, they would recognize math content while children were playing the game.

The relationship between professional development and math content knowledge has been studied with math teachers (Oleson, 2010; Yamnitzky, 2010). Math content knowledge of teachers increased after professional development experiences. Participants who have weaker content knowledge increased their math content knowledge level than those who have higher content knowledge at the beginning of the course (Oleson, 2010). In another professional development study, the effectiveness of lesson designed for intervention has been examined on 154 elementary teachers (Yamnitzky, 2010). The researcher used survey and interview to collect data. Results showed that lesson designed for intervention influenced

teachers' comprehending core concepts and preparing their course instruction. Teachers also stated that they felt they were better math teachers.

Ball and her colleagues (2008) stated that it was generally unknown the extent of teachers' content knowledge which was influenced by student learning. According to their analysis on the mathematical demands for teaching, Ball et al. (2008) defined two content knowledge categories for teaching math. These categories were CCK and SCK. Ball et al. (2008) also found that teachers need to possess SCK which is in-depth and detail knowledge beyond merely carrying out the mathematical procedure without mistakes (i.e., CCK). Following the study Ball et al. (2008), researchers examined the CCK and SCK of the teachers while studying their content knowledge level.

Ribeiro (2009) examined teachers' self-efficacy and their specialized math knowledge regarding co-learner delivery model. He emphasized in his study that co-learner delivery model was effective for improving self-efficacy and specialized math knowledge of math teachers. Preservice teachers' math content knowledge has been investigated by McCoy (2011) who examined the relationship between mathematics teacher efficacy and the growth in specialized math content knowledge. She studied on 101 preservice elementary math teachers and found that the level of specialized math content knowledge of preservice teachers increased significantly during the mathematical content course.

SCK in the math education was also examined by Bair and Rich (2011). They conducted two content courses designed for elementary and secondary school math teaching for three years. They collected qualitative data and used grounded theory. The study showed the effectiveness and the importance of Ball and Bass's (2003b) framework, especially SCK part. Ho and Lai (2012) also studied SCK of pre-service math teachers. They found that pre-service teacher education program should emphasize and improve more SCK courses in the program. Aslan-Tutak and Adams (2015) studied on geometry content knowledge of elementary preservice teachers.

They examined 102 preservice teachers and used pre and posttest design on experimental and comparison preservice math teachers. This study showed that geometry content knowledge courses increased geometry content knowledge of experimental group preservice teachers.

Recent studies demonstrated that content knowledge framework of Ball and her colleagues (2008) was used by different to measure content knowledge and PCK of math teachers and preservice teachers. Not only researchers used the framework, but also reviewed studies focused on this framework. For example, Olanoff, Lo and Tobias (2014) published a review article which was basically about Ball and her colleagues' framework. They reviewed 43 articles which were mainly related to fraction content knowledge studies regarding pre-service teacher education. They found that it was a requirement to study on how to improve fraction content knowledge of pre-service math teachers.

In another study using the CCK and SCK of Ball and her colleagues' framework, Welder (2007) investigated effects of a content course. She studied with 48 elementary preservice math teachers. After the content course, CCK and SCK of participants regarding algebra knowledge have been increased. She also found the significant correlation between CCK and SCK results of participants.

Content knowledge has been studied in the field of chemistry. Researchers studied on preservice chemistry education (Sanger, 2007; Kind, 2014). For example, Sanger (2007) examined chemistry content knowledge of elementary pre-service teachers. He compared inquiry-based course with traditional teaching method. He found that inquiry-based course was more effective than traditional ones regarding pre-service teachers' content knowledge level. Kind (2014) studied on 265 pre-service teachers' content knowledge. The study showed that chemistry pre-service teachers' content knowledge was not sufficient to teach chemistry in high school. Faikhamta, Bunsawansong and Roadrangka (2006) evaluated chemistry content knowledge level of pre-service chemistry teachers. They developed chemistry test. Findings showed

that pre-service chemistry teachers failed to explain main concepts of chemistry science. They used daily language for explaining, and they defined terms with memorization without understanding the meaning of concepts.

In chemistry education field, content knowledge has been examined with different intervention models (Khourey-Bowers & Fenk, 2009). For example, Khourey-Bowers and Fenk (2009) examined the effectiveness of constructivist chemistry professional development on teachers' content knowledge level. Bowers and Fenk studied on 69 chemistry teachers. They showed that participating constructivist chemistry professional development programs enhanced content knowledge level of chemistry teachers. Also, teachers could vary their teaching models. In another study, Thiele and Treagust (1994) stated that analogy-inclusive teaching was the effective method for teaching professional development. They also commented that teachers were used their content knowledge effectively while they were demonstrating their competence in defining analogy. The Effects of science writing heuristic approach on college students' chemistry content knowledge have been examined by Greenbowe, Poock, Burke, and Hand (2007). In this study, science writing heuristic approach has been found as the effective method of students' knowledge level and performance (Greenbowe et al., 2007). Another approach for improving chemistry content knowledge is the metacognitive method which enhances problem-solving ability to use their content knowledge (Perkins & Salomon, 1989). This method makes students more appropriate and flexible to learn and practice chemistry content knowledge (Rickey & Stacy, 2000).

How chemistry teachers shaped their content knowledge has been determined by specific chemistry tests (Bergquist & Heikkinen, 1990; Lythcott, 1990; Nurrenburn & Pickering, 1987; Pickering, 1990; Sawyer, 1990; Smith & Metz, 1996). Findings showed that students answered correctly most of the questions on tests. Even their correct answer scores were high; they could not explain chemistry concepts well. Study of Luft, Firestone, Wong, Ortega, Adams and Bang (2011). They examined 98 beginner science teachers. Results indicated that new science teachers did not have

enough content knowledge to teach the subjects. Lopez, Shavelson, Nandagopal, Szu and Penn (2014) examined 90 preservice chemistry students and measured them with concept map. Results indicated that concept map helped the pre-service chemistry students to shape their content knowledge. Recently, science content knowledge has been studied in literature, too (Diamond, Maerten-Rivera, Rohrer & Lee, 2013; Diamond, Maerten-Rivera, Rohrer & Lee, 2014; Santau, Maerten-Rivera, Bovis, & Orend, 2014). For example, Diamond and his colleagues (2013) examined the relationship between using multiple assessment tools and science teachers' content knowledge. They applied questionnaire on 203 teachers, and 62 of them were observed. They found the significant positive relationship between science test scores and both self-reported science knowledge and classroom observation scores. Results also indicated positive relationship between science courses taken and self-reported science knowledge. There was a two-year longitudinal science knowledge study conducted by Maerten-Rivera, Huggins-Manley, Adamson, Lee, and Llosa (2015). They used paper-based tests to evaluate content knowledge level of elementary science teachers. They proved that paper-based tests could be used for testing science content knowledge.

Studies about science content knowledge have been focused on the effects of different intervention models on the content knowledge level of science teachers. For example, Diamond and his colleagues (2014) examined the effects of the professional development intervention including fifth grade science curriculum, teacher workshops, and school site support on science teachers' content knowledge. They found that intervention had a significant effect on an experimental group of teachers' content knowledge compared to control group. Green, Lubin, Slater, and Walden (2013) examined the effects of professional development on science teachers' content knowledge for two weeks. They used concept maps to assess science teachers. The study indicated that two weeks professional development increased content knowledge level of science teachers. The effects of learning progression-based method on the content knowledge level of science teachers were studied. Jin, Shin, Johnson, Kim and Anderson (2015) examined 194 science

teachers who participated in professional content knowledge workshop and found out that the workshop increased teachers' content knowledge level. Increasing content knowledge level of science teachers was important for teaching the content to students. Student-Teacher–Scientist Partnerships intervention was used on science teachers and increased their content knowledge level (Houseal, Abd-El-Khalick, & Destefano, 2014).

Science knowledge of preservice teachers has been investigated by researchers who have implemented specific interventions or methods. One of these methods was video club method which is useful and beneficial for increasing science learning and science content knowledge of preservice teachers (Johnson & Cotterman, 2015). Intervention designed for enhancing science content knowledge of PETE students was conducted in the study of Santau et al. (2014) who studied on 19 preservice elementary teachers. They assessed the development of their science content knowledge within specifically designed science course. The study was conducted at the beginning and end of the science course. Results showed that intervention about science content knowledge was effective on moderate and difficult science contents.

Literacy content knowledge of teachers and preservice teachers has also been discussed in several studies. For example, Shedd (2011) studied on literacy content knowledge of early childhood educators. This study showed that content knowledge level of literacy educators was almost good but not depth to teach it. In another study, James (2011) examined literacy content knowledge of special education preservice teachers. She measured content knowledge level with content maps. Students from two different universities performed worse than estimated. Also, some studies investigated the effects of content knowledge on writing skills (Olsen, 2010; Robertson, 2011). Olsen (2010) examined the effects of leadership content knowledge in writing skills of elementary school principals. The study indicated that the more leadership content knowledge someone has, the stronger instruction to demonstrate pedagogy and evaluation. In another study, the researcher focused on first-year composition courses. She proposes that a well-designed composition

course will prepare first-year students better for writing the composition. The study indicated that content of course and knowledge of teachers influenced their composition writing skills positively. There was a similar study, which was an organized case study, to seven university students enrolling in the first year composition course (Robertson, 2011). She found that first-year composition course enhanced of participants regarding transferring the writing abilities to other courses.

Content knowledge level of computer education preservice teachers was examined by Sendag and Odabası (2009). They studied on 40 preservice mathematic teachers. They checked out computer content knowledge level of participants with pre and post test results. Multiple choice computer content knowledge test was used, and results showed the significant increase in computer content knowledge level of preservice teachers. Another area was language and reading education. Moats and Foorman (2003) checked content knowledge level of teachers. Researchers applied four-year longitudinal study on second, third and fourth-grade teachers. They used survey. Results showed that teachers had lower content knowledge than expected and student learning outcomes were insufficient. Agriculture education content knowledge level was also studied. Rice and Kitchel (2015) examined content knowledge preparation of preservice agriculture education teachers. They found that preservice teachers dissatisfied content knowledge courses regarding quality, quantity, and transferability.

### 2.3. Teachers' Content Knowledge in Physical Education

In physical education, Siedentop (2002) defined content knowledge by using Shulman's conceptualization. Siedentop explained that main subject matter of physical education is the sport and physical activity that physical education teachers should teach them in schools. According to Siedentop, teachers and coaches should know all components of content knowledge such as a wide range of knowledge, sport specific skills, and representation of psychomotor, cognitive and social dimensions and they should use content knowledge regarding educational or sport related targets.

Siedentop (1989) defined the development of content knowledge in physical education. The study focused on competent content areas of elementary teachers. Results of this study showed that if teachers had enough content knowledge, they could teach sport-specific tasks. In this study, Siedentop also indicated that pre-service teachers should participate a specific sport and do it naturally to have deep content knowledge (Siedentop, 2002).

Researchers in physical education examined the effects of content knowledge (Rovegno & Gregg, 2007; Wallhead & O'Sullivian, 2007). Rovegno and Gregg (2007) examined African American children's perceptions after American folk dance unit. Folk dance unit was learned by two teachers and they taught it to their students. The study showed that if teachers have content knowledge for a specific subject, they can successfully teach it to their students. Wallhead and O'Sullivian (2007) studied on six students who were enrolled in tag rugby lesson via peer teaching task. They used sport education model and examined development of content knowledge and performance of students. Results of the study indicated that students attended class more than before and they showed high competency on defined content which was designed for peer teaching tasks. In lower complex learning tasks, the study demonstrated that instructional approach of peer teaching in developing students' content knowledge was very effective and usable to reach learning goals.

Studies in physical education field explained content knowledge descriptively. For example, Capel and Katene (2000) conducted a study that examined 27 secondary college students. They looked out their perceptions of subject matter knowledge in the six areas of activities in the National Curriculum in Physical Education (NCPE). They used questionnaire and collected pre and post test data. Results indicated that the highest percentage of students have a good knowledge of traditional team games in traditional team games, whereas the highest percentage of students perceived little content knowledge in outdoor and adventure activities and dance. The results were explained by the dominance of games identified in students' prior experiences,

qualifications and knowledge of activities on entry to the PETE program and limited introduction to dance or outdoor activities at school (Capel & Katene, 2000). Also, college students' perception of content knowledge significantly increased in some activities. Similarly, high school students' content knowledge level in exercise physiology (health-related knowledge) has been examined (Martin, 2008). Ninth (*N*= 236) and twelfth (*N*=150) grade students, totally 386 high school students enrolled this study. Findings showed that content knowledge perceptions of high school students were under the curriculum outcome expectations.

Health-related fitness content knowledge has been studied in the physical education setting in several studies. For example, Castelli and Williams (2007) examined 73 middle school physical education teachers' health-related fitness content knowledge and self- efficacy by using a cognitive health-related fitness test and a self-efficacy questionnaire. Results indicated that physical education teachers possessed high self-confidence in teaching health-related fitness content, but their test scores did not meet the goal. Estimated content knowledge level for physical education teachers or PETE students were answering more than 70% of overall questions correctly (Castelli & Williams, 2007; South Carolina Department of Education [SDE], 2000). The researchers suggested a continuous effort for developing teachers' content knowledge through professional development programs. On the same way, Hunuk, İnce & Tannehill (2012) studied professional development of physical education teachers via community of practice. They examined twelve experienced physical education teachers (6 in treatment and 6 for control groups) and their 278 students. Results demonstrated that treatment group teachers (six of twelve) and their students' health-related fitness content knowledge has improved. Findings also showed that teachers' participation in a community of practice changed their teaching practices and teaching culture by focusing on their students' needs, increased their engagement in physical education and triggered continuous learning towards personal, professional needs.

There are studies examining the effectiveness of different teaching models on health-related content knowledge. For example, Pritchard, Hansen, Scarboro and Melnic (2015) investigated the effectiveness of sports education fitness model on high school students' content knowledge. Results showed that sports education fitness model increased health-related content knowledge of participants. In another example, health related content knowledge of fourth-grade students has been studied (Zang et al., 2014). They examined 616 students and used the cognitive assignment to increase content knowledge. The study showed that cognitive assignment method mostly increased health-related content knowledge of fourth-grade students.

Over the last decade, content knowledge in physical education has been studied regarding Ward's (2009a) content knowledge framework. Ward explained content knowledge in physical activity courses as: a) rules, etiquette and safety, b) technique and tactic, c) student errors, and d) instructional task and representation. Then, Ward adapted math content knowledge framework (Ball et al., 2008) to the physical education field. Ball and her colleagues categorized content knowledge as CCK and SCK. Ward used these terms to make content knowledge more comprehensible. It was described that CCK was about how to know and perform content specific physical activity courses, and SCK was about how to teach CCK. In this study, Ward implied that CCK and SCK were intertwined and they were not separated from each other (See figure 4).

Since close explanations of SCK and PCK which were defined as "the ways of representing and formulating the subject that it was comprehensible to others" (Shulman, 1986), these two terms were often confused. Researchers could use these terms interchangeably. SCK can be differentiated from PCK in the following way. If you asked a teacher to describe the task progression for teaching a handstand, you would likely get a list of tasks that begin with basic weight bearing activities and finish with a kick up to the handstand without the support of a partner. This would represent part of the SCK of gymnastics (i.e., knowing the proper task progressions). But if the teacher was asked to teach the handstand tasks to first-grade students, she

might only use the first few tasks on the original list. Another teacher teaching high school student with several years of gymnastics experience might use the tasks that were more towards to the middle and end of the list. This would represent part of the PCK (i.e., knowing the proper task progressions for the specific group of learners) distinguished from SCK.

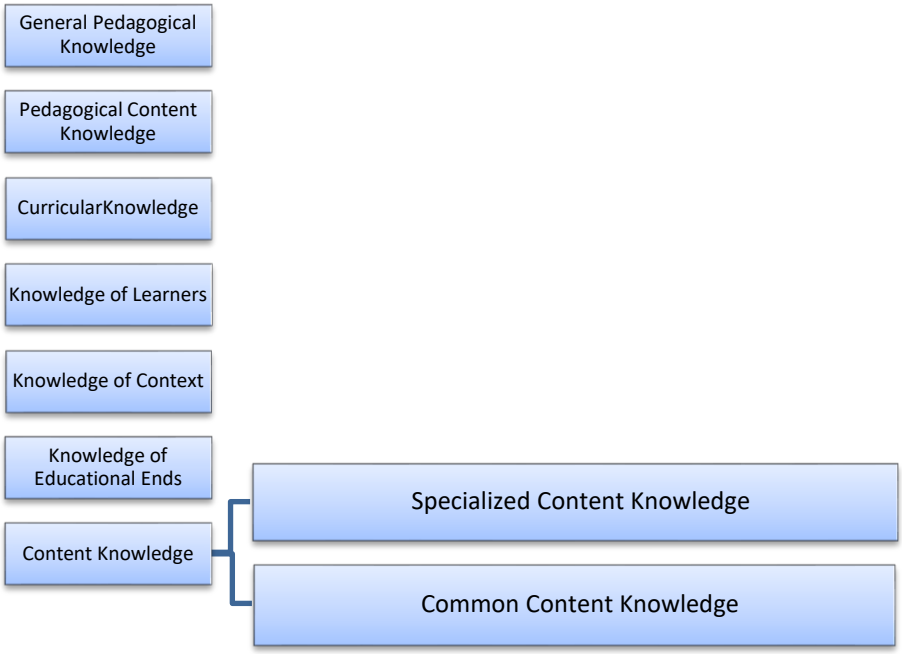



*Figure 3*. CCK and SCK in Teacher Knowledge Bases

Physical education teachers must have deep and sufficient content knowledge to teach physical education appropriately (Siedentop, 2002; Ward, 2013). Studies showed that changing a teacher's content knowledge level, especially SCK, increased teacher's PCK which is highly related to student outcomes (Ward, Ayvazo, & Lehwald, 2014; Ward, Kim, Ko, & Li, 2014; Iserbyt, Ward, & Li, 2015; Iserbyt, Ward, & Martens, 2015; Kim, 2015; Sinelnikov, Kim, Ward, Curtner-Smith, & Li, 2015; Ward, Lehwald, & Lee, 2015).

According to recent studies in literature, workshops can be used to increase content knowledge level of physical education teachers. Ward, Kim, Ko and Li (2014) explained workshop which is prepared for specific physical activity unit. It is a

specific knowledge designed to emphasize CCK and SCK which are necessary to teach for every grade level (e.g. secondary or high school). The workshop included SCK and CCK which were important for teaching specific physical activity unit in the real school setting. It helps to organize content used in class. The workshop can be used for professional development of physical education teachers (Sinelnikov et al., 2015; Ward, Ayvazo, & Lehwald, 2014).

In the study of Ward, Ayvazo and Lehwald, (2014), effects of content knowledge workshop on physical education teachers' PCK and learning level of their students have been examined. They studied on four physical education teachers and their 96 students. Results showed that PCK of teachers and student outcomes increased significantly as a result of content knowledge workshops. Although the duration of the workshop was short, its effectiveness on student learning outcomes and PCK levels of teachers was ensured by Sinelnikov and his colleagues (2015). They studied on two middle school teachers and their 48 students. Findings indicated that content knowledge workshop increased PCK level of teachers and their students performed better.

Kim (2015) also examined the effects of the content knowledge workshop on PCK and student learning. She examined one teacher and his 24 students in volleyball unit. She collected data before and after volleyball workshop. This study showed that there was a strong relationship among content knowledge and PCK, and student learning. Similar findings were found in another study (Iserbyt, Ward & Li, 2015). They examined one experienced physical education teacher and her 64 students. The teacher taught badminton skills on four classes. Then she took badminton intervention and taught badminton skills on different four classes. Results indicated that PCK level of teacher increased after content knowledge intervention.

In the same year, Iserbyt, Ward and Martens (2015) did another study about effects of content knowledge. They studied on one physical education teacher and his 88 students regarding four different teaching models such as traditional, sports

education, traditional content knowledge, and sports education content knowledge models. Results indicated that sports education content knowledge and traditional content knowledge groups performed better than traditional and sport education groups. Findings of those studies were similar that increasing content knowledge positively affected teacher's PCK and student learning.

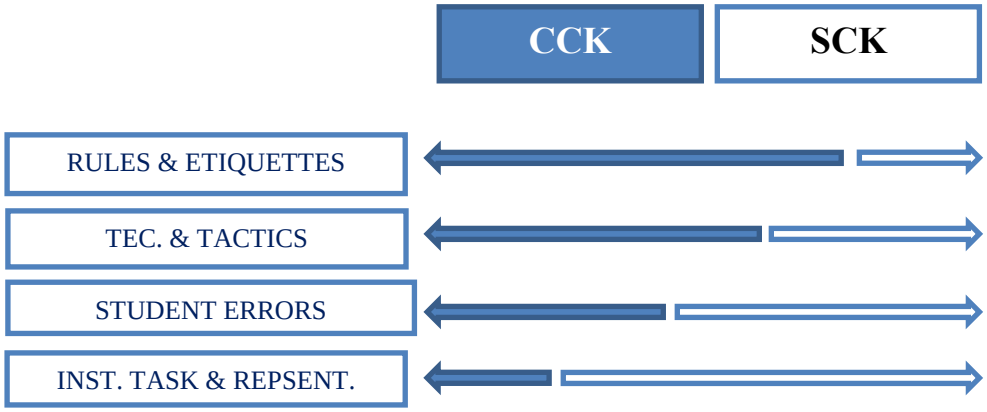



*Figure 4.* Relationship between Common and Specialized Content Knowledge in Physical Education (Ward, 2009a)

As stated above, studies indicated that assessing content knowledge had been an important issue for teaching physical education. However, previous studies focusing on content knowledge had some limitations (Ward, Kim, Ko & Li, 2014; Kim, 2015; Iserbyt, Ward & Li, 2015) such as small sample size and limited measurement tools. For example, Kim (2015) studied with one teacher and his 24 students. She collected data via interview and observation tools. In another example, Iserbyt, Ward & Li (2015) examined one teacher and his 88 students from four classes. They used observation as a methodology. Interview and observation tools for examining SCK could be valid for small sample size. Nevertheless, using these tools for larger sample size is not practical and application of them is quite difficult. It is certain that valid and reliable tools are required in order to measure SCK part of Ward's new framework for large sample size. According to Ayvazo, Ward and Stuhr (2010), content knowledge can be measured and evaluated with content specific knowledge test including CCK and SCK parts. Developing valid and reliable knowledge tests

can be a good alternative way to examine knowledge level of physical education teachers.

### 2.4. Content Knowledge in PETE

Physical education teachers are supposed to have deep and sufficient content knowledge, especially for physical activity courses, before graduating from PETE programs (Siedentop, 2002). However, studies showed that PETE programs provide insufficient content knowledge opportunities for pre-service teachers (Ayvazo et al., 2010; Siedentop, 2002; Ward, 2009a). If they leave without enough content knowledge, they cannot teach long instructional units, which provide students with better opportunities to develop their skills (Ward, 2009a). Moreover, when they teach without the exact knowledge and sufficient content knowledge, they cannot provide appropriate tasks for students to, and they cannot respond correctly to student performance errors (Siedentop, 2002).

Siedentop (2002) argued that PETE programs should provide more physical activity/sports content knowledge courses. He also argued that disciplinary courses are not content knowledge courses even though some people consider the disciplinary courses as content knowledge courses (Siedentop, 2002). His rationale for excluding disciplinary courses as content knowledge is because most of that content is not taught in schools (Siedentop, 2002). Siedentop (2002) observed that

> *"You can't have pedagogical content knowledge without content knowledge, and all of our advances in pedagogy in physical education can't change that simple truth" (p. 368).*

In literature, there are limited studies about content knowledge in PETE, especially empirical studies (Ward, 2006). As an example for empirical study, Rovegno (1993) conducted a study that examined how PETE majors acquired content knowledge for a nontraditional approach to physical education. The researcher used field and course observation, document analysis and in-depth interviews with 12 PETE major

students. The study showed that preservice teachers thought to teach physical education like take for granted, but they understood that teaching physical education was not an easy issue.

Recently, content knowledge in PETE programs has been studied by Ward and his colleagues (2012) based on the new categorization of Ward (2009a). A sample of the study was from 28 programs in Korea and 24 programs in Ohio State. Findings of the study showed that PETE programs in Ohio State and Korea were similar. Both programs focused on the performance of content in physical activity classes, not on teaching the content. Recently, Kim, Lee, Ward, and Li (2015) examined movement content knowledge classes of 26 PETE programs in the USA. Study of Ward et al. (2013) investigated content knowledge in PETE in the international area based on their allocated times. The study was comprised data from universities in USA (n: 26), China (n: 12), England & Wales (n: 7), Turkey (n: 22) and Belgium (n: 9). Then, syllabi of PETE in Turkey were examined by Ince, Ward and Devrilmez (2012). There were almost 55 PETE programs in Turkey and researchers contacted all of them. Only 22 PETE programs have answered for this study. Findings showed that PETE programs in Turkey allocate duration time as 89.6 % for CCK and 9.8 % for SCK in physical activity and sport courses. Studies above had similar results and it could concluded that PETE programs allocated enough time for CCK but not for SCK.

### 2.5 Current Status of Content Knowledge in Physical Education

There are studies about effects of content knowledge (concentrated on SCK) on PCK and student learning outcomes. Few studies directly examined content knowledge level of physical education teachers, effects of CCK on SCK and PCK, and how to develop content knowledge of physical education teachers. Furthermore, measuring and evaluating content knowledge are the missing points for physical education research field. Physical education teachers graduate from PETE program, so they are supposed to have sufficient content knowledge. There are not enough studies for

examining content knowledge in PETE program and how to develop effective sport specific courses in PETE.

As a conclusion, content knowledge is a very important issue for pre-service teacher education. PETE programs should provide sufficient and appropriate content knowledge regarding CCK and SCK domains. This study aims to improve content knowledge level of the pre-service teacher with the intervention using new categorization of Ward (2009a), which includes CCK and SCK.

Table 1.

Recent Studies about Content Knowledge in Physical Education

| Researcher (Year) | Participants | Data Collection Instruments | Findings |
|---|---|---|---|
| Rovegno & Gregg, 2007 | 17 elementary school students with eight years old. 12 weeks American folk dance unit was taught | Qualitative research tools: video recording, field notes, interviews, reflections of participants. | Students learned what they taught. If teachers have CK for a specific subject, they can teach it to students successfully. |
| Wallhead & O'Sullivian, 2007 | Six preservice teachers and 27 eight grade students ($M_{age}$= 13.2). Teaching rugby with sports education model. | Interview, lesson observation | Students showed high level engagement to the lesson. Content knowledge was very effective and usable to reach learning goals. |
| Capel & Katene, 2000 | 27 secondary college students ($M_{age}$= 13.2) with pre and posttest design. | Questionnaire | The highest percentage of students perceived good subject knowledge in traditional team games<br>The highest percentage of students perceived little content knowledge in outdoor and adventure activities and dance. |
| Castelli & Williams, 2007 | 73 middle school physical education teachers ($M_{age}$= 41.00) | Health-related fitness test and self-efficacy questionnaire | PE teachers possessed high self-confidence in teaching health-related fitness content, but their test scores did not meet the goal. |
| Hunuk, İnce & Tannehill, 2012 | Twelve experienced physical education teachers and their 278 students. Six of all teachers were treatment group; six of others were the control group. | Community of practice, health-related fitness content knowledge test, field notes, interview | Treatment group teachers and their students improved health-related fitness content knowledge. |

Table 1. (Cont.)

Recent Studies about Content Knowledge in Physical Education

| Researcher (Year) | Participants | Data Collection Instruments | Findings |
|---|---|---|---|
| Ward, Kim, Ko & Li, 2014 | Quasi-experimental design with Four middle school physical education teachers, 96 students. Content knowledge packet workshop with pre and posttest. | Video recording, observer coding, | Content knowledge workshop was increased PCK level of teachers and student learning outcomes. |
| Kim, 2015 | One teacher and his 24 students | Interviews, student game performance, and student daily content quizzes | Increasing content knowledge positively affected teacher's PCK and student learning. There was a strong relationship with content knowledge and PCK and student learning. |
| Iserbyt, Ward & Li, 2015 | One teacher and her 64 students. Teacher taught badminton four classes before and after badminton CK intervention | Video recording, observer coding | PCK level of teacher increased after content knowledge workshop. Experimental group student performed better than comparison group students. |
| Iserbyt, Ward & Martens, 2015 | One teacher and his 88 students. The teacher taught swimming two groups with traditional and sport education models. Then he took CK intervention and taught two groups. | Video recording, observer coding | PCK level of teacher differed after content knowledge intervention. Sports education-content knowledge and traditional- content knowledge groups performed better than traditional and sport education groups. |

Table 1. (Cont.)

Recent Studies about Content Knowledge in Physical Education

| Researcher (Year) | Participants | Data Collection Instruments | Findings |
|---|---|---|---|
| Ward, Li, Kim & Lee, 2012 | 28 PETE programs in Korea and 24 PETE programs at Ohio State University from the USA | Syllabi Coding | All of the programs in South Korea focused exclusively on performance (CCK).<br>In Ohio, a majority of programs focused on performance (CCK).<br>South Korea and Ohio licensure programs are more similar than different with their emphasis on performance of content over the teaching of content |
| Ward, Ince, Iserbyt, Kim, Lee, Li & Sutherland, 2013 | Content knowledge in PETE in international area USA (n: 26), China (n: 12), England & Wales (n: 7), Turkey (n: 22) and Belgium (n: 9) universities. | Syllabi coding | Allocated time for CCK is enough but not for SCK. |
| Ince, Ward & Devrilmez, 2012 | Syllabi of 22 Turkish PETE programs | Syllabi coding | Turkish PETE programs mostly focused on CCK and least for SCK |
| Kim, Lee, Ward & Li 2015 | Movement content knowledge with syllabi of 26 USA PETE programs | Websites, program coordinators, and course syllabi | USA PETE programs teach not a lot of CCK. Study also showed that allocated time for SCK is not sufficient |

# CHAPTER 3

# METHOD

## 3.1 Study Design

A quasi-experimental design was used to examine the badminton content knowledge level of PETE students. Experimental and comparison groups were purposefully selected from two different universities with PETE programs in Turkey. At both universities, an elective badminton course had been offered to PETE students. Participants in one of the universities were selected as the experimental group, and participants in the other university were selected as the comparison group.

Experimental group followed a 10-week badminton course which was designed according to Ward's (2009a) framework. Comparison group followed their usual badminton course without any instructional manipulation.

Before and after the intervention, both experimental and comparison groups completed a validated badminton content knowledge test including CCK (rules, etiquette & safety; technique & tactic) and SCK (student errors; instructional tasks & representation) components. After the intervention, structured interviews were conducted with 12 participants in the experimental group to examine their perception on the intervention (Figure 5). In addition to interviews, researcher took field notes for 10 weeks.

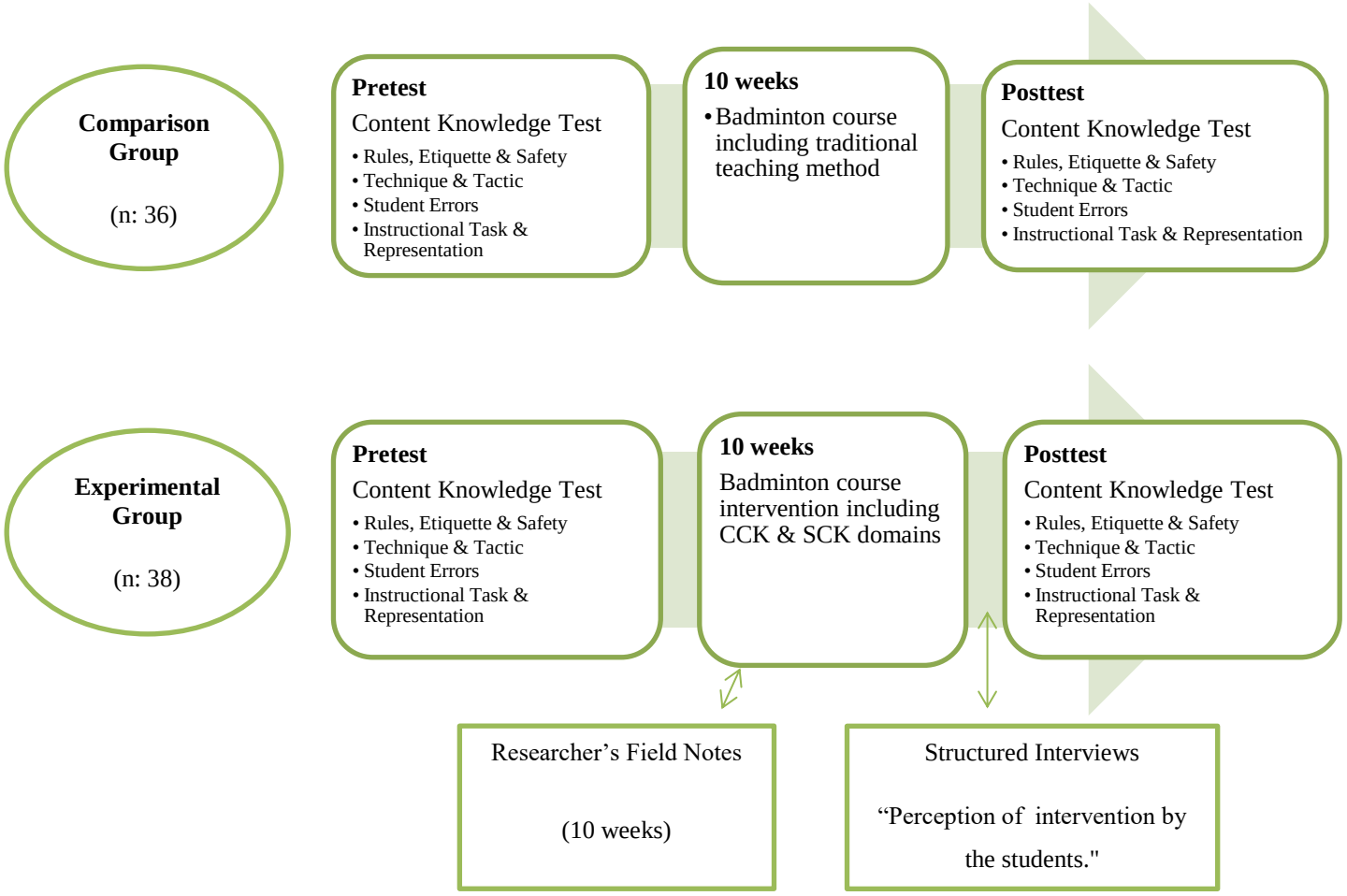



*Figure 5.* Design of the Study

## 3.2 Sampling

There were 55 physical education teacher education programs (PETE) in Turkey (Council of Higher Education, 2012). Of all PETE programs, Kütahya Dumlupınar University and Kırıkkale University PETE programs were chosen because of the similar PETE student profile and characteristics, and both programs offer an elective badminton course in their curriculum. Both university administrators accepted to attend this study. Then, the researcher visited the two universities and decided which university was appropriate for the intervention. Badminton course participants in Dumlupınar University PETE program were chosen as the experimental group because of the university administrators' approval to re-design the badminton course according to Ward's (2009a) content knowledge framework. Badminton course participants of Kırıkkale University PETE program were selected as the comparison group for this study.

In the experimental group, the number of the students enrolled in the badminton course was 46. Eight of them were removed from the study due to less than 80% attendance during the ten weeks intervention. Finally, 38 (32 boys, six girls) students completed the study in the experimental group.

The number of students enrolled in the elective badminton course in the comparison group was 48 at the beginning. Twelve of the students were removed from the study due to less than 80% attendance during the 10-week course as well. Totally, 36 (28 boys, eight girls) students completed the study in the comparison group. Characteristics of the experimental and comparison group participants on sex and mean age are presented in Table 2.

Table 2.

*Characteristics of Participants on Sex and Mean Age*

| Groups | Sex | | Age (mean) | SD |
|---|---|---|---|---|
| | Men | Women | | |
| Experimental | 32 | 6 | 21.4 | 4.1 |
| Comparison | 28 | 8 | 20.9 | 5.5 |

### 3.3 Badminton Instructors

Experimental group instructor was 30 years old Ph.D. student in sports pedagogy area. He had previous experience in badminton as both player and coach. He played badminton at national player level. He had eight-year coaching experience. Before the intervention, experimental group instructor studied Ward's (2009a) content knowledge framework and prepared the ten weeks badminton course intervention accordingly. For familiarity with new content knowledge framework, in the beginning, the researcher read articles and discussed framework with a program development expert. He also communicated with the developer of the framework from the USA.

Comparison group instructor was 41 years old. He had Ph.D. in physical education. He had previous experience in badminton as both player and instructor. He played badminton at the amateur level. He was teaching badminton for 15 years in university PETE programs.

### 3.4 Data Collection Methods

Participants' badminton knowledge was examined with a validated badminton content knowledge test for this study. Structured interview was conducted for the evaluation of experimental group participants' perception of the intervention. Ten weeks field notes were kept by the researcher.

### 3.4.1. Development of Badminton Content Knowledge Test

#### 3.4.1.1. *Test Developers*

Test developers were two badminton coaches (national team level), one university badminton course lecturer (twenty years teaching experience, with a Master of Science), one expert international level badminton player, one program development expert (Ph.D. degree) and one language expert.

Program development expert was the leader of the test development process**.** He assessed the convenience of the developing test items to teacher education curriculum and the purposes of secondary and high school physical education lessons. The university badminton course lecturer contributed to the preparation of a table of the specification and wrote test items. The badminton coaches and badminton player assisted in the writing of test items and assessed the validity of the items. The program development expert controlled the ease of using the test items regarding the principals of measurement and evaluation. Turkish language expert checked the clarity and grammatical accuracy of the test items. Anderson and Morgan's opinions (2008) on test competencies and responsibilities were adopted while organizing the expert group above.

#### 3.4.1.2. *Test Item Development Procedure*

At the beginning of the test development procedure, the program development expert, university badminton course lecturer and a badminton coach came together and reviewed the teacher content knowledge test including CCK and SCK which had been adapted for the field of physical education by Ward (2009a). It was discussed how to apply rules, etiquette, safety, technique and tactic under CCK, and student errors, instructional task and representation under SCK to badminton knowledge test. Following this, a badminton related literature review was undertaken by this group and the subjects that need to be included in each subdomain of CCK and SCK were listed as test items. These items were studied by all expert group members except the language experts. After a consensus had been reached among the members on the

items, the table of the specification which contains expectations to learn outcomes was prepared.

In the second stage of the test development process, the expert group discussed appropriate question preparation techniques regarding CCK and SCK. Considering suggestions and examples from the literature, the expert group decided on multiple choice questions for CCK and open-ended questions for SCK part of the test. The reason for choosing open-ended questions for SCK is directly related to Ayvazo and her colleagues (2010) advice that multiple choice question approach could be limited to measure SCK and open-ended questions could be used instead of multiple choice questions.

In the third stage, the badminton experts wrote 242 multiple choice questions with taking each expected learning outcomes of CCK in the table of the specification into consideration. These questions were examined in terms of measurement, evaluation and program development by the expert group. The number of multiple-choice questions was reduced to 133 questions which met each learning outcomes in the table of specification. The final version of the CCK part of the test was agreed on after the clarity, and grammatical accuracy of the test items had been checked by Turkish language experts. Consequently, the CCK part of the test included 113 questions in total: 48 questions for rules, etiquette and safety domain; 85 questions for technique and tactic domain (Table 3) (See Questions in the Appendix 4).

Table 3.

*Distribution of Content Knowledge Questions*

| *Sub-Domains* | *Number of Questions* |
|---|---|
| Rules | 36 |
| Etiquette | 8 |
| Safety | 4 |
| Technique | 49 |
| Tactic | 36 |
| Student Errors | 20 |
| Instructional Task and Repre | 14 |
| Total | 167 |

At the end of the third stage, 34 questions were prepared by badminton experts for the table of the specification to measure SCK part of the test. The prepared SCK part of the test was checked by measurement and evaluation experts. Then the language expert reviewed the questions, and the SCK part was finalized.

In the fourth stage of the test development, draft test was applied to 10 PETE students who had already completed badminton course to evaluate the clarity and ease of using the test. These PETE students stated that they found the test relatively straightforward. The knowledge test took its final form in this stage. One point was given for each correct answer. Participants could get 133 points from the CCK part and 34 points from the SCK part of the test highest (See questions in the Appendix 4).

3.4.1.3. *Validation Study of the Test*

After the preparation of CCK and SCK parts of the content knowledge test, it was conducted to 156 PETE program students [71 women, 85 men; mean age 19.85 years (SD=2.71)] who had previously completed a badminton course in different universities including Dumlupinar (n= 67), Kirikkale (n= 58), Mugla (n=22) and Pamukkale (n= 9) Universities.

3.4.1.4. *Psychometric Characteristics of the Test*

Psychometric properties of the CCK and SCK domains were examined separately. Different analysis methods were applied according to the features of CCK and SCK domains of badminton content knowledge test. Ohio State University Test Analyze Program (TAP), version 12.9.3 was used to analyze multiple choice items of CCK part of the test (Brooks & Johanson, 2003). The program reports specific information regarding examinees and test analysis information related to the whole test (e.g., raw scores, percentage scores, summary statistics, reliability, standard error of measurement, item difficulty, item discrimination, and distractor analyses). TAP has some particular advantages that it: a) ensures interval confidence for each participant score, (b) allows the creation of a table of specifications and analyzing those subsets

of items, (c) constitutes individual rank reports for each participant, (d) separates item analysis and participant results, (g) calculates the number of items which require level of reliability using the Spearman- Brown prophecy formula (Allen & Yen, 1979).

To ensure evaluator consistency in grading open-ended items in SCK part of the test, the agreement between three inter and one intra-evaluator at various points was analyzed. "Key concepts/answers" list describing correct answers was given to evaluators dealing with open-ended questions. Then, randomly selected 28 participants' SCK tests were separately given to three different evaluators, and later analyzed. Intra evaluator agreement was analyzed through one of these evaluators who was asked to evaluate 28 participants' tests again after two weeks from the previous one.

3.4.1.5. *Findings on CCK*

*Item difficulty findings of the CCK questions*. Item difficulty means simply the correct answer percentage of students when there is more than one correct alternative answer per question. It ranges from 0 to 1 with a lower range indicating more difficult questions, and a higher range an easier question. Item difficulty is relevant for determining whether students have learned the concept tested. It also plays an important role to make a distinction between students who know the tested material and those who do not. If the questions are too difficult for the participants, almost all of them will give wrong answers; on the other hand, if the questions are too easy, almost all of them will give right answers. Thus, the item does not have a sharp distinction. (Lord, 1952). The difficulty of each item should be between .20 and .85, and the overall item difficulty of the test should be around .50 (Laatsch & Choca, 1991; Chase, 1999). The results of the item difficulty index acquired for each question in the test were within the acceptable values in the study. The overall item difficulty index of rules, etiquette & safety rules was .62, and for the technique & tactics part, it was .42. Results showed that overall item difficulty index of the test and item difficulty index of the test's each question were within acceptable values.

The item discrimination, which is a correlation between item score and total test score, is used for evaluating the measurement quality of each item. It allows respondents to have a higher overall score to be discriminated from those getting a lower score. Item discrimination should be .20 or higher (Anderson & Morgan, 2008). Results of item discrimination in CCK were .41 for rules, etiquette & safety rules, and .32 for technique & tactics. Item discrimination results of multiple-choice questions on the test are on acceptable value.

#### 3.4.1.6. *Findings on SCK*

Inter-evaluator and intra-evaluator agreement levels on the items were 83 % and 87 % respectively. Inter and intra-evaluator results are highly acceptable for this test according to Van der Mars' (1989) criteria.

### 3.4.2. Interview Questions

Structured interview was used to reveal the effectiveness of the intervention. The interview was applied to each subject through asking the same questions. The interviewer uses same words and same order for all subjects (Corbetta, 2003). There is an interview protocol including probes (Ryan, Coughtan & Cronin, 2009). The structured interview allows researchers to control subjects, to make comparison and analysis easier. Despite positive sides of the structured interview, there are some limitations. One of them is that using structured interview may be thought like speaking in general. Explanations of participants can be short and monotone (Doody, & Noonan, 2013).

Structured questions of this study were prepared according to intervention including subdomains of content knowledge framework. While writing questions, the researcher followed two ways: a) the assistance of program development expert, b) the table of specification. Then, questions were checked regarding language appropriateness. Overall, 12 questions were determined to assess ideas and feelings of PETE students on intervention. For example, one of these interview questions was

that “What is the importance of teaching tactic besides teaching technique in badminton sport?”

Duration of each interview was approximately 20-35 minutes. Interviews have been applied by researcher of this study. Researcher applied interviews alone because when there is more than one interviewer; there maybe happen inconsistencies in interview style and approach which can affect quality of the research conversation and results of the study (Herriott & Firestone, 1983). Lecturer and interviewer were the same person and this might be affected the answers of participants. In order not to affect results, researcher took position as a researcher not lecturer while having interview (see researcher’ self-reflexivity).

### 3.4.3 Researcher’ Self-Reflexivity

I, as a researcher, took researcher position while doing interviews. I have explained interview process to all participants. I have also explained my researcher position during the process of interview. I asked same questions and used same prompts in order to make coherence.

### 3.4.4 Field Notes

Field notes have been described as researcher’s feelings and observations in terms of his/her real life experiences regarding a specific subject (Patton, 2002). Field notes explain observation setting (field) according to researcher’s perspective. It allows the researcher to be part of the observation setting. Researcher took totally 10 field notes. These notes include researcher’ observation notes during ten weeks badminton intervention.

## 3.5 Intervention

### 3.5.1 Intervention Content

Ten weeks badminton course was applied to experimental and comparison groups. The content of the instruction on technical dimensions of badminton (skills taught) was similar in both experimental and comparison groups (See Table 4).

Experimental group intervention included service, clear, drop, smash, net drop, drive, lob/lift and footwork skills in badminton. In practice, researcher aimed to the transmission of knowledge in the classroom setting and utilized peer tutoring (Falchikov & Blythman, 2001). The reason beyond the selection of peer tutoring was increasing the time for SCK in the instruction. During the peer tutoring activities, students were training on the SCK components of the content knowledge through observing their peers' skills and providing feedback to them. Peer tutoring helped them to learn how to perform skills (Common Content Knowledge) and how to teach them (Specialized Content Knowledge) Specialized content knowledge content was explained in table 4.

Table 4.

*Task Progression of Specialized Content Knowledge*

| Skills | Task Progressions |
|---|---|
| Serve | *Task 1*: Forehand long serve to the target area from each side<br>*Task 2*: Fore hand short serve to the target area from each side<br>*Task 3*: Backhand short serve to the target area from each side<br>*Task 4*: Alternative serves and return game with a partner<br>*Task 5*: Alternative serves and four corners target returns with a partner |
| Clear | *Task 1*: Clear toss to yourself (forehand)<br>*Task 2*: Clear toss to yourself (backhand)<br>*Task 3*: Clear toss to yourself (alternative hitting forehand and backhand)<br>*Task 4*: Wall rally drill using forehand and backhand clear strokes<br>*Task 5*: High serve and clear forehand return to the target area<br>*Task 6*: High serve and clear backhand return to the target area<br>*Task 7*: High serve and clear alternative returns to the target area<br>*Task 8*: Forehand clear rally in the right side<br>*Task 9*: Backhand clear rally in the left side<br>*Task 10*: Forehand and backhand clear rally in the whole court. |
| Net Drop | *Task 1*: Net drop toss to yourself (forehand)<br>*Task 2*: Net drop toss to yourself (backhand)<br>*Task 3*: Net drop toss to yourself (alternative hitting forehand and backhand)<br>*Task 4*: Wall rally drill using forehand and backhand netdrop strokes<br>*Task 5*: Toss and forehand net drop return to the target area<br>*Task 6*: Toss and backhand net drop return to the target area<br>*Task 7*: Toss and forehand or backhand net drop return to the target area<br>*Task 8*: Short serve and net drop backhand return game<br>*Task 9*: Short serve and net drop alternative forehand and backhand return game |
| Drive | *Task 1:* Hold racket through weist and catch shuttle front<br>*Task 2:* Shuttle of shuttlecock nearest to the net<br>*Task 3:* Through slow to fast shuttle of shuttlecock<br>*Task 4:* Short serve and drive (paralel)<br>*Task 5:* Short serve and drive (cross line) |

Table 4 (conti.).

*Task Progression of Specialized Content Knowledge*

| Skills | Task Progressions |
|---|---|
| Drop Shot | *Task 1*: Toss and underhand down the line drop shot to the target area<br>*Task 2*: Toss and underhand crosscourt drop shot to the target area<br>*Task 3*:Haripin drop shot rally at the net<br>*Task 4*: Serve and overhead drop shot return game<br>*Task 5*: Short serve – underhand clear – overhead drop shot combination<br>*Task 6*: High serve – overhead r return – crosscourt drop shot combination |
| Smash | *Task 1*: High serve and smash return to the target (down the line)<br>*Task 2*: High serve and smash return to the target (cross court)<br>*Task 3*: High serve-smash – underhand drop shot/blocking combination<br>*Task 4*:High serve-smash – a blocked drop shot – underhand clear<br>*Task5*: Short serve-underhand clear-smash –a blocked drop shot |
| Singles | *Task 1*: Continues rally with three shots (short serve – underhand clear return – drop shot or smash – underhand clear return)<br>*Task 2*: Continues rally with six shots (straight clear – straight return clear – crosscourt clear – straight return clear – crosscourt drop shot – net drop shot )<br>*Task 3*: Continues rally with six shots (straight clear – crosscourt drop shot- net drop short return-crosscourt drive – straight clear – crosscourt smash)<br>*Task 4*: Single game using only shaded areas |
| Doubles | *Task 1*: Short serve and push return to the target area (midcourt)<br>*Task 2*: Short serve and net drop shot to the target area (forehand side alley)<br>*Task 3*: High serve – Smash return – blocked drop shot by rotating side by side position or up and back position<br>*Task 4*: Clear –smash – block continues rally<br>*Task 5*: Short serve –push return rally<br>*Task 6*: Double games using only the side alleys |
| Footwork | *Task 1:* Showing basic footwork styles and choosing one<br>*Task 2:* Forehand front corner and return center<br>*Task 3:* Backhand front corner and return center<br>*Task 4:* Forehand front corner and return center<br>*Task 5:* Forehand back corner and return center<br>*Task 6:* Backhand back corner and return center<br>*Task 7:* Forehand side baseline and return center<br>*Task 8:* Backhand side baseline and return center<br>*Task 9:* 6 corner together and return center |

Each lesson began by repeating the skill learned in the previous weeks. Then instructor showed video related to the new skill. After the demonstration of new skill, instructor let students perform it. As performing, he explained the possible error and how to fix it. At this point, students began to utilize peer tutoring. They were both performing the new skill and teaching it each other.

In the comparison group, instructor used his traditional badminton teaching method without specifically considering SCK. The lesson started with warming up and then students repeated previous weeks' techniques. Then, the instructor demonstrated new skill and students practiced it. At the end of the lesson, students played game or match.

Table 5.

*Instructional Content of Intervention and Comparison Groups Weekly*

| **Week** | **Experimental Group** | **Comparison Group** |
|---|---|---|
| 1 | Presentation about Rules, Etiquette and Safety | Racket Grip, Shuttlecock control |
| 2 | Racket Grip, Shuttlecock control, Backhand and Forehand service | Backhand and Forehand Service |
| 3 | Clear | Clear |
| 4 | Footwork | Net drop |
| 5 | Net drop | Drop |
| 6 | Drop | Smash |
| 7 | Drive | Footwork |
| 8 | Smash | Drive |
| 9 | Lob/Lift | Single Tournament |
| 10 | Singles-Doubles tournament | Double Tournament |

### 3.5.2 Intervention Fidelity

Intervention fidelity of this study was checked by researcher regarding four basic components (Murphy & Gutman, 2006);

a) Intervention Design: It was proved by describing the content and each session in detail, and by using the comparison group. Content for intervention was organized according to the table of the specification which was developed by the expert group. The theoretical framework used in the study should be explained in detail (Borrelli, 2011). The researcher defined theoretical framework through explaining and supporting with studies in the literature. Each session of both interventions was defined in the previous section in detail. Using comparison group made to gauge the effectiveness of the intervention.

b) Training of Providers: Instructor who applied intervention has been two years process about content knowledge framework. After the process, program development expert approved his knowledge proficiency to prepare intervention. Instructor developed intervention and discussed it with three program development expert. Discussing with experts helped to implement the intervention. The previous expertise of instructor on teaching badminton sport was another cue for training component of intervention fidelity.

c) Intervention Delivery: Researcher should define used methods while implementing the intervention in order to allow other researchers to replicate the study (Boutron, Moher, Altman, Schulz, & Ravaud, 2008). The researcher explained all process of intervention previous section. He also defined peer tutoring and video methods. The researcher also recorded each session with the video camera to adherence intervention protocol. Table of specification supported the intervention delivery component.

d) Receipt of Intervention: It was assessed by interviewing with experimental group students so as to evaluate their perceptions about intervention. Their answers were evaluated with content analysis. Results showed that they understood what the intervention aimed to and they found it effective and successful.

Through instructions of Murphy and Gutman (2006)'s study, all components for intervention fidelity have been ensured.

### 3.5.3 Summary of Teaching Strategies used in the Course Intervention

Table 6 showed what kind of teaching strategies, tools and instructional behaviors were used while applying intervention.

Table 6.

*Teaching Strategies, Tools and Instructional Behaviors during Intervention*

| **Content Knowledge** | **Strategy** | **Instructional Strategies Samples** | **Example** |
|---|---|---|---|
| Rules, etiquette and safety | Lecturing | Instructor's power point presentation | Presentation of rules in badminton |
| Technique and tactic | Visual representation | Video presentation | Watching video representing clear stroke |
| | Direct instruction | Demonstration | Students perform clear stroke. |
| | | Cues | Remember you should follow shuttlecock |
| | Role modelling | Instructor demonstrates how to practice with playing a student | Playing clear stroke |
| Student errors | Peer tutoring | Peer teaching/ peer assisting | A student recognized his/her peer's smash stroke error |
| Instructional task and representation | Peer tutoring | Peer teaching/ peer assisting, | That student shows how to correct smash stroke to his/her peer |
| | Feedback | Specific feedback | You remember excellent all required steps for clear |
| | | Non-specific feedback | Good job class |

### 3.6 Data Collection Procedures

At the beginning of the study, Middle East Technical University Human Subjects Ethical Committee permission was taken (Appendix 5). Consent forms and acceptance letters were obtained from Kırıkkale and Dumlupınar University administrations. Also, each student completed a personal consent form showing their voluntary participation.

There were three phases in data collection. Firstly, pre-test data were collected from both groups. Secondly, the ten weeks intervention was applied. Thirdly, post-test data were collected from both groups at the end of the intervention.

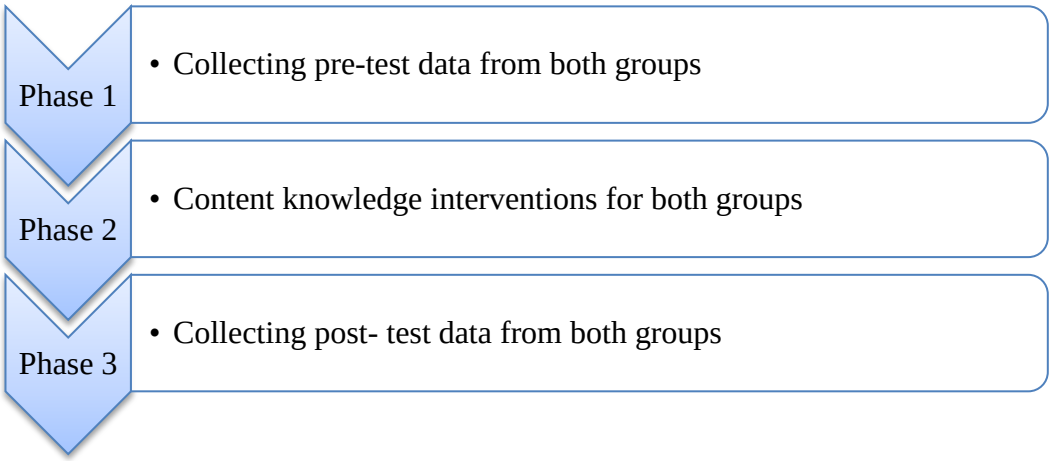



*Figure 6.* Phases of Data Collection

Badminton content knowledge achievement test was conducted in a classroom setting. Totally 75 minutes, 45 minutes for CCK and 30 minutes for SCK, were given to participants to complete the test. Between the CCK and SCK tests 10-minute break was given.

### 3.7 Data Analysis

Mixed ANOVA was used to check whether there were significant differences between experimental and comparison groups regarding pre and post test results (Tabachnick & Fidell, 2007). Assumptions of mixed ANOVA were checked before applying it. All assumptions were met, and mixed ANOVA could be used for analysis (See Appendix 2). The Greenhouse-Geisser results were focused while checking significant differences between and within the groups. Structured interview data were analyzed with content analysis method (Morgan, 1993).

# CHAPTER 4

# RESULTS

In this chapter, findings of the study are reported for each research question. Firstly, effects of the intervention on the CCK of PETE students are presented. Secondly, effects of the intervention on the SCK of PETE students are reported. Lastly, interview findings of PETE students' perceptions on the intervention are given.

**4.1 Research Question 1.** How does the badminton course intervention influence the related CCK levels of PETE students?

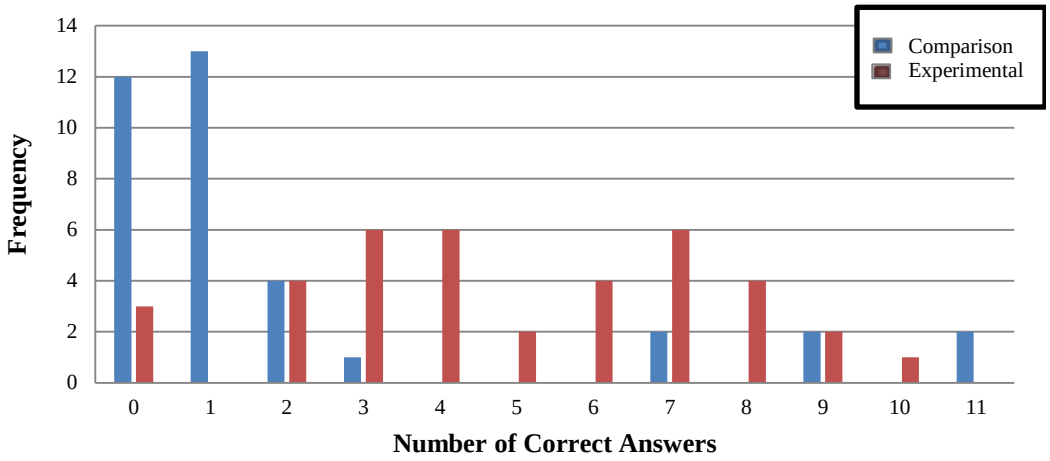
CCK levels of PETE students are examined under two sub-questions. First sub-question is related to the PETE students' knowledge of rules, etiquette and safety, and the second sub-questions is related to the technique and tactic aspect of badminton.

*4.1.1 Research Sub-Question 1:* What is the effect of the intervention on the PETE students' knowledge of rules, etiquette and safety in badminton?

Pre-test results of the comparison and experimental groups were not significantly different from each other. ANOVA results demonstrated that there was no significant difference between comparison and experimental groups ($F$ (1, 73) = .03, p>.05). According to ANOVA results, there were significant differences between pre and post test results ($F$ (1, 72) = 78.81, p<.05) for both groups. Additionally, univariate tests showed that experimental group participants' acquisitions from pre to posttest were higher than comparison group participants' gains ($F$ (1, 72) = 44.17, p<.05).

Pre-test results of comparison group showed that correct answer scores were between 0 and 11 ($M$=2.17 SD= 3.21,). Percentage of correct answers was 4.5%. In the

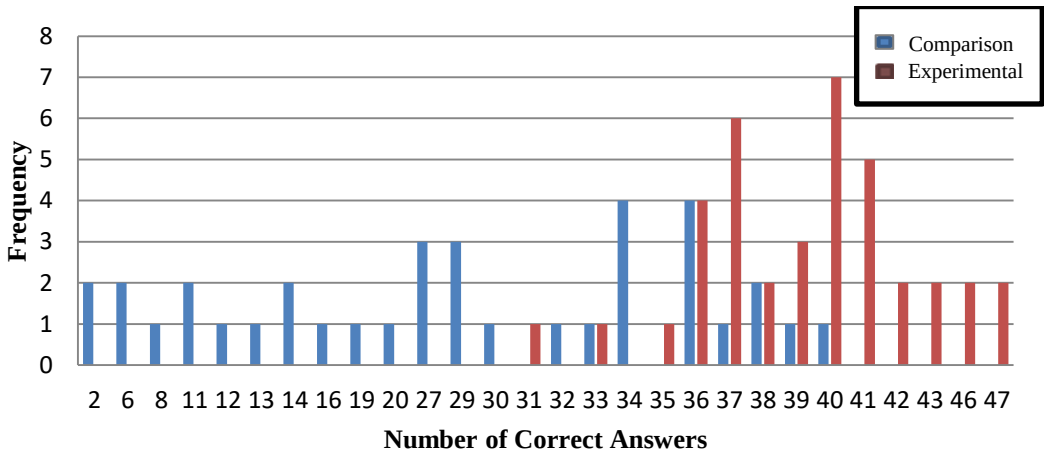
experimental group, pre-test number of correct answers was between 0 and 10. (*M*=4.9 SD= 2.62). Percentage of correct answers was 10.2%. Maximum possible score from this part of the test was 48. Results indicated that participants did not have a knowledge of rules, etiquette and safety in badminton sport before interventions (See figure 7).




* Maximum possible score: 48

*Figure 7.* Pre-test frequency of rules, etiquette and safety scores in experimental and comparison groups

Post-test descriptive findings showed that correct answer scores of comparison group students were between 2 and 40 (*M*=24.69, SD= 11.86). Percentage of correct answers was 51.4% (See figure 8). Descriptive post-test results of experimental group students indicated that correct answer scores were between 35 and 47 (*M*=39.45, *SD*= 3.53). Percentage of experimental group students' correct answers was 82.2% (See figure 8).




* Maximum possible score: 48

*Figure 8.* Post-test frequency of rules, etiquette & safety scores in experimental and control groups

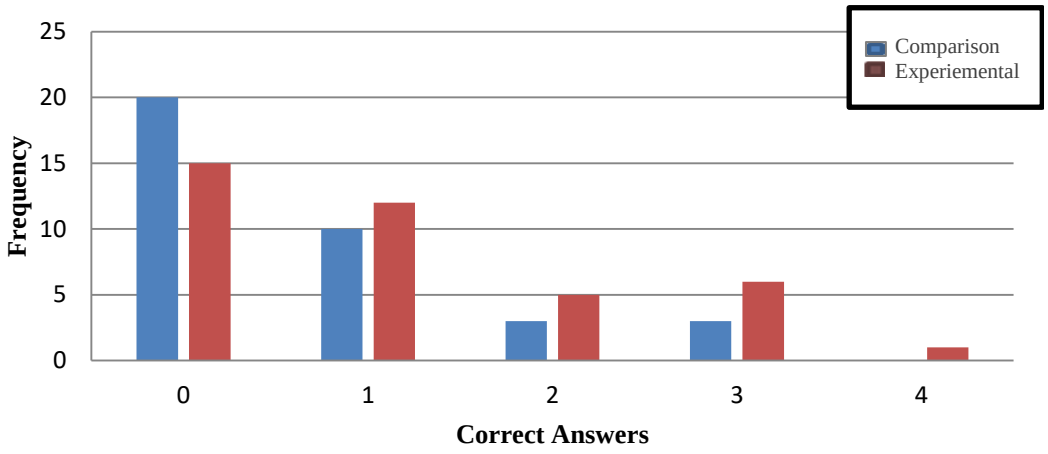
4.1.2 *Research Sub-Question 2: What is the effect of the intervention on the* PETE students' *knowledge of techniques and tactics in badminton?*

Pre-test results of the comparison and experimental were not significantly different from each other in technique and tactic domain. ANOVA results demonstrated that there was no significant difference between comparison and experimental groups ($F$ (1, 73) = .02, p>.05). Results indicated that participants had limited knowledge of technique and tactic before the intervention.

ANOVA results showed that there were significant differences between pre and post test results ($F$ (1, 72) = 101.24, p<.05) for both groups. Findings also indicated that experimental group participants' gains from pre to posttest were higher than comparison group participants' gains ($F$ (1, 72) = 87.09, p<.05).

Pre-test results of comparison group showed that correct answer scores were between 0 and 3 ($M$=0.70, SD= 0.94). Percentage of correct answers was 0.8%. Moreover, pre-test findings of experimental group participants indicated that correct answer

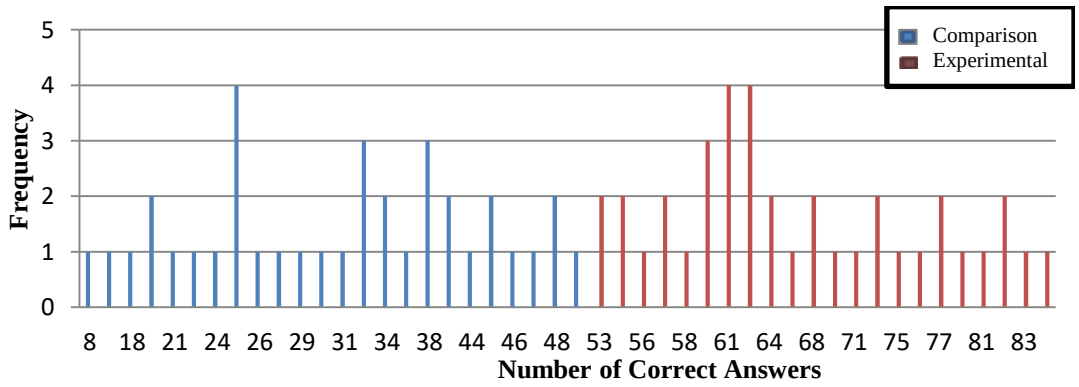
scores were between 0 and 4 (*M*=1.13, *SD*= 1.17). Percentage of the correct answers was 1.3 % (See figure 9).




* Maximum possible score: 85

*Figure 9.* Pre-test frequency of technique & tactic scores in experimental and comparison groups

Posttest descriptive results of comparison group demonstrated that correct answer scores were between 8 and 49 (*M*=32.08, *SD*= 10.39). Percentage of correct answer was 37.7%. (See figure 10). Experimental group students performed better than the comparison group in post-test technique and tactics part of the knowledge test. Correct answer scores of the experimental group were between 53 and 84 (M=66.55, SD= 9.18). Percentage of correct answers was 78.3%. (See figure 10)




* Maximum possible score: 85

*Figure 10.* Post-test frequency of technique & tactic scores in experimental and comparison groups

**4.2 Research Question 2.** How does the badminton course intervention influence the related SCK levels of PETE students?

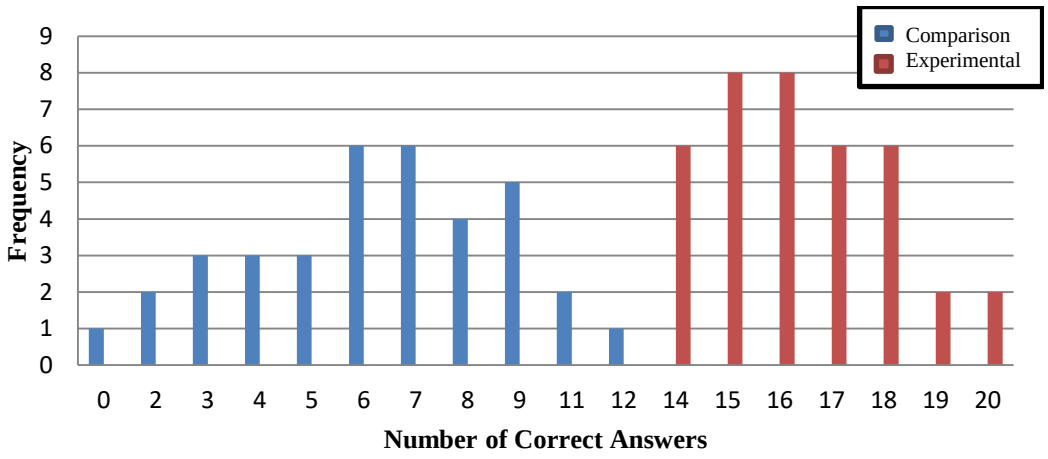
SCK levels of PETE students are examined via two sub-questions. First sub-question is related to the PETE students's knowledge of student errors, and the second sub-questions is related to instructional tasks & representations aspect of badminton.

4.2.1 *Research Sub-Question 3: What is the effect of the intervention on the* PETE students' *knowledge of student errors in badminton?*

Pre-test result of the comparison group was 0. Similarly, pre-test results of the experimental group were 0. Before interventions, participants in both groups did not have any information about student errors.

ANOVA results indicated that there were significant differences between pre and post test results ($F(1,72)= 210.14$, $p<.05$) for both groups. Results also showed that experimental group students' gains from pre to posttest results were higher than comparison group students' gains ($F$ (1, 72) = 93.11, $p<.05$).

Posttest descriptive results of comparison group indicated that correct answer scores were between 0 and 12 ($M$=6.36, $SD$=4.4). Percentage of correct answers was 31.8%. On the other hand, posttest results of experimental group showed that correct answer scores were between 14 and 20 ($M$=16.32, $SD$= 3.7). Percentage of correct answers was 81.6% (See figure 11).



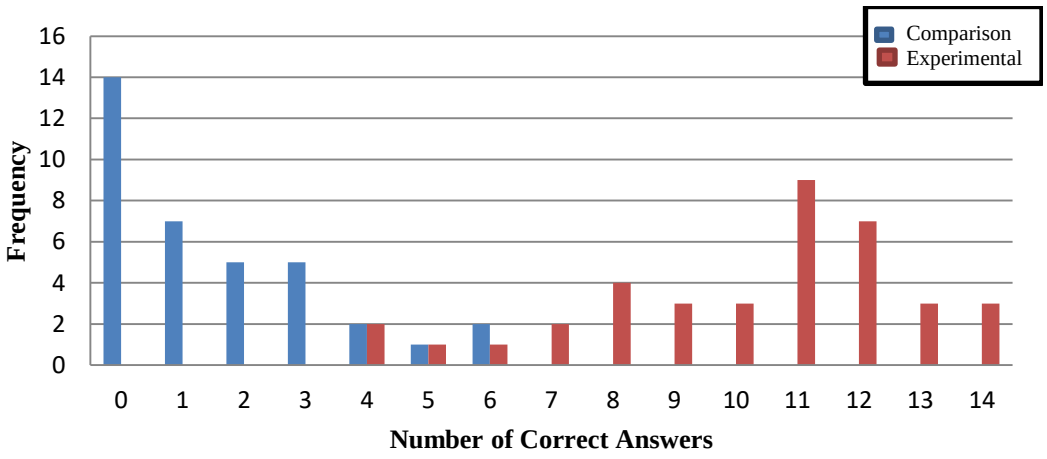

* Maximum possible score: 20

*Figure 11*. Post-test frequencies of student errors score in experimental and comparison groups

4.2.2 Research Sub-Question 4: *What is the effect of the intervention on the* PETE students' *knowledge of instructional tasks & representations in badminton?*

Pre-test results of both groups were 0. ANOVA results indicated that there were significant differences between pre and post test results ($F$ (1, 72) = 215.77, $p<.05$) for both groups. Results also showed that experimental group students' gains from pre to posttest results were higher than comparison group students' gains ($F$ (1, 72) = 117.51, $p<.05$).

According to comparison group posttest results, correct answer scores were between 0 and 6 ($M$=1.58, $SD$= 1.5). Percentage of correct answers was 11.3%. Posttest results of the experimental group indicated that correct answer scores were between 4 and 14 (M=10.16, SD= 2.9). Percentage of correct answers was 72.4% (See figure 12).




* Maximum possible score: 20

*Figure 12*. Post-test frequency of instructional task and representation scores in experimental and comparison groups

**4.3 Research Question 3.** How do the badminton course students at PETE program perceive the badminton content knowledge intervention?

After post-test data collection, structured interview was applied on 12 volunteer experimental group participants. As a result of thematic content analysis of student interviews and researcher's field notes, a total of 4 themes emerged: 1) enjoyment, 2) content knowledge development, 3) learning how to teach, and 4) instructor's content knowledge level (see table 7).

Table 7.

*Themes of Research Question 2*

| **Themes** | **Sub-themes** |
|---|---|
| 1. Enjoyment | ➢ Fun while teaching and learning badminton<br>➢ Being excited for new subject matter |
| 2. Content knowledge development | ➢ Feeling confident to teach<br>➢ Learning all domains of framework<br>➢ Possible difficulties and solutions when being physical education teacher |
| 3. Learning how to teach | ➢ Teaching different group of learners<br>➢ CCK is not enough to teach alone |
| 4. Instructor's content knowledge | ➢ Effective teaching strategies<br>➢ Effective feedback<br>➢ Effective modification, analogies, cues and representations |

4.3.1. *Enjoyment*

Students indicated their enjoyment while they were playing and teaching badminton during class time. They were generally ready for new subject matter to learn how to teach and how to play. Students expressed that they liked badminton courses because they were excited while coming to courses. Students also complained about limited duration of the class.

*"Lesson was very good. Every badminton day, I was excited because I knew today we would learn a new skill. We would practice it and learn how to teach it."*

Student 10, Interview

*"I love badminton course. I wish other courses could be organized like badminton course. I wait for Tuesdays because of badminton course. I like playing, teaching and learning."*

Student 7, Interview

*"I can't explain to you how I enjoy from badminton course. I like our lecturer. He is a nice person. He knows badminton very well. It is sure that he loves teaching badminton. He uses games in order to motivate us."*

Student 2, Interview

*"When I started to practice new skill well, the class was over. That time I said 'NO!'."*

Student 5, Interview

The researcher also witnessed the students' enjoyment in the intervention group classes throughout the 10 weeks. He expressed that high motivation of students increased his (instructor's) motivation too.

*"When I came to the gym, almost everybody was ready to the lesson. I enjoyed lessons because students were willing to learn. They were always asking a question when I gave a break."*

Field Notes, Week 8

*"I played badminton for 15 years and taught it for 5 years. If I compare my coaching experience and experience of teaching badminton according to this framework, I liked teaching badminton to PETE students much more than my coaching experience."*

Field Notes, Week 4

*"Duration of a badminton course is 2 hours, but I don't understand how the time is over. If basketball lecturer did not warn me about time, I would not finish the lesson.*

*When my students see basketball lecturer, they always argue about the duration of the class. This absolutely shows that students enjoy badminton course."*

Field Notes, Week 7

4.3.2. *Content Knowledge Development*

Experimental group students expressed that intervention was effective for learning how to play and how to teach badminton. They indicated that they felt as physical education teachers after the intervention. They also believed they would teach badminton when they became physical education teacher.

"*I think this lesson reached its aim. We learned how to play, as well as how to teach it. This is really very good for us physical education teachers. I feel I can teach badminton when I become a teacher."*

Student 3, Interview

"*I can say a lot of things. For example, we taught each other. I saw an error of my friend and I fixed it. When I fixed, I learned how to teach it. This was vice versa. I liked to teach."*

Student 6, Interview

Badminton course was designed according to new content knowledge framework. All domains of the framework are important in order to get deep knowledge of content. Students' explanations showed that they understood the importance of each domain.

*"Rules we should know. Because when I become teacher and student asked a rule, and I don't know his question. This is terrible. I have to know rules. Etiquette should be known I believe. The teacher should emphasize fair play while students are playing badminton. Safety, we must know. As I see, badminton requires poles and*

*heavy weights for taking them straight so we should explain safety rules to students."*

Student 12, Interview

"*I think the tactic is absent part of teaching. I always believe tactic should be taught while teaching technique."*

Student 7, Interview

*"Tactic is important. It allows students to understand while they learn techniques".*

Student 1, Interview

" *I did not get any course like badminton. When lecturer came class and explained us, that everybody would teach each other. How? Then we understood. I taught my friend, and he taught me. He learned I learned. I felt the first time as a teacher. Since this course or intervention is really effective."*

Student 4, Interview

The effectiveness of the intervention was ensured by notes of researcher too.

*" Today we learned how to perform and teach forehand and backhand services. Students liked the video, and they understood why we use peer tutoring. It was easy to recognize that students enjoyed teaching each other. There was an interaction in class."*

Field notes, Week 3

*"There was an incidence. One of the students was resting side of the hall. He was watching his friends. Suddenly, he stood up and went to one of his classmates. And he began to correct errors of his friend. I surprised because he was not in playing area. Then he came to me and said; "I am not able to play but I can continue to teach." I said yes, absolutely. That time I understood my students got the point of this intervention."*

Field notes, Week 5

*"Week 6, this week we learned how to play and how to teach net drop shot. I was the lecturer of Badminton course for that semester instead of regular lecturer of this course. This week regular lecturer visited the course. While we were talking, one of the students shouted his friend. Regular lecturer got angry and called the student. Then he recognized our intervention and did not say anything to the student. He was shocked because everybody was teaching each other. He said that all students had fun."*

Field notes, Week 6

4.3.3. *Learning How to Teach*

Learning not only how to perform but also how to teach was the aim of this intervention. Students were familiar to perform, but they did not get any course which was designed how to teach. They got familiar week by week and understood why they were performing and teaching.

*"I played and taught. These are good. I felt as a teacher."*

*"It is supposed that preservice teacher has learned all parts of technique. So he/she can teach it to specific learners when he/she went to the real school setting and teach it."*

Student 11, Interview

"*I think they are very important for comprehending specific sport. But physical education teacher should know more than technique and tactic. He should know how to teach them."*

Student 8, Interview

*"No, performing is not sufficient. We must know how to teach a sport. I wish another course would be designed like this course.*

Student 2, Interview

Results of the structured interview showed that some students were worried about how to teach a specific sport when they became physical education teachers in school.

*"When I got this course, I understood I could not teach any sport except basketball and badminton. I have played basketball for 15 years; I think I can teach it. Then I can teach badminton because I know how to teach it.What else? I m worried about how to teach other sports. For example, I got handball course a year ago. Yet, I m not sure I can teach handball. This course was good but caused my worries about being physical education teacher."*

Student 6, Interview

Teaching specific sport in school physical education lesson is an issue that physical education teachers should take into consideration. Students stated that they learned how to teach badminton effectively. They explained that they would use modified games in order to correct errors of students. Findings also demonstrated that students comprehended the importance of preparing a lesson plan.

*"After this course, I recognized what should I do when I become physical education teacher. I learned how to fix an error of student while he was performing. I am planning to use modified games as we have used in badminton course."*

Student 3, Interview

*"I observed how you applied for this course. I recognized that you came to hall ready. I knew what we would learn this week. I think preparing lesson plan is very important. I will do it when I become physical education teacher."*

Student 9, Interview

Learning how to teach was one of the main aims of this intervention. Explanations of students demonstrated that intervention reached its goals. Moreover, field notes of researcher supported interview findings.

*"I saw students got used teaching each other. I recognized that students corrected their errors while they were demonstrating correct performances. Teaching increased their motivation."*

Field notes, Week 5

4.3.4. *Instructor's Content Knowledge*

Instructors in PETE programs are supposed to have sufficient CCK and SCK in order to teach specific sport/physical activity course. Results of student interviews showed that badminton course lecturer had enough CCK and SCK to teach badminton for PETE students. According to the findings, students thought that content knowledge of instructor was deep and effective so they could learn badminton in terms of teaching and performing.

*"First time I saw a lecturer using video before demonstrating a new skill. It was very good. The sequence of showing new technique was that we first watched the video then lecturer demonstrated, and we performed and taught each other."*

Student 11, Interview

*"Lecturer knows badminton very well. He showed us every technique properly. He corrected our errors. He was giving feedback whenever we did error."*

Student 4, Interview

*"He taught us how to play and how to teach badminton. I liked his cues while I was teaching technique to my friends. I will use these implications when I become physical education teacher".*

Student 6, Interview

Field notes of researcher supported the importance of CCK and SCK in order to teach badminton. Researcher indicated that he could organize students even if the number of students was more than badminton court capacities.

*"Today, there were more students than badminton court capacities. I modified courts and divided students. Then I used different applications. For example, I divided students. There were five students in each courtside. One of them threw shuttlecock up, and other four students hit the shuttlecock. After four students had hit, shuttlecock thrower changed. At this time, I recognized that my content knowledge allowed me to modify and organize students. This is really important."*

Field notes, Week 4

*"This week I taught drop shot. It is a difficult technique. Students could not perform well, and their motivation decreased. Then I organized a game which was related drop shot. They enjoyed the game. After then they performed drop shot better."*

Field notes, Week 6

Table 8

Results of Research Question 1

| **Domains** | **Sub-domains** | **Experimental Group** | | **Comparison Group** | |
|---|---|---|---|---|---|
| | | **Pre** | **Post** | **Pre** | **Post** |
| CCK | Rules, Etiquette and Safety | *M*= 4.89, 10.2 % | *M*=39.45, 82.2 % | *M*=2.16, 4.5 % | M=24.69, 51.4 % |
| CCK | Technique and Tactic | *M*= 1.13, 1.33 % | *M*=66.55, 78.3 % | *M*=0.72 0.85 % | *M*=32.08, 37.7 % |
| SCK | Student Errors | 0 | M=16.32, 81.6 % | 0 | *M*=6.36, 31.8 % |
| SCK | Instructional Task and Representation | 0 | *M*=10.16, 72.4 % | 0 | *M*=1.58, 11.3 % |

Table 9

A Summary of the Design and Results

| Research Question | | Data Collection | | | | |
|---|---|---|---|---|---|---|
| **Category** | **Question** | **Tool** | **Validity and Reliability** | **Subjects** | **Data Analysis** | **Results** |
| Rules, Etiquette and Safety | What are the effects of intervention on rules, etiquette and safety knowledge of PETE students? | Achievement Test | • Table of Specification<br>• Internal consistency .91<br>• Test retest .91 | All participants | Test Analysis Program (TAP)<br>Mixed ANOVA | • Significant differences between pre and post test results for both group<br>• Comparison group results 51.4 %<br>• Experimental group results 82.4 %<br>• Experimental group reach estimated CK level, not comparison group |
| Technique and Tactic | What are the effects of intervention on technique and tactic knowledge of PETE students? | Achievement Test | • Table of Specification<br>• Internal consistency .90<br>• Test retest .91 | All participants | TAP<br>Mixed ANOVA | • Significant differences between pre and post test results for both group<br>• Comparison group results 37.7 %<br>• Experimental group results 78.3 %<br>• Experimental group reach estimated CK level, not comparison group |
| Student Errors | What are the effects of intervention on student errors knowledge of PETE students? | Achievement Test | • Table of Specification<br>• Inter evaluator agreement .83<br>• Intra evaluator agreement .87 | All participants | TAP<br>Mixed ANOVA | • Significant differences between pre and post test results for both group<br>• Comparison group results 31.8 %<br>• Experimental group results 81.6 %<br>• Experimental group reach estimated CK level, not comparison group |

Table 9 (Conti…)

A Summary of the Design and Results

| **Research Question** | | **Data Collection** | | **Subjects** | **Data Analysis** | **Results** |
|---|---|---|---|---|---|---|
| **Category** | **Question** | **Tool** | **Validity and Reliability** | | | |
| Instructional Task and Represent. | What are the effects of intervention on instructional task and representation knowledge of PETE students? | Achievement Test | • Table of Specification<br>• Inter evaluator agreement .83<br>• Intra evaluator agreement .87 | All participants | Test Analysis Program<br>Mixed ANOVA | • Significant differences between pre and post test results for both group<br>• Comparison group results 11.3 %<br>• Experimental group results 72.4 %<br>• Experimental group reach estimated CK level, not comparison group |
| PETE students' perceptions on intervention | How do PETE students perceive the effectiveness of intervention | Structured Interview | | 12 PETE students | Content Analysis | • Participants perceived intervention effective in order to have deep badminton CK |

# CHAPTER 5

# DISCUSSION

The purpose of this study was to examine the effects of badminton content knowledge intervention, based on Ward's content knowledge framework, on pre-service teachers' learning. PETE students are supposed to have enough content knowledge for skill-based courses, as the same on disciplinary courses (Siedentop, 2002). According to studies (Castelli & Williams, 2007; South Carolina Department of Education [SDE], 2000) in literature, estimated content knowledge level of physical education teachers or PETE students should be 70 % or over correct answers from all questions. In this study, content knowledge level criteria for PETE students were set as 70 % or over correct answers. Discussion part is organized according to three research questions.

**5.1 Research Question 1.** How does the badminton course intervention influence the related CCK levels of PETE students?

In this study, results showed that both groups significantly increased their CCK scores after interventions. Moreover, experimental group PETE students' scores were significantly better than comparison group students' scores. CCK posttest results showed that correct answer scores of comparison group were 51.4 % for rules, etiquettes & safety and 37.7 % for technique & tactic part. Besides, posttest correct answer scores of experimental group PETE students were 82.2 % for rules, etiquettes & safety and 78.3 % for technique & tactic part. These findings showed that experimental group reached estimated percentage on CCK parts of the test (> 70 %) while comparison group students could not reach estimated percentage to be successful on CCK parts of the test.

Insufficient content knowledge performance has been found in comparison group PETE students of this study. Similarly, low content knowledge performance has been detected in math, chemistry and literacy education studies (Ball, 1990; Depaepe et al., 2015; Shedd, 2011). Content knowledge level of preservice math teachers has been assessed (Hill et al., 2004). Results showed that preservice math teachers performed low scores in content knowledge assessments. For example, Kleickmann et al (2013) examined first year and last year content knowledge level of preservice math teachers. They found that content knowledge levels of first and last year preservice math teachers were different and their scores were lower than expected. Moreover, the study of Ball (1990) indicated that preservice math teachers used their precollege math knowledge during and after preservice education process because they were graduated from teacher education department with insufficient math content knowledge.

Studies on preservice chemistry teachers examined content knowledge with specific tests (Bergquist & Heikkinen, 1990; Faikhamta et al., 2006; Kind, 2014; Lythcott, 1990; Sawyer, 1990; Smith & Metz, 1996) and survey (Shedd, 2011). Studies indicated that preservice teachers' content knowledge is not in expected level to teach chemistry in high school settings (Kind, 2014). A similar study has been applied by Faikhamta et al. (2006). They found that content knowledge level of preservice chemistry teachers was not enough for teaching chemistry when they graduated from preservice chemistry teacher education. In another example, Luft et al. (2011) indicated that even preservice teachers answered correctly most of the items; they could not demonstrate how they answered questions. Similarly, Lopez and his colleagues (2014) indicated that shaping content knowledge for preservice chemistry teachers was critical. The study showed that using content map resolved shaping content knowledge problems.

Low-performance findings have been found in literacy education (James, 2011; Shedd, 2011). Studies examined literacy content knowledge level of special education preservice teachers. Results demonstrated that special education teacher

candidates have insufficient literacy content knowledge. Results of the study imply that when these preservice teachers become real school teachers, they will not teach literacy properly because they will not have PCK in order to teach it. Insufficient literacy content knowledge has been recognized in the study of Shedd (2011). The study showed that teachers have the breadth of content knowledge but they don't have depth for the content knowledge required for teaching literacy.

Meanwhile, low content knowledge performance has been found in physical education literature as well. Some studies examined content knowledge in high school settings (Capel & Katene, 2000; Martin, 2008). Researchers checked perceptions of students regarding team game content knowledge (Capel & Katene, 2000) and exercise physiology content knowledge (Martin, 2008). Results were in line with the results of the comparison group. They determined that content knowledge level of students was lower than expectations of curriculum developers and educators.

Content knowledge in physical education has been deeply investigated into health-related content knowledge field (Castelli & Williams, 2007; İnce & Hunuk, 2013; Santiago et al., 2012). Low-performance findings of comparison group were similar with the study of Castelli and Williams (2007) that assessed health-related fitness content knowledge of in-service middle school physical education teachers. In this study, even participants trust their content knowledge level; they could not reach estimated levels which are specified by South Carolina Physical Education Assessment Program (70 % or over correct answers from all questions). Similar low-performance findings have been found on the study of Santiago et al. (2012). Findings indicated that overall health-related fitness content knowledge of participants was lower than the estimated level (< 70 %). Besides, İnce and Hunuk (2013) have examined health-related fitness content knowledge of experienced physical education teachers. They found similar low findings with studies above. One of the reasons for having similar findings might be that physical education teachers graduate from PETE with low content knowledge.

As a summary, comparison group's low content knowledge performance has been detected in other education fields. Studies discussed above had some similar qualities. The reason of low performance may be a) there weren't specifically designed interventions; b) there were ineffective interventions; c) Graduating from teacher education program with low content knowledge.

Similar to our results; experimental group participants increased their content knowledge level in terms of estimated content knowledge level in Castelli and Williams' (2007) study. Similar high-performance content knowledge findings have been found in math, chemistry, science, literacy and physical education studies. Specific interventions focusing content knowledge have been used in these studies (Oleson, 2010; Yamnitzky, 2010).

Studies including professional development interventions designed for improving content knowledge of math teachers or math preservice teachers showed that math content knowledge level increased after interventions (Oleson, 2010; Welder, 2007; Yamnitzky, 2010). In addition, if teachers had weak content knowledge before the intervention, they increased their content knowledge level more than those had high content knowledge (Oleson, 2010). On the other hand, the study of Yamnitzky (2010) indicated that interventions on instruction process had a positive impact on elementary teachers' math content knowledge level (Yamnitzky, 2010).

Content knowledge studies on chemistry showed similar results (Khourey-Bowers, & Fenk, 2009; Sanger, 2007). For example, chemistry content knowledge of elementary preservice teachers with inquiry-based intervention has been studied. Results of the study showed that inquiry-based course was more effective than traditional methods (Sanger, 2007). Another study was Khourey-Bowers and Fenk (2009) that examined effects of constructivist chemistry professional development intervention on content knowledge. Findings demonstrated that constructivist chemistry professional development intervention was effective on the content knowledge level of chemistry

teachers. A metacognitive method as one of professional development interventions has been effective on the content knowledge level of chemistry teachers and students (Rickey & Stacy, 2000). One of the effective teaching methods for chemistry has been found in the study of Thiele and Treagust (1994). They used analogy-inclusive teaching method in order to assess the professional development of chemistry teachers. The study showed that when analogy-inclusive teaching method has been applied chemistry teachers, those teachers use their content knowledge more effective while teaching chemistry. Researchers focused on the effects of science writing heuristic approach (Greenbowe et al., 2007) and metacognitive method (Perkins & Salomon, 1989) on chemistry content knowledge. Findings of studies above were in line findings of this study. Studies ensured that specific approach and/or method enhanced content knowledge of chemistry teachers or preservice teachers.

Similar high-performance results have been found in science content knowledge studies. Content knowledge level of preservice science teachers has been evaluated with specific science content knowledge interventions (Diamond et al., 2014; Johnson & Cotterman, 2015; Santau et al., 2014). For example, Diamond and his colleagues (2014) investigated science teachers' content knowledge level. The study showed that intervention enhanced content knowledge level of teachers. Moreover, professional development of science teachers has been examined with concept maps (Green et al., 2013). The study demonstrated that two weeks professional development increased content knowledge level of science teachers. Content knowledge level of teachers has been increased with video club method. Findings demonstrated that video club method increased content knowledge level of preservice science teachers (Johnson & Cotterman, 2015). Similarly, specifically designed elementary science method course increased content knowledge level of preservice elementary teachers (Santau et al., 2014). Pecore, Kirchgessner and Carruth (2013) applied a unique collaborative professional development experience between zoological park personnel and university faculty and showed that these experiences improved science content knowledge. Content knowledge intervention

was implemented on beginner science teachers and studies found similar results mentioned above (Jin et al., 2015; Bartos & Lederman, 2014). Another similar result wth this study was found on student-teacher–scientist partnerships intervention science study. It was implemented on science teachers and intervention increased their content knowledge level (Houseal et al., 2014).

The effectiveness of specific designed content knowledge intervention on writing skills has been showed in some studies (Olsen, 2010; Robertson, 2011). Studies about leadership (Olsen, 2010) and composition (Robertson, 2011) focused on content knowledge. Results of these studies indicated that when content knowledge level of participants increased, their performance and pedagogy were influenced positively.

To sum up, content knowledge studies in education fields have supported findings of the experimental group. Experimental group participants performed high scores (over 70 % correct answers from all questions) after badminton content knowledge intervention. Similar findings were maybe the reason of effectiveness of an intervention designed according to new content knowledge framework.

**5.2 Research Question 2.** How does the badminton course intervention influence the related SCK levels of PETE students?

SCK posttest results indicated that correct answer scores of comparison group were 31.8 % for student errors and 11.3 % for instructional task & representations. Experimental group PETE students performed 81.6 % correct answers for student errors and 72.4 % correct answers for instructional task & representations is posttest. According to SCK results, experimental group PETE students reached estimated a percentage for SCK part of the test (> 70 %) while comparison group students could not reach estimated SCK level (< 70 % or over).

Low content knowledge performance has been detected in math and physical education studies in the literature. In mathematics, Ball and her colleagues (2008) defined that content knowledge was basic knowledge in order to teach complex tasks. Therefore, preservice teachers should be graduated with sufficient content knowledge in order to be able to teach it students in real school settings. Some studies focusing on this content knowledge framework examined math content knowledge of preservice teachers (Ho & Lai, 2012; Aslan-Tutak & Adams, 2015) For example, specialized content knowledge of pre-service math teachers has been examined (Ho & Lai, 2012). Results were similar with comparison group results. Ho and Lai (2012) indicated that allocated time for SCK in preservice math teacher education program was not enough for developing their content knowledge in order to teach complex mathematical tasks. Studies ensured that content knowledge framework including CCK and SCK domains was effective to increase content knowledge level of teachers or preservice teachers. Study of Olanoff and her colleagues (2014) reviewed all articles examined content knowledge framework on preservice teacher education. Results showed that fractions of content knowledge framework should be studied and improved.

In physical education, comparison group low performance might be the reason of allocated time for content knowledge in PETE badminton course. According to results, CCK is insufficient but SCK is worse. Similar results were found in some studies (İnce et al., 2012; Kim et al., 2015; Ward et al., 2012; Ward et al., 2013). Ward and his colleagues (2012) found that PETE programs are focusing more on CCK than SCK. Furthermore, Ward and his colleagues (2013) studied on content knowledge in PETE in the international area based on their allocated times. Results indicated that percentage of allocated time to content in PETE was 10 % in the USA, 29.5 % in China, 20.5 % in England & Wales, 31.5 % in Turkey and 38 % in Belgium. Also CCK is taught much more often in content knowledge courses than SCK. More specifically, technique & tactics which are CCK domain was dominant in content knowledge of all content instruction. Student errors and task representation domains which are SCK were in very minimum level. More recently,

the study of Kim et al. (2015) indicated that insufficient common content knowledge is taught in the PETE curriculums and movement content classes are not significantly focusing on specialized content knowledge. Similar allocated time for SCK and CCK has found in studies of Turkish (İnce et al., 2012), Korea (Ward et al., 2012) and USA (Ward et al., 2013) contexts.

The reasons for low performance of comparison group and studies above may be: a) ineffective intervention which includes traditional teaching methods, b) pedagogical content knowledge and content knowledge levels of lecturers, c) insufficient allocated time for specialized content knowledge.

Badminton content knowledge intervention designed according to new content knowledge framework (Ward, 2009a) including SCK domains was effective to increase content knowledge level of experimental group PETE students. The effectiveness of content knowledge framework has been supported by studies in math and physical education fields.

Studies in math education have been focused on the effectiveness of content knowledge framework including CCK and SCK domains on content knowledge of math teachers (Bair & Rich, 2011; Ho & Lai, 2012; McCoy, 2011). For example, McCoy (2011) examined the level of specialized mathematics content knowledge of preservice teachers. Mathematics content course increased SCK level. Similarly, Bair and Rich (2011) studied on elementary and secondary school mathematics teachers. They found that content knowledge framework increased teachers' content knowledge. Results of the study were similar with results of the experimental group. Furthermore, content knowledge level of preservice math teachers has been examined. For example, Welder (2007) focused content knowledge of preservice math teachers with content related courses. The study showed that preservice teachers should graduate from preservice teacher education program with sufficient algebra content knowledge. Results also indicated the importance of common and specialized content knowledge in order to have deep content knowledge.

High content knowledge level is related to teachers' pedagogical content knowledge and student learning outcomes (Hill et al., 2005; Turini, 2011; Oppermann et al., 2016). In math education, teachers' content knowledge affects directly their student learning outcomes. The positive and linear relationship between content knowledge and student achievement has been proved on studies (Hill et al., 2005; Turini, 2011). For example, Turini (2011) showed a linear relationship while she was teaching math. Oppermann and her colleagues (2016) supported this relationship. Findings showed that if preschool math teachers had enough content knowledge, they would use content knowledge while their children were playing the daily game.

The effectiveness of content knowledge framework (Ward, 2009a) including SCK and CCK domains in physical education has been studied in last decade. These studies focused on the effectiveness of content knowledge on PCK and student learning (Ward, Kim, Ko & Li, 2014). Having deep content knowledge affects and increases pedagogical content knowledge of physical education teachers (Lee, 2011; Iserbyt, Ward, & Li, 2015; Kim, 2015; Sinelnikov et al., 2014). For example, Kim (2015) examined effects of volleyball content knowledge intervention (focusing on SCK) on a physical education teacher's teaching practice and student learning. The study showed that intervention positively affected teacher's teaching practice skills and also increased student learning. On this study, intervention for the experimental group was designed according to domains of Ward (2009a) and results showed that experimental group reached estimated the level of content knowledge in all parts of Ward' (2009a) framework. It is supposed that experimental group PETE students have high-level badminton PCK because of recent studies in literature (Iserbyt, Ward, & Martens 2015; Iserbyt, Ward, & Li, 2015). When experimental group students become physical education teachers, it is also supposed that learning outcomes of students in school will be high.

In summary, studies indicated that if researchers apply intervention designed according to new content knowledge framework (Ball et al., 2008; Ward, 2009a) on pre-service and/or in-service teachers, content knowledge and pedagogical content

knowledge levels of participants increase. Specifically, emphasizing specialized content knowledge in intervention influenced teachers' or preservice teachers' knowledge about how to teach besides what to teach.

SCK part of content knowledge framework can be measured with short answer and open-ended questions (Ayvazo et al., 2010). In this study, achievement test was used for measurement. On the other hand, SCK can be measured with the content map as well (Ward et al., 2015). A content map is visual representations of SCK. It allows understanding SCK level of physical education teachers or preservice teachers. It helps teachers to define and sequence of content that they must teach. Recently, there are studies about the content map (Ward, Dervent, Lee, Wang, 2016, in press; Ward, Tsuda, Dervent, & Devrilmez, 2016, in review). One of these studies was about content knowledge level differences between experienced and novice physical education teachers. The study showed that experience of teachers was important to have sufficient content knowledge. Another study was Ward and his colleagues (2016, in review) who compared preservice students of CCK focused and SCK focused physical activity classes which were tennis, badminton, basketball and volleyball. They used the content map in order to measure SCK level of participants. Results showed that SCK focused group had higher scores than CCK focused group. These studies in publication process demonstrated that SCK part of content knowledge could be also measured with the content map.

To conclude, physical education teacher education programs feature CCK domain of content knowledge, especially technique and tactic part. According to studies focused allocated time for content knowledge in syllabi, preservice physical education teachers graduated from PETE in terms of how to play a sport, not how to teach it. Nevertheless, results of this study indicated the importance of SCK in order to have both knowing and teaching.

**5.3 Research Question 3.** How do the PETE students perceive the badminton content knowledge intervention?

Structured interview questions were asked 12 experimental group students. Interview results showed that students found intervention effective and successful. They stated that methods used during intervention such as peer tutoring and watching video were interesting and effective. They loved not only learning but also teaching badminton skills. They felt themselves as teachers. They believed that they could teach badminton for different groups of learners.

Similar high perception about content knowledge intervention has been found in math and physical education literature (Rovegno, 1993; Yamnitzky, 2010). In math education field, Yamnitzky (2010) examined math teachers' perception about math concepts and organizing course instruction activities. Findings indicated that increasing content knowledge of math teachers enhanced their perception. The participant teacher began to feel themselves as a better math teacher after the intervention. In another study, Millsaps (2005) studied on two math teachers in order to examine the relationship between content knowledge and pedagogical content knowledge. Case study findings indicated that content knowledge of teachers affected their pedagogical content knowledge in terms of instructional practices and student learning.

There were studies measuring and evaluating perceptions of physical education teachers and/or preservice physical education teachers in terms of content knowledge (Rovegno, 1993; Rovegno & Gregg, 2007; Wallhead & O'Sullivian, 2007). For example, Rovegno (1993) conducted a study that examined how PETE students acquired content knowledge of a nontraditional approach to physical education. The researcher used field and course observation, document analysis and in-depth interviews with 12 PETE students. The study showed that preservice teachers were thinking to teach physical education like take for granted but they understood that teaching physical education is not an easy issue. Findings are different than this

study. The reason of this difference may be effects of specialized content knowledge. SCK allows teachers or preservice teachers how to teach a skill. If a physical education teacher or pre-service teacher knows how to teach a skill, he/she can teach it specific learning groups. This is highly related to pedagogical content knowledge.

Similar findings have been indicated in the study of Rovegno and Gregg (2007). They examined African American children's perceptions after American folk dance unit. Results showed that if teachers have content knowledge, they can teach it to students. Participants of this study learned how to perform American folk dance. Students defined that intervention increased their enjoyment, fun and engagement. Study of Wallhead and O'Sullivian (2007) supported our findings as well. They stated that students who attended intervention showed high engagement to the lesson. Students understood what teacher taught. Results also showed that students solved problems on lower complex tasks.

Overall, the intervention designed according to Ward (2009a)'s new content knowledge framework enhanced self-confidence of PETE students in terms of teaching badminton to specific learning groups. Their explanations are the cues for pedagogical content knowledge which are very important for teaching (Lee, 2011; lserbyt, Ward & Martens, 2015; Kim, 2015; Ward, Kim, Ko & Li, 2014).

# CHAPTER 6

## CONCLUSION

The purpose of this study was to examine effects of badminton content knowledge intervention on PETE students' content knowledge level. On the way of this purpose, there were three conclusions for this study.

First one was to develop a valid and reliable tool in order to measure badminton content knowledge level of preservice and in-service physical education teachers. In the line of this aim, badminton achievement test was developed. It was tested with a pilot study. Reliability and validity of test were checked and the test was accepted as a valid and reliable tool for measuring badminton content knowledge level of PETE students.

Second, recent studies showed that enhancing content knowledge increased PCK level of physical education teachers (Iserbyt, Ward, & Martens, 2015; Kim, 2015; Ward, Kim, Ko & Li, 2014). Nevertheless, there were few studies examined directly content knowledge level of preservice teachers. In this study, 10 weeks badminton intervention based on Ward (2009a)'s new categorization was used. The intervention was developed by the expert group. Intervention fidelity was checked. The intervention was applied on the experimental group by the researcher himself, whereas comparison group was applied 10 weeks intervention with the traditional method by badminton lecturer of that comparison PETE program. The content of two interventions was similar (93 % similarities). Pretest results of two groups were tested and results were close to zero. After 10 weeks interventions, posttests of groups were tested. Post-test results demonstrated that experimental group students reached estimated level (70 % or over correct answers of all questions) on all parts of content knowledge domains. Nevertheless, comparison group students could not reach estimated level. According to results, content knowledge intervention which

includes CCK and SCK was effective in order to increase content knowledge level of experimental group PETE students. On the other hand, the traditional method also significantly increased content knowledge level of comparison group students but they could not reach estimated content knowledge level. Increasing content knowledge somehow is important but reaching estimated level (% 70 or over) is more important for PCK which is highly related to student learning outcomes (Grossman, 1990; Ward, 2009a). The deeper content knowledge the more PCK and this means more effective physical activity courses and student learning.

Third, in order to represent the effectiveness of the intervention designed with new categorization, a structured interview was conducted on 12 experimental group students. Results of the interview showed that experimental group students found intervention effective. Lecturer used peer tutoring and watched video before new skills. These methods attracted their interest and increased their motivation. They enjoyed lessons because they learned how to play and how to teach. They defined that they felt themselves both as students and teachers. They also indicated that they feel they can teach badminton different age group of learners. The interview also included questions about lecturer. They defined lecturer who applied badminton content knowledge intervention had deep content knowledge. They answered that lecturer demonstrated skills appropriately, use tools effectively, and demonstrate analogies, modification and practice examples. Interview answers indicated that lecturer taught them not only how to play but also how to teach badminton skills.

The study concluded that badminton content knowledge intervention including CCK and SCK domains is effective and successful for reaching estimated badminton content knowledge level of PETE students. Developed badminton achievement test is a valid and reliable tool for measuring and evaluating content knowledge level of PETE students.

## Recommendations for PETE Programs and PETE Lecturers

The study showed that PETE students must reach estimated CK level. Expected content knowledge should be assessed. In order to reach these goals, researcher has some recommendations for PETE programs and lecturers;

1. Physical activity and sports courses in PETE programs should be designed according to CCK and SCK domains. By this way, PETE students can learn not only what to teach but also how to teach activities.
2. This study showed that if lecturer had deep content knowledge, he could represent his PCK and content knowledge level of PETE students reached estimated level. In the line of this result, lecturers of PETE should have deep content knowledge on specific physical activity courses.
3. In order to represent both CCK and SCK in specific physical activity course, using peer tutoring method is highly recommended. This method is enhancing students' both teaching and learning abilities.
4. PETE programs allocate more time for SCK which is related with PCK and student learning outcomes.

## Recommendations for Policy Makers

The study demonstrated that PETE physical activity courses should be designed according to SCK and CCK domains.

1. Policy in Turkey demonstrated that PETE spent more time on CCK, less time for SCK (İnce et al., 2012). Having deep content knowledge requires sufficient SCK. For this reason, curriculum policy about physical activity sports courses in PETE programs should be reviewed and included SCK domain.
2. Even PETE programs allocated most time for CCK, the pilot study showed that PETE students who completed badminton course could not reach estimated CCK level (lower than 70 %). It is recommended that curriculum policy for physical activity courses should be designed in order to increase CCK level of PETE students.

## Recommendations for Curriculum Developers

This study showed that physical activity content knowledge level of PETE students can be measured with specifically developed achievement tests.

1. It is recommended that curriculum developers should prepare achievement test which includes CCK and SCK domains for different physical activity courses in order to measure and evaluate content knowledge level of preservice or in-service teachers.
2. While developing achievement test, using table of specification and expert opinion are recommended for preparing valid and reliable achievement tool.
3. It is recommended that curriculum developers can use multiple-choice questions for CCK, short answer and open-ended questions for SCK parts while preparing achievement test.

## Recommendations for Researchers

This study demonstrated how to design a specific sport course in PETE program in order to improve content knowledge of preservice teachers. Study also showed how to develop a valid and reliable achievement test and measure content knowledge level of them.

1. Badminton example was used for showing how to apply intervention in order to improve content knowledge of preservice teachers. It is recommended that future studies can be done for different sports from different sport forms (e.g., team sports).
2. Measuring and evaluating content knowledge of preservice teachers are important. Valid and reliable badminton achievement test has been developed and applied. Achievement tests from different sports are required for measuring and evaluating content knowledge of preservice and in-service teachers.

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# APPENDICES

## APPENDIX A: ETHICAL COMMITTEE APPROVAL

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IAK Başkanı

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz Beden Eğitimi ve Spor Bölümü öğrencisi Erhan Devrilmez'in "Designing Physical Activity and Sport Courses to Improve Common& Specialized Content Knowledge of Pre-service Teachers in a PETE Program." isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

15/05/2014

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## APPENDIX B: CURRICULUM VITAE

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### Education

| Year | Degree | Place |
|---|---|---|
| 2004 | High School | Atatürk High School, Kütahya |
| 2009 | BS | Dumlupinar University, School of Physical Education and Sport, Kütahya |
| 2016 | Ph.D | Middle East Technical University, Dept. of Physical Education and Sports, Ankara |

### Work Experience

| Year | Enrollment | Institution |
|---|---|---|
| 2005-2009 | Badminton Coach | Provincial Directorate of Youth and Sports, Kütahya |
| 2010- Present | Research Assistant | Middle East Technical University, Dept. of Physical Education and Sports, Ankara |

### Research Interests

Sport Pedagogy
Teacher Education
Badminton

**Articles in Peer Reviewed International Journal**

Akpınar, S., **Devrilmez**, **E.,** & Kirazci, S. (2012). Coincidence-Anticipation Timing Requirements are Different in Racket Sports. *Perceptual and Motor Skills, 2,* 581-593.

**Articles in Peer Reviewed National Journal**

Yıldız, A., Koçak, S., Altunsöz, I. H., & **Devrilmez, E.** (2015). Spectators' Participation Decisions in the Basketball Matches. *Pamukkale Journal of Sport Sciences*, *6*, 1-11.

**Articles in Other National Journal**

**Devrilmez, E**. & Koçak, S. (2013). Importance and Outcomes of Turkish Sport Shuras in Turkish Sport History. *Journal of Physical Education and Sport, 15*, 77-88.

**Peer-Reviewed Oral Presentations**

**Devrilmez, E.** & İnce, M.L. Importance of Common and Specialized Content Knowledge on Physical Education Teacher Education: Literature Review. 7. Student Congress in Sport Sciences, 15-17 May 2014, Karaman, Turkey.

İnce, M.L., Ward, P. & **Devrilmez, E**. Common Content and Specialized Content Knowledge of Physical Activity Courses in Turkish PETE Programs 12th International Sport Sciences Congress, 12-14 December 2012, Denizli, Turkey.

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**Devrilmez, E.** & İnce, M.L. Developing the Sport Skill Related Courses for the Prospective Teachers by Using the Contemporary Common and Specialized

Content Knowledge Views: Badminton Example. 14th International Sport Science Congress, 1-4 November 2016, Antalya, Turkey.

Yıldız, A., Koçak, S., Yıldırım, S., & **Devrilmez, E.** Volunteers' Motivation and Sense of Community in a Sports Event. 14th International Sport Science Congress, 1-4 November 2016, Antalya, Turkey.

**Peer-Reviewed Poster Presentations**

**Devrilmez E.,** Yapar A., ve İnce M. Description of Coach-Athlete Relationship in Elite Level Badminton Context. Applied Education Congress, Ankara. 13-15 September 2012.

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**Devrilmez E**., Koçak S. (2012). Importance and outcomes of Turkish Sport Shuras in Turkish Sport History. II. International Sport Sciences in Physical Education and Sport Congress, Ankara. 31 May- 2 June 2012.

Ergün, S., Koçak, S. **Devrilmez, E**., & Tek, T. Determination of Levels of Physical Activity of the Employees Working at Public Institutions and Organizations: Sample of Turkish Petroleum Coorperation 14th International Sport Science Congress, 1-4 November 2016, Antalya, Turkey.

Kirazcı, S., Söğüt, M., & **Devrilmez, E.** Coincidence Anticipation Time of Experienced Tennis Players: Effect of Stimulus Speed and the Use of the Racket 14th International Sport Science Congress, 1-4 November 2016, Antalya, Turkey.

Golshaei, B., Kirazcı, S., & **Devrilmez, E.** The Effect of Different Stimulus Speeds and Different Levels of Badminton Participation on Coincidence Anticipation

Timing.14th International Sport Science Congress, 1-4 November 2016, Antalya, Turkey.

Kavi Şimsek, N., **Devrilmez, E., &** Kirazcı, S. Coincidence Anticipation Timing Performance of Young Badminton Players: Constant versus Decelerating Speed and Badminton Participation Level. 14th International Sport Science Congress, 1-4 November 2016, Antalya, Turkey.

**Social Work**

| Year | Enrollment | Institution/ Social Responsibility |
|---|---|---|
| 2012- Present | Counselor | Sport Education Group |
| 2015 | Secretary | 5th Contemporary and Creative Approaches in Physical Education Symposium, Ankara, Turkey |
| 2010- Present | Counselor | Education Commission of Turkish Badminton Federation |

**Personal**

National Badminton Coach
Licenced Badminton Player

## APPENDIX C: PILOT STUDY

### 1. Participants of pilot study

Participants' were 156 volunteer PETE students (71 female, 85 male) who were just completed a PETE program badminton course. Mean age of them was 19.85 (SD= 2.71).

### 2. Procedure

Badminton CK achievement test was conducted on classroom setting. Totally 75 minutes, 45 minutes for CCK and 30 minutes for SCK, were given to participants for the completion of the test. Between the CCK and SCK tests a 10 minute break was provided.

### 3. Results of Pilot Study

### 3.1. Common Content Knowledge

Total score for rules, etiquette and safety part was 48 points. Average score of PETE students was 30.03 (SD=9.01, 62.6 %).

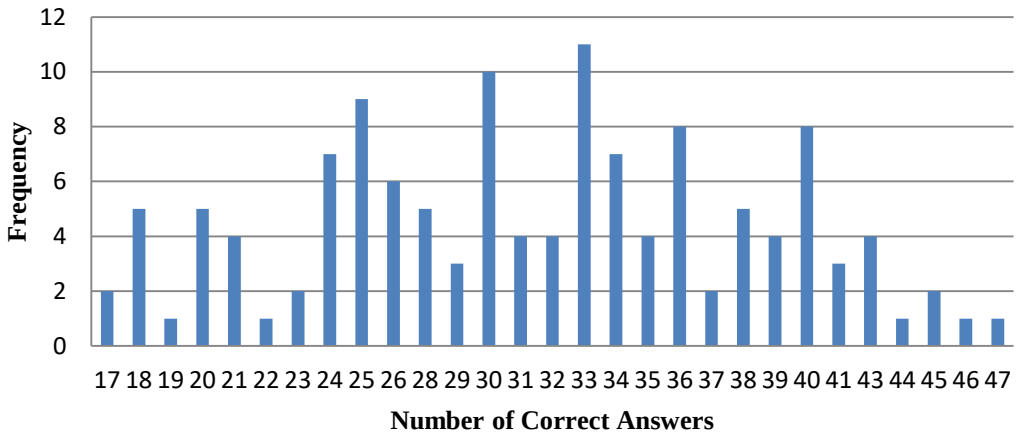



*Figure 13.* Frequency of rules, etiquette & safety scores

Technique & tactic part of test has totally 85 points. Correctly responded average score was 34.96 (SD= 11.6, 41.1 %) of subjects.

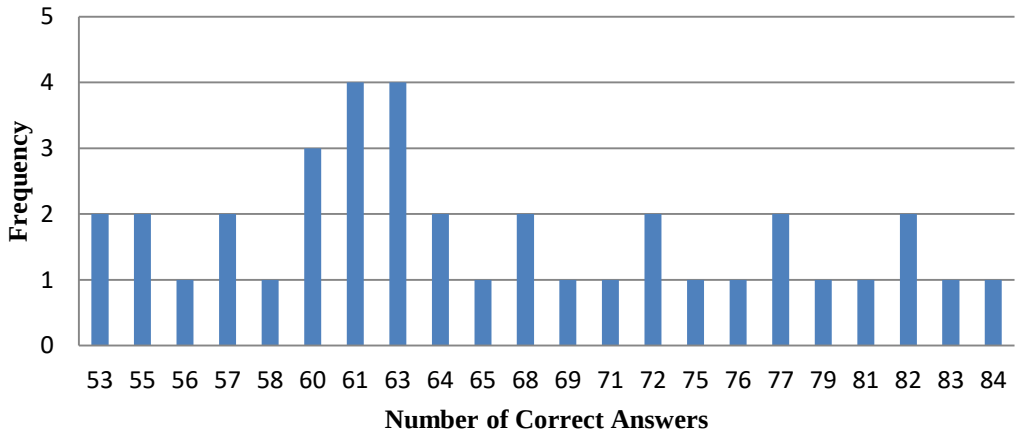



*Figure 14.* Frequency of Technique & Tactic

### 3.1.1. Item Difficulty of CCK

Difficulty of each item should be .20-.85 and overall item difficulty of test should be around .50 (Chase, 1999; Laatsch & Choca, 1991). According to results of pilot study, each item difficulty was in estimated range. Overall item difficulty of rules, etiquette & safety was .62 and technique & tactic part was .42. Results showed that item difficulty index of test is on estimated range.

### 3.1.2. Item Discrimination of CCK

Item discrimination should be .20 or higher (Anderson & Morgan, 2008). Results of item discrimination of CCK were .41 for rules, etiquette & safety, and .32 for technique & tactics. Item discrimination results of multiple-choice questions on test are acceptable.

### 3.2. Specialized Content Knowledge

First part of SCK was student errors which have total 20 points. Average score of subjects was 6.24 (SD= 2.52, 31.20 %).

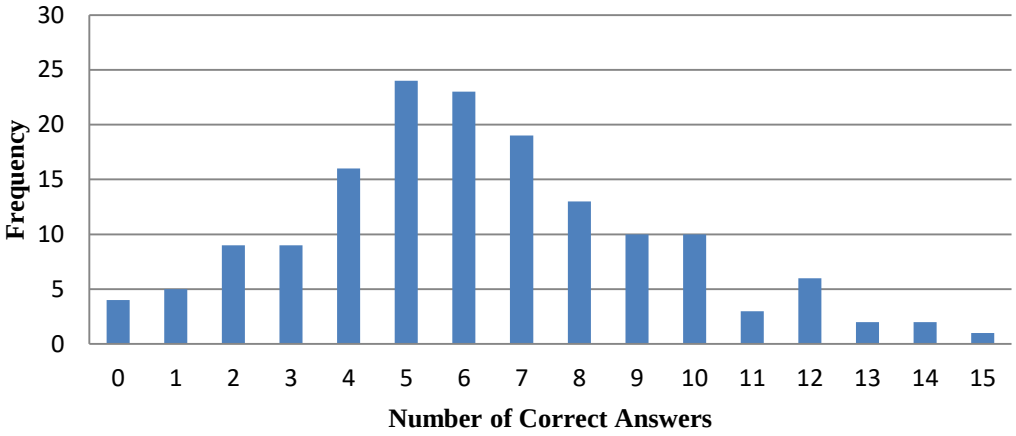



*Figure 15.* Frequency of student error scores

Second part was instructional task & representations which have totally 14 points. Score of students was 2.14 (SD= 1.91, 15.90 %).

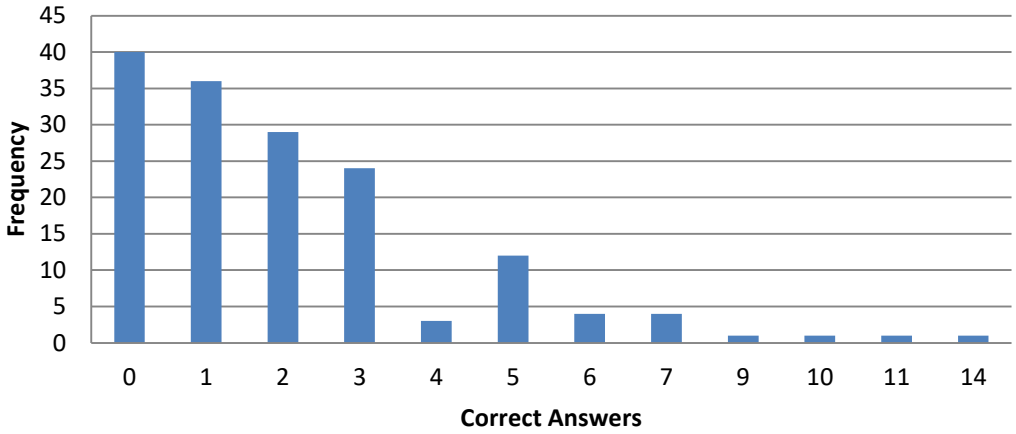



*Figure 16.* Frequency of instructional task & representation scores.

## APPENDIX D: ASSUMPTIONS OF MIXED ANOVA

**1. Random Sampling and Independent Observation.** It is assumed that random sampling is not violated. Observations within each group should be independent. Overall, random sampling and independent observation assumptions are not violated.

**2. Normality Assumption.** Normality assumption in mixed ANOVA can be checked with skewness and kurtosis values (close to zero), Kolmogorov-Smirnov and Shapiro-Wilk Test results (should be non significant to be an evidence for normality), histogram and q-q plots.

Table 10

*Normality Results of Content Knowledge Test*

| | *Rules, Etiquette & Safety* | | *Technique & Tactic* | | *Student Errors* | | *Instructional Task & Representation* | |
|---|---|---|---|---|---|---|---|---|
| | *Pre* | *Post* | *Pre* | *Post* | *Pre* | *Post* | *Pre* | *Post* |
| N | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| Skewness | .63 | -1.28 | .99 | -.10 | | -.25 | | .15 |
| Kurtosis | -.84 | .63 | -.08 | -1.06 | | -1.32 | | -1.55 |
| Kolmogorov Smirnov | .18 | .24 | .40 | - .08 | | .22 | | .77 |
| Shapiro-Wilks | .09 | .47 | .17 | .20 | | .34 | | . 19 |

Table 10 shows that normality assumption is not violated. Even skewness, kurtosis, Kolmogorov-Smirnov, Shapiro- Wilks values indicated normality; q-q plots were checked.

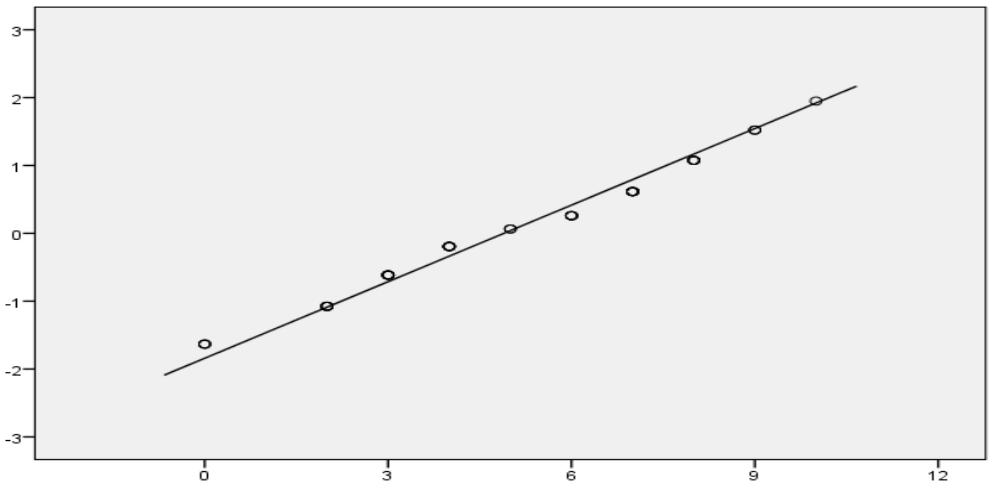



*Figure 17*. Q-Q plot of Rules, Etiquette and Safety

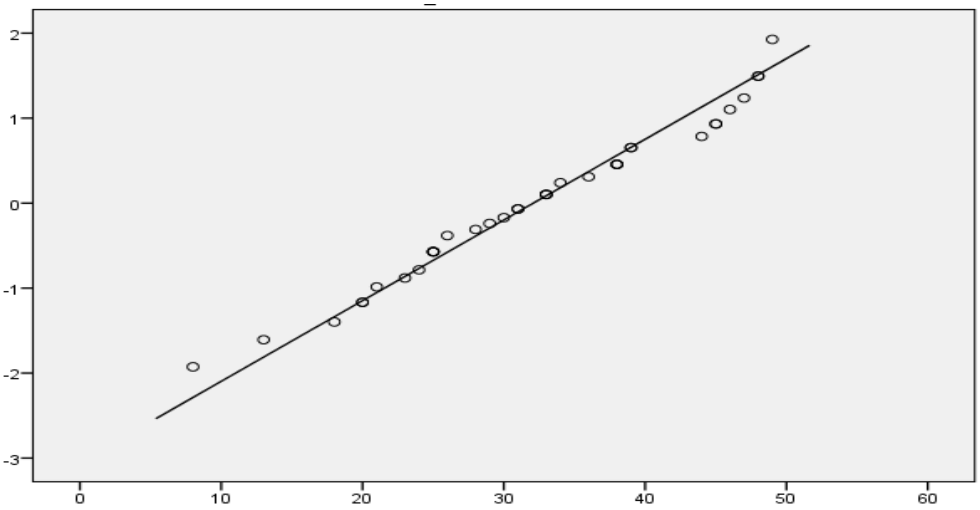



*Figure 18.* Q-Q plot of Technique and Tactic

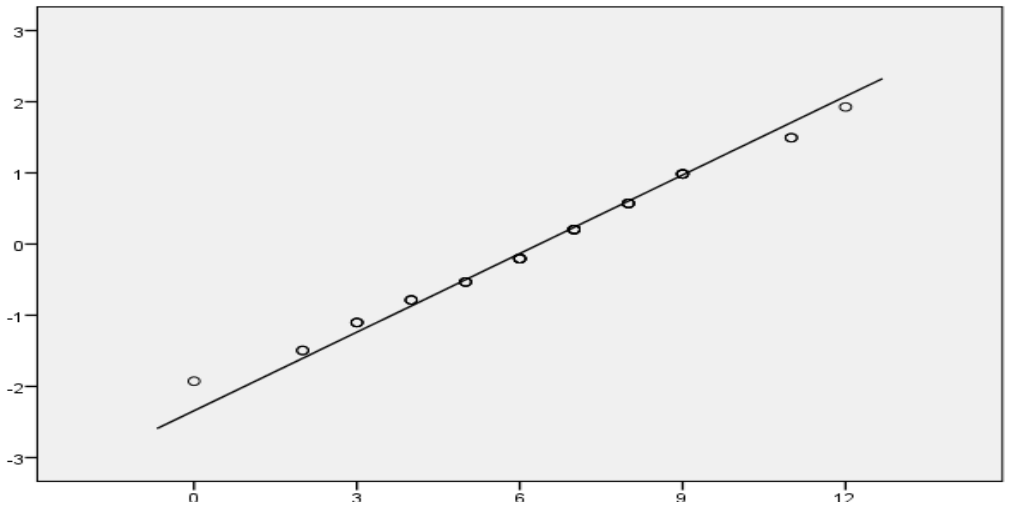



*Figure 19.* Q-Q plot of Student Errors

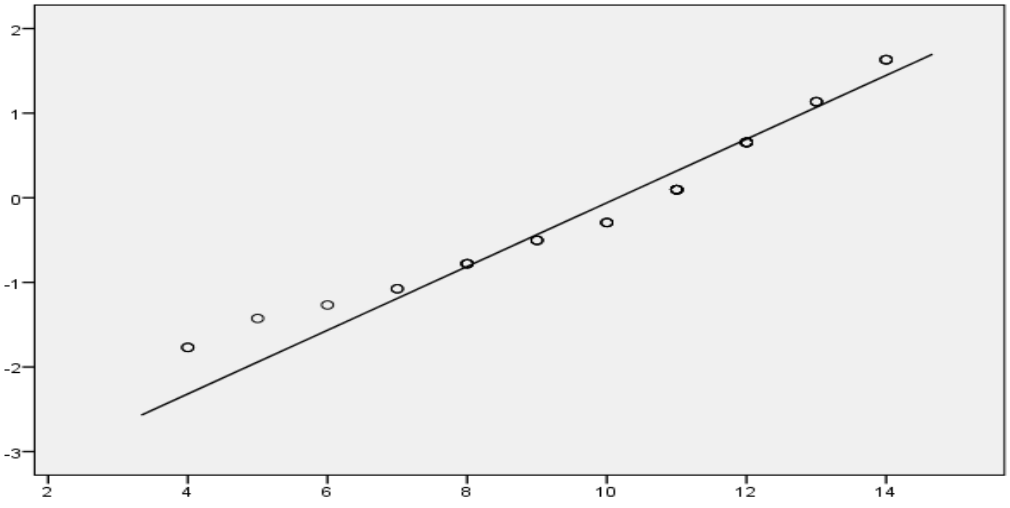



*Figure 20.* Q-Q plot of Instructional Task & Representation

Q-Q plots also demonstrate that normality assumption is not violated.

**3. Homogeneity of Variances.** It is an assumption of ANOVA which deems that groups have equal or similar variance. One of the most common homogeneity of variance tests is Levene's test which is expressed by F statistic. Values should be lower than .05 in order not to violate assumption. Results of this study showed that homogeneity of variance is not violated (Table 7)

Table 11

*Levene's Test of Content Knowledge Test*

| | *Statistic* | *df1* | *df2* | *Sig.* |
|---|---|---|---|---|
| Rules, etiquette & safety | .02 | 1 | 72 | .89 |
| Technique_tactic | .31 | 1 | 72 | .58 |
| Student_error | 5.51 | 1 | 72 | .05 |
| Instructional task & representation | 4.95 | 1 | 72 | .11 |

**4. Sphericity Assumption**. It is an assumption which checks variance difference between related groups of the within-subject factor for all groups of the between-subjects is supposed to be equal**.** Sphericity assumption was checked by Mauchly's test. Results showed that assumption is not violated ($W$= .57, $p$ < .05)

Assumptions of mixed ANOVA are checked and statistical analysis can be conducted.

## APPENDIX E: TÜRKÇE ÖZET/TURKISH SUMMARY

## GİRİŞ

Alan bilgisi, bir öğretmenin belirli bir konuyu öğrencilerine öğretebilmesi için sahip olması beklenen bilgi olarak tanımlanmaktadır (Grossman, 1990; Shulman, 1986). Öğrencilerin öğrenme düzeyini etkileyen ve belirli bir konunun etkili bir şekilde öğretimi için gerekli temel etkenlerden biridir (Ward, 2013). Öğrencilerin öğrenim çıktılarının istenen düzeyde olması için öğretmenlerin yeterli ve derinlemesine alan bilgisine sahip olması gereklidir. Beden eğitimi alanında Siedentop (2002), yeterli alan bilgisine sahip olmayan öğretmenlerin gerçek okul öğretim sürecinde daha kısa öğretimsel uygulamalar gerçekleştirdiği ve bu durumun öğrencilerin öğrenme düzeyini olumsuz etkilediği belirlenmiştir (Rovegno, 1993). Ayrıca öğretmenlerin yetersiz alan bilgisine sahip olmaları bazı öğretimsel konuları tekrar tekrar öğretmelerine ve öğrencilerin öğrenmelerinde ilerleme olmamasına neden olmaktadır (Hastie & Vlaisavljevic, 1999). Alan yazındaki çalışmalar alan bilgisi seviye artan öğretmenlerin öğretmekle yükümlü oldukları pedagojik alan bilgisinin arttığını göstermektedir (Kim, 2015; Ward, Kim, Ko, & Li, 2014).

Öğretmen alan bilgisinin önemi anlaşılmış olmakla birlikte, bu kavramın içeriği konusunda tartışma devam etmektedir. Son dönemde, Matematik alanından Ball, Thames ve Phelps (2008) öğretmen alan bilgisini kavramsallaştırılmasına önemli bir katkıda bulunmuştur. Ball ve arkadaşları alan bilgisini; a) Genel alan bilgisi (GAB), b) Özelleşmiş alan bilgisi (ÖAB) olarak iki kategoriye ayırmıştır. GAB, öğretmenin neyi öğreteceğini; ÖAB ise genel alan bilgisini öğretmenin nasıl öğreteceği konusunu belirtmektedir. Özelleşmiş alan bilgisi sıklıkla pedagojik alan bilgisi ile karıştırılmaktadır. Bu nedenle, özelleşmiş alan bilgisi ile pedagojik alan bilgisi arasında kavramsal farklılığın anlaşılması önemlidir. Örnek olarak, bir beden eğitimi öğretmeninin futbolda ayak içi pasın öğretim sürecini başlangıcından bitişine dek bilmesi öğretmenin bu beceri ile ilgili özelleşmiş alan bilgisi düzeyini göstermektedir. Aynı öğretmenin ayak için pası 6.sınıf öğrencilerine öğretirken

gerekli uyarlama ve düzenlemeleri yapabilmesi yada 8.sınıf öğrencilerine öğretirken farklı öğretim stratejileri kullanması, bu öğretmenin pedagojik alan bilgisi düzeyini göstermektedir

Yakın zamanda Ward (2009a), Ball ve arkadaşlarının matematik alanında geliştirdikleri alan bilgisi çerçevesini beden eğitimi ve spor alanına uyarlamıştır. Ward'un alan bilgisi kavramsal çerçevesini; GAB alt boyutları, a) Kurallar, Görgü ve Güvenlik kuralları, b) Teknik ve Taktik; ÖAB alt boyutlarını ise, a) Öğrenci hataları, b) Öğretim tasarımı ve sunumu, oluşturmaktadır.

Beden eğitimi öğretmenlerinin, beden eğitimi öğretmeni yetiştiren programlardan mezun olmadan önce özellikle fiziksel aktivite dersleri için yeterli ve derinlemesine alan bilgisine sahip olması beklenmelidir (Siedentop, 2002; Ward vd., 2014). Beklentilerin tam tersine, yapılan çalışmalar beden eğitimi ve spor öğretmen eğitimi programlarında eğitim alan öğretmen adayları için yeterli alan bilgisi geliştirme olanakları sağlanmadığını göstermektedir (Ayvazo, Ward, & Stuhr, 2010; İnce, Ward, & Devrilmez, 2012; Siedentop, 2002; Ward, 2009a; Ward vd., 2013). Daha önce farklı ülkelerdeki (ABD, Çin, Güney Kore, İngiltere, Belçika, Türkiye) beden eğitimi öğretmen eğitimi programları üzerinde yapılan ve içeriği fiziksel aktivite/spor olan derslerin (atletizm, cimnastik, basketbol, voleybol, badminton vb.) incelendiği çalışmalarda, alan bilgisinin ÖAB boyutuna çok sınırlı yer verildiği saptanmıştır (Ward vd., 2013). Ülkemizde 22 beden eğitimi öğretmen eğitimi programı üzerinde yapılan bir çalışma da diğer ülkelerdekine benzer bir sonuç göstermiştir (İnce vd., 2012).

Türkiye'deki beden eğitimi öğretim müfredatı 2011 yılında yenilenmiştir (MEB, 2011). Yeni müfredata göre öğretilmesi beklenen sporlar beş alt başlıkta belirtilmiştir (örneğin; raket sporları, su sporları, takım sporları gibi). Beden eğitimi öğretmenlerinden her spor grubundan en az birini bilmesi ve öğretebilmesi beklenmektedir. Çalışmada badminton sporunun seçilme nedeni, bu sporun raket sporları grubunda Türkiye genelinde beden eğitimi derslerinde en fazla kullanılan

sporlardan biri olmasıdır. Badminton, sınırlı büyüklükte bir oyun alanında, düşük maliyetli malzemelerle, 20-30 kişiden oluşan öğrencilere beden eğitimi derslerinde kolayca sunulabilmektedir.

Bu zamana kadar yapılan çalışmalar alan bilgisi (özellikle özelleşmiş alan bilgisi) ile pedagojik alan bilgisi arasındaki ilişkiyi incelemiştir ( Iserbyt, Ward, & Li, 2015; Kim; 2015; Sinelnikov, Kim, Ward, Curtner-Smith, & Li, 2015). Yeterli ve derinlemesine alan bilgisine sahip olmak için genel ve özelleşmiş alan bilgisi alt boyutlarının her ikisininde beklendik düzeyde olması gerektiği bilinmektedir. Buna rağmen az sayıda çalışma alan bilgisinin her iki alt boyutunu da incelemiştir. Bu çalışmanın amacı, Ward (2009a)'ın alan bilgisi kavramsal çerçevesine göre hazırlanan badminton alan bilgisi öğretim programının beden eğitimi öğretmen adaylarının badminton alan bilgisi düzeylerine etkisini incelemektir.

## YÖNTEM

### Araştırma Deseni

Beden eğitimi öğretmen adaylarının badminton alan bilgisi düzeylerini belirlemek için yarı deneysel araştırma deseni kullanılmıştır. Deney ve karşılaştırma grupları amaçlı örneklem seçimi yöntemi ile belirlenmiştir. Amaçlı örneklem seçimi yöntemi kullanılmasının nedeni çalışmada yer alan iki üniversitenin de sadece bir öğretmenlik sınıfının olmasıdır.

Yapılan çalışmada, Ward (2009a)'ın kavramsal çerçevesine göre tasarlanan 10 haftalık badminton öğretim programı ve badminton alan bilgisi testi çalışmanın bağımsız değişkenleri olarak belirlenmiştir. Bağımlı değişkenler ise badminton öğretim programı öncesi ve sonrası beden eğitimi öğretmen adaylarının alan bilgisi seviyesi ve deney grubu öğrencilerinin badminton öğretim programı hakkındaki görüşlerini kapsamaktadır.

Çalışma üç aşamadan oluşmaktadır. Birinci aşamada araştırmacı, badminton alan bilgisi testine kullanarak her iki gruptan ön test verisi toplamıştır. İkinci aşamada, deney ve karşılaştırma gruplarına 10 haftalık badminton öğretim programı uygulanmıştır. Üçüncü aşamada araştırmacı her iki gruptan son test verilerini toplamıştır. Üçüncü aşamada ek olarak deney grubu öğrencileri ile badminton öğretim programı hakkında görüşme yapılmıştır.

**Örneklem**

Türkiye genelinde 55 beden eğitimi öğretmeni yetiştiren kurum bulunmaktadır. Bütün bu kurumlar arasında Kütahya Dumlupınar Üniversitesi and Kırıkkale Üniversitesi beden eğitimi ve spor öğretmenliği bölümleri tercih edilmiştir. Öğrenci seçme kriterlerinin birbirlerine çok yakın olması ve çalışmaya gönüllü olmaları bu iki bölümün seçilme nedenleridir. Araştırmacı iki üniversitenin beden eğitimi öğretmenliği bölümlerini ziyaret etmiş ve öğretim programlarının uygulanması için uygun olduklarını tespit etmiştir. Ziyaret sonrası araştırmacı Kütahya Dumlupınar Üniversitesini deney grubu, Kırıkkale Üniversitesini ise karşılaştırma grubu olarak belirlemiştir.

Deney grubunda toplam 46 öğrenci badminton dersi için kayıt yaptırmıştır. Program sürecinde 8 öğrenci daha araştırma dışında tutulmuştur. On haftalık öğretim programı boyunca %80'den daha az derse devam eden 8 öğrenci çalışma dışında tutulmuştur. Sonuç olarak 38 (32 erkek, 6 kadın) öğrenci çalışmanın deney grubunu oluşturmuştur.

Karşılaştırma grubunda başlangıçta 48 öğrenci seçmeli badminton dersine kayıt olmuştur. On haftalık öğretim programı boyunca %80'den daha az derse devam eden 12 öğrenci çalışma dışında tutulmuştur. Sonuç olarak 36 (28 erkek, 8 kadın) öğrenci karşılaştırma grubu öğrencilerini oluşturmuştur.

## Badminton Öğreticileri

Deney grubunun badminton öğreticisi 30 yaşında spor pedagojisi alanında doktora öğrencisidir. Badminton deneyimi hem oyunculuk hemde antrenörlük geçmişinden gelmektedir. Araştırmacı milli sporcu düzeyinde badminton oynamıştır ve doktora eğitimine başlamadan önce 8 yıl badminton antrenörlüğü yapmıştır. Deney grubu öğreticisi öğretim programını uygulamadan önce Ward (2009a)'ın kavramsal çerçevesi üzerine çalışmıştır ve bu kavramsal çerçeveye uygun olacak şekilde 10 haftalık badminton öğretim programı hazırlamıştır. Araştırmacı yeni alan bilgisi kavramsal çerçevesini anlayabilmek ve özümsemek için kavramsal çerçeve ile ilgili makaleler okumuş ve öğretim tasarımı uzmanı ile görüş alışverişinde bulunmuştur. Ayrıca araştırmacı kavramsal çerçeveyi geliştiren ABD'li araştırmacı ile görüşmüştür.

Karşılaştırma grubu öğreticisi ise 41 yaşında ve beden eğitimi alanında doktora sahibidir. Öğreticinin badminton deneyimi oyunculuk ve ders öğreticiliği deneyiminden gelmektedir. Amatör düzeyde badminton sporculuk deneyimine sahiptir. Karşılaştırma grubu öğreticisi bir üniversitenin beden eğitimi öğretmen eğitimi bölümünde 15 yıldır badminton öğretimi gerçekleştirmektedir.

## Veri Toplama Araçları

Katılımcıların badminton alan bilgisi seviyesi geçerli ve güvenilir bir badminton bilgi erişi testi ile belirlenmiştir. Test uzman bir grup tarafından belirtke tablosuna göre geliştirilmiştir. Test GAB ve ÖAB olarak iki bölümden oluşmaktadır. Testin GAB bölümü 133 çoktan seçmeli sorudan oluşmaktadır. Alt boyutlarına göre bakıldığında ise kurallar, görgü ve güvenlik kuralları boyutunda 85; teknik ve taktik alt boyutunda ise 48 çoktan seçmeli soru yer almaktadır. Testin ÖAB bölümünde ise toplam 34 soru yer almaktadır. Testin ÖAB alt boyutlarında ise öğrenci hataları için 20 kısa cevaplı sorular; öğretim tasarımı ve sunumu alt boyutunda 14 açık uçlu soru yer almaktadır.

Testin geçerlilik  ve güvenililirliği için pilot bir çalışma yapılmıştır. Testin geçerlilik ve güvenilirlilik değişkenlerini incelemek için Ohio Devlet Üniversitesi test analiz programı (sürüm 12.9.3) kullanılmıştır. Pilot çalışma bulguları, geliştirilen badminton bilgi erişi testinin geçerli ve güvenilir bir ölçüm aracı olduğunu göstermiştir.

Öğretim programı sonunda 12 deney grubu öğrencisi ile görüşme yapılmıştır. Öğretim programının etkililiğini belirlemek amacıyla yapılan görüşmede yarı yapılandırılmış görüşme yöntemi kullanılmıştır.

**Öğretim Programı**

*Programın İçeriği*

Deney ve karşılaştırma grupları 10 haftalık badminton dersine katılmıştır. İki gruptaki katılımcılara uygulanan programlar tekniksel (beceriler) açısından birbirine çok yakındır. Deney grubunda servis, clear, drop, smaç, net drop, lob/lift, drive ve ayak çalışması teknikleri uygulanmıştır. Karşılaştırma grubunda ise servis, clear, net drop, drop, smaç ve drive teknikleri uygulanmıştır.

Deney grubu öğretim programında eşli öğretim yöntemi kullanılmıştır. Bu yöntemle öğretici, ders sürecinde ÖAB'ne ayrılan zamanı arttırmayı amaçlamıştır. Bu yöntemle katılımcılar birbirlerinin hatalarını fark etmiş ve nasıl düzeltilmesi gerektiğini açıklamıştır. Hataların fark edilmesi ve düzeltilmesi ÖAB alt boyutlarını temsil etmektedir. Karşılaştırma grubu ise geleneksel badminton ders öğretimi yöntemini kullanmıştır.

## Veri Toplama Süreci

Araştırmaya başlamdan önce Orta Doğu Teknik Üniversitesi İnsan Araştırmaları Etik Kurulu onayı alınmıştır. Ayrıca katılan her iki üniversitenin yöneticilerden onay yazısı ve her katılımcıdan gönüllü katılım formu alınmıştır.

Çalışmanın veri toplama süreci üç aşamalıdır. Birinci aşamada her iki gruptan ön test verileri toplanmıştır. İkinci aşamada her iki gruba 10 haftalık öğretim programı uygulanmıştır. Son aşamada ise her iki gruptan son test verileri toplanmıştır. Ayrıca son test uygulanmasından sonra 12 deney grubu öğrencisiyle görüşme yapılmıştır.

## Veri Analizi

Çalışmada deney ve karşılaştırma grubunun ön ve son test verileri arasında anlamlı fark olup olmadığını belirlemek için Karışık ölçümler için ANOVA testi uygulanmıştır (Tabachnick & Fidell, 2007). Ayrıca Geisser-Greenhouse sağlaması kullanılarak değişken içi ve değişkenler arası farklılıklar kontrol edilmiştir.

# BULGULAR

Bu bölümde çalışmanın bulguları araştırma sorularına göre raporlanmıştır. Birincisi, uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının GAB düzeylerine etkisini incelemektir. İkincisi, uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının ÖAB düzeylerine etkisini incelemektir. Son olarak, öğretmen adaylarının öğretim programı hakkında düşünceleri raporlanmıştır.

**Araştırma Sorusu 1.** Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının GAB düzeylerine etkisi nedir?

Beden eğitimi öğretmen adaylarının GAB düzeyleri iki alt boyutta incelenmiştir. İlk alt öğretmen adaylarının badminton kurallar, görgü ve güvenlik kuralları bilgisini, ve

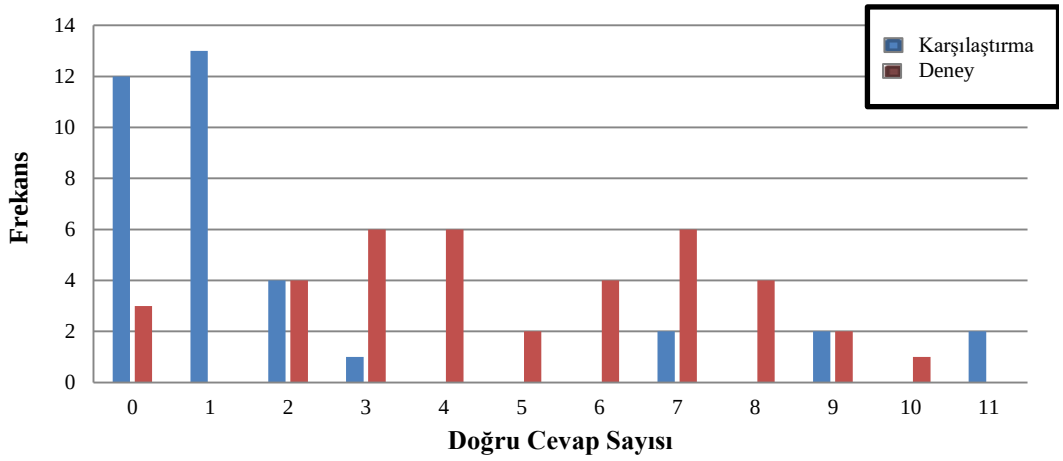
ikinci alt boyut ise öğretmen adaylarının badminton teknik ve taktik bilgileri ile ilgilidir.

*Araştırma Sorusu Alt Boyut 1*: Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının badminton kurallar, görgü ve güvenlik kuralları bilgisine etkisi nedir?

Karşılaştırma ve deney grubunun ön test bulgularında istatistiksel olarak anlamlı farklılık bulunmamıştır. ANOVA bulgularına göre de anlamlı farklılık bulunmamıştır ($F$ (1, 73) = .00, p>.05).

ANOVA bulguları her iki grubun ön test ve son test değerleri arasında istatistiksel olarak anlamlı farklılık bulunmuştur ($F$ (1, 72) = .10, p<.05). Deney grubu katılımcılarının ön test ve son test değerleri arasındaki kazanımları karşılaştırma grubunun kazanımlarından istatistiksel olarak daha yüksek bulunmuştur ($F$ (1, 72) = .00, p<.05).

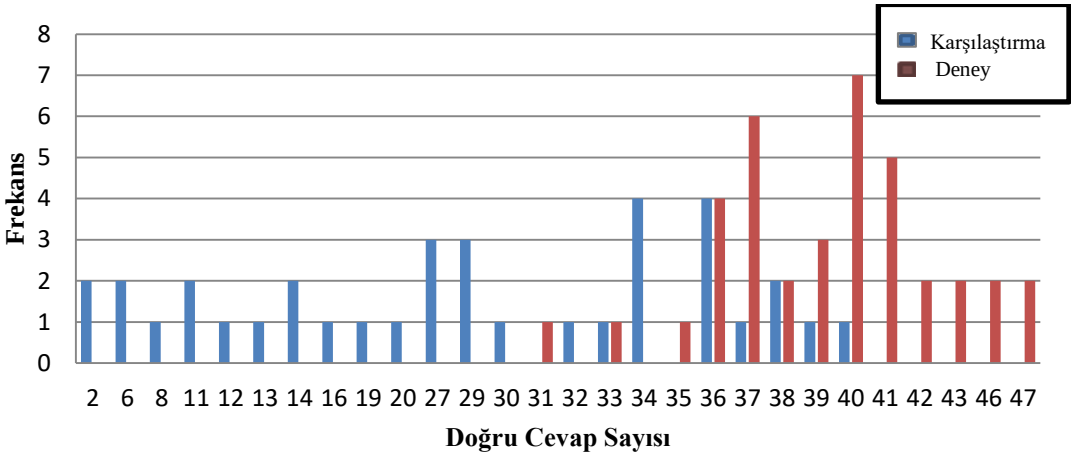
Karşılaştırma grubunun ön test doğru cevapları en az 0 ve en çok 11 doğru cevap aralığında yer almaktadır ($M$=2.17 SS= 3.21). Doğru cevap yüzdesi 4.5 (%) olarak belirlenmiştir. Deney grubunda ise ön test doğru cevapları en az 0 ve en çok 10 doğru cevap aralığında yer almaktadır ($M$=4.9 SD= 2.62). Doğru cevap yüzdesi 10.2 (%) olarak belirlenmiştir. Testin bu bölümünden elde edilebilecek en yüksek skor 48'dir. Ön test bulgularına göre öğretim programları öncesi her iki grup katılımcıları badminton sporuyla ilgili kurallar, görgü ve güvenlik kuralları bilgisine sahip değildirler (Bakınız Şekil 1).




* Maksimum skor: 48

*Şekil 1*. Deney ve kontrol gruplarının badminton kuralları, görgü ve güvenlik kuralları bilgisi ön test skorları frekansı

Son test betimsel istatistik bulgularına göre karşılaştırma grubu doğru cevapları en az 2 ve en çok 40 doğru cevap aralığında yer almaktadır (*M*=24.69, *SS*= 11.86). Doğru cevap yüzdesi 51.4 (%) olarak saptanmıştır (Bakınız Figür 1). Deney grubu betimsel bulguları, katılımcıların doğru cevap aralığının 35 ve 47 arasında olduğunu göstermektedir (*M*=39.45, *SS*= 3.53). Doğru cevap yüzdesi 82.2 (%) olarak saptanmıştır (Bakınız şekil 2).




* Maksimum skor: 48

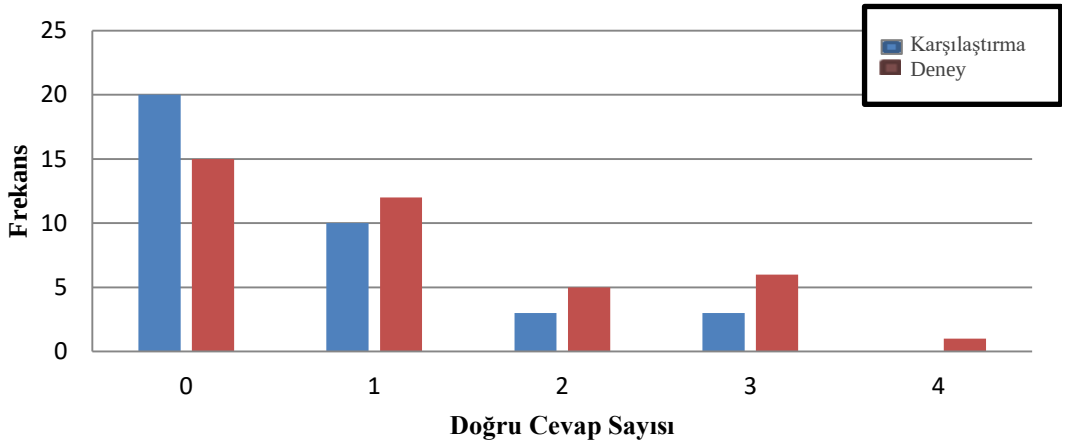
*Şekil 2*. Deney ve kontrol gruplarının badminton kuralları, görgü ve güvenlik kuralları bilgisi son test skorları frekansı

*Araştırma Sorusu Alt Boyut 2*: Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının badminton teknik ve taktik bilgisine etkisi nedir?

Karşılaştırma ve deney grubunun teknik ve taktik ön test bulgularında istatistiksel olarak anlamlı farklılık bulunmamıştır. ANOVA bulgularına göre anlamlı farklılık bulunmamıştır ($F$ (1, 73) = .00, p>.05). Ön test bulgularına göre her iki grup öğrencileri öğretim programları öncesinde sınırlı düzeyde badminton teknik ve taktik bilgisine sahip oldukları belirlenmiştir.

ANOVA bulguları her iki grubun ön test ve son test değerleri arasında istatistiksel olarak anlamlı farklılık bulunduğunu göstermektedir ($F$ (1, 73) = .09, p<.05). Deney grubu katılımcılarının ön test ve son test değerleri arasındaki kazanımları karşılaştırma grubunun kazanımlarından istatistiksel olarak daha yüksek bulunmuştur ($F$ (1, 72) = .14, p<.05).

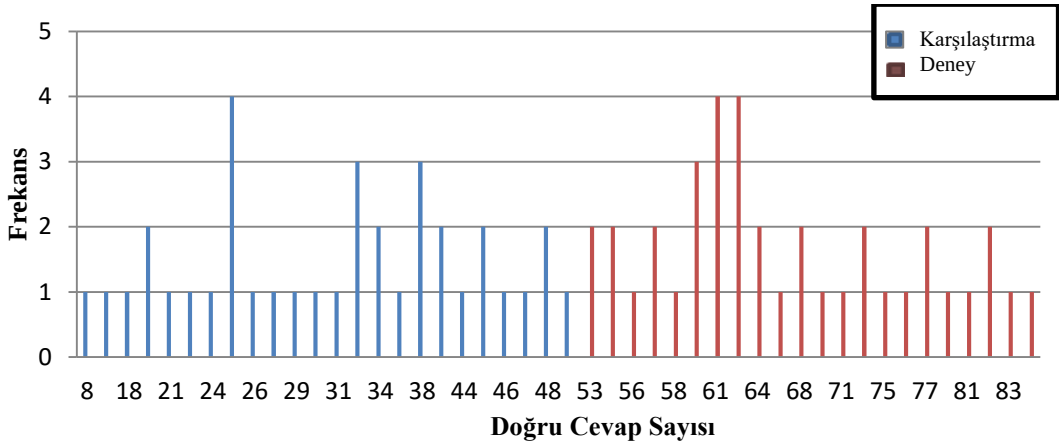
Betimsel sonuçlara göre karşılaştırma grubu ön test doğru cevapları en az 0 ve en çok 3 doğru cevap aralığı olarak saptanmıştır ($M$=0.70, $SS$= 0.94). Doğru cevap yüzdesi 0.8 (%) olarak saptanmıştır. Karşılaştırma grubu doğru cevap aralığı ise 0 ve 4 olarak belirlenmiştir ($M$=1.13, $SS$= 1.17). Doğru cevap yüzdesi 1.3 (%) olarak saptanmıştır (Bakınız şekil 3).




* Maksimum skor: 85

*Şekil 3*. Deney ve kontrol gruplarının badminton teknik ve taktik bilgisi ön test skorları frekansı

Son test betimsel sonuçları, karşılaştırma grubu doğru cevap aralığının 8 ve 49 olduğunu göstermektedir (*M*=32.08, *SS*= 10.39). Doğru cevap yüzdesi 37.7 (%) olarak belirlenmiştir (Bakınız Figür 4). Teknik ve taktik alt boyutunda deney grubu öğrencileri karşılaştırma grubu öğrencilerinden daha iyi performans göstermişlerdir. Deney grubu doğru cevap skorları en az 53 ve en fazla 84 doğru cevap aralığı olarak saptanmıştır (M=66.55, SD= 9.18). Doğru cevap yüzdesi 78.3 (%) olarak belirlenmiştir (Bakınız şekil 4).




* Maksimum skor: 85

*Şekil 4.* Deney ve kontrol gruplarının badminton teknik ve taktik bilgisi son test skorları frekansı

**Araştırma Sorusu 2.** Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının ÖAB düzeylerine etkisi nedir?

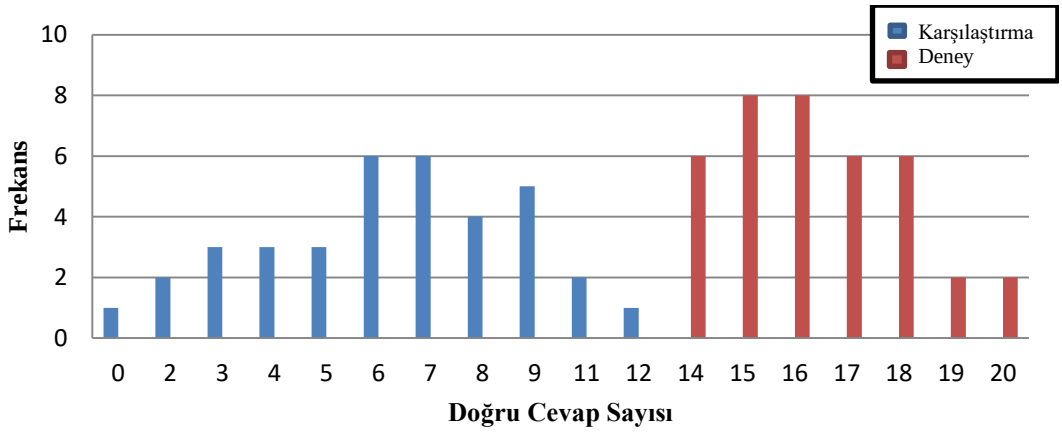
Beden eğitimi öğretmen adaylarının ÖAB düzeyi iki alt araştırma sorusuyla incelenmiştir. İlk alt soru beden eğitimi öğretmen adaylarının öğrenci hataları bilgisi, ve ikinci alt soru öğretmen adaylarının badminton öğretim tasarımı ve sunumu bilgisi ile ilgilidir.

*Araştırma Sorusu Alt boyut 3:* Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının öğrenci hataları bilgisine etkisi nedir?

Karşılaştırma grubu beden eğitimi öğretmen adaylarının öğrenci hataları ön test skorları 0'dır. Benzer olarak deney grubu öğrencilerinin de ön test skorları 0 olarak bulunmuştur. Öğretim proramları öncesinde her iki grup öğrencilerinin öğrenci hataları bilgilerinin olmadığı saptanmıştır.

ANOVA sonuçlarına göre her iki grubun ön test ve son test değerleri arasında istatistiksel olarak anlamlı farklılık bulunduğunu göstermektedir ($F$ (1, 73) = 1.02, p<.05). Deney grubu katılımcılarının ön test ve son test değerleri arasındaki kazanımları karşılaştırma grubunun kazanımlarından istatistiksel olarak daha yüksek bulunmuştur ($F$ (1, 72) = 1.14, p<.05).

Karşılaştırma grubu son test betimsel sonuçlarına göre doğru cevap aralığı 0 ve 12 olarak belirlenmiştir ($M$=6.36, $SS$=4.4). Doğru cevap yüzdesi 31.8 (%) olarak belirlenmiştir. Diğer taraftan, deney grubu son test bulguları doğru cevap aralığının 14 ve 20 arasında olduğunu göstermektedir ($M$=16.32, $SS$= 3.7). Doğru cevap yüzdesi ise 81.6 (%) olarak saptanmıştır (Bakınız şekil 5).




* Maksimum skor: 20

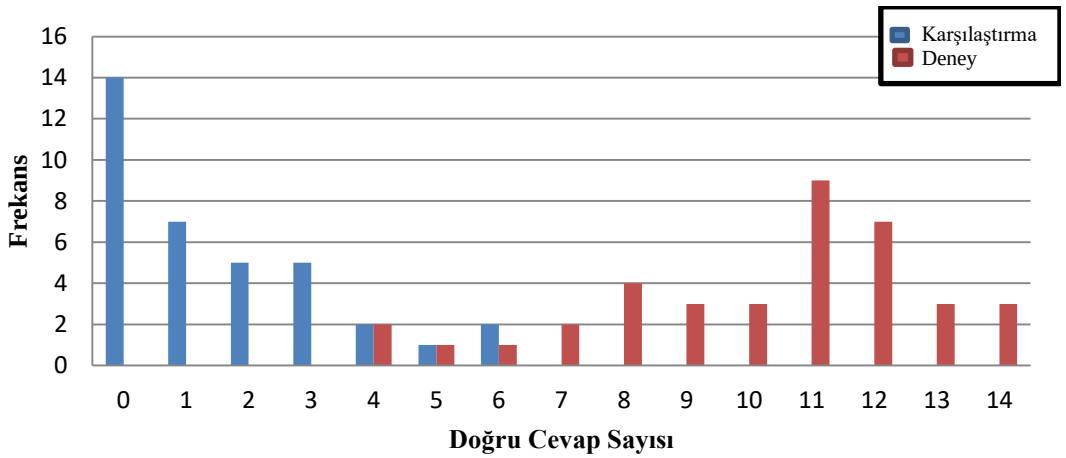
*Şekil 5.* Deney ve karşılaştırma grupları öğrenci hataları bilgisi son test skorları frekansı

*Araştırma Sorusu Alt boyut 4:* Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının öğretim tasarımı ve sunumu bilgisine etkisi nedir?

Karşılaştırma grubu beden eğitimi öğretmen adaylarının öğretim tasarımı ve sunumu ön test skorları 0'dır. Benzer olarak deney grubu öğrencilerinin de ön test skorları 0 olarak bulunmuştur. Öğretim proramları öncesinde her iki grup öğrencilerinin öğretim tasarımı ve sunumu bilgilerinin olmadığı saptanmıştır.

ANOVA sonuçlarına göre her iki grubun ön test ve son test değerleri arasında istatistiksel olarak anlamlı farklılık bulunduğunu göstermektedir ($F$ (1, 73) = 2.86, p<.05). Deney grubu katılımcılarının ön test ve son test değerleri arasındaki kazanımları karşılaştırma grubunun kazanımlarından istatistiksel olarak daha yüksek bulunmuştur ($F$ (1, 72) = 1.04, p<.05).

Karşılaştırma grubu son test betimsel sonuçlarına göre doğru cevap aralığı 0 ve 6 olarak belirlenmiştir ($M$=1.58, $SS$= 1.5). Doğru cevap yüzdesi 11.3 (%) olarak belirlenmiştir. Deney grubu son test bulguları doğru cevap aralığının 4 ve 14 arasında olduğunu göstermektedir ($M$=10.16, $SS$= 2.9). Doğru cevap yüzdesi ise 72.4 (%) olarak saptanmıştır (Bakınız şekil 6).




* Maksimum skor: 14

*Şekil 6*. Deney ve karşılaştırma grupları öğretim tasarımı ve sunumu bilgisi son test skorları frekansı

**Araştırma Sorusu 3.** Deney grubu öğrencilerinin badminton öğretim programı hakkındaki düşünceleri nelerdir?

Son test verileri toplandıktan sonra gönüllü olan 12 deney grubu öğrencisi ile yarı yapılandırılmış görüşme yapıldı. Öğrenci görüşmeleri için tematik içerik analizi ve araştırmacının alan notları sonucunda 4 tema ortaya çıkmıştır: 1) Eğlenme, 2) Badminton alan bilgisi gelişimi için öğretim programının etkililiği, 3) Öğretmeyi öğrenmek, 4) Badminton öğretim görevlisinin genel ve özelleşmiş alan bilgisine sahip olmasının önemi (Tablo 1'e bakınız)

Tablo 1.

*Araştırma Sorusu 3'ün Temaları*

| **Temalar** | **Alt-Temalar** |
|---|---|
| 1. Eğlenme | ➢ Badminton öğrenirken ve öğretirken eğlence<br>➢ Yeni konu öğrenirken heyecanlanma |
| 2. Alan Bilgisi Gelişimi | ➢ Öğretmek için güven hissetme<br>➢ Kavramsal çerçevenin tüm alt boyutlarını kavrama<br>➢ Beden eğitimi öğretmeni olduğunda muhtemel sorunlar ve çözümleri algılama |
| 3. Nasıl öğreteceğini öğrenme | ➢ Farklı öğrenen gruplarına öğretme<br>➢ GAB öğretmek için sadece yeterli değildir |
| 4. Öğretim görevlisinin alan bilgisi | ➢ Etkili öğretim stratejileri<br>➢ Etkili geri bildirim<br>➢ Etkili düzeltme, analojiler, ipuçları ve sunumları |

*Eğlenme*

Öğrenciler badminton ders saati boyunca badminton oynarken ve öğretirken eğlendiklerini belirttiler. Yeni konuyu nasıl oynayacakları ve nasıl öğretecekleri konusunda genelde hazırdırlar. Öğrenciler badminton dersini sevdiklerini çünkü derse gelirken heyecanlandıklarını belirttiler. Öğrenciler ders saatinin kısalığından da yakındılar.

*" Dersler çok iyiydi. Her badminton günü, heyecanlıydım çünkü biliyordum ki bugün yeni bir beceri öğreneceğiz. Her ders uygulama yaptık ve nasıl öğretileceğini öğrendik"*

Öğrenci 10, Görüşme

*“Badminton dersini seviyorum. Keşke diğer derslerde badminton dersi gibi tasarlansa. Badminton dersi olduğu için salıları sabırsızlıkla bekliyorum. Oynamayı, öğrenmeyi ve öğretmeyi seviyorum.”*

Öğrenci 7, Görüşme

*“Yeni tekniği uygulamaya başladığımda, ders saati bitiyordu. O anda içimden HAYlR diye bağırdım.”*

Öğrenci 5, Görüşme

Araştırmacı 10 hafta boyunca uygulamada deney grubu öğrencilerinin eğlenmelerine şahit olduğunu belirtti. Araştırmacı ayrıca öğrencilerinde öğretim görevlisinin de motivasyonlarının yükseldiği belirtti.

*“Salona geldiğimde herkes derse hazır görünüyordu. Öğrenciler öğrenmeye istekli oldukları için derslerden çok keyif alıyordum. Ara verdiğim zaman sürekli soru soruyorlardı.”*

Alan Notları, Hafta 8

*“ Badminton sporunu 15 yıldır oynamakta ve 5 yıldır öğretmekteyim. Eğer antrenörlük deneyimimi ve bu kavramsal çerçeveye göre ders öğretimim karşılaştıracak olursak, bu dersi öğretmeyi antrenörlük deneyimimden daha fazla sevdiğimi ve dersten daha fazla keyif aldığımı söyleyebilirim.”*

Alan Notları, Hafta 4

<u>Alan Bilgisi Gelişimi</u>

Deney grubu öğrencileri badminton sporunu nasıl oynayacakları ve nasıl öğreteceklerini öğrenmek için uygulanan öğretim programının etkili olduğunu ifade ettiler. Öğretim programı sürecinde beden eğitimi öğretmeni olduklarını hissettiklerini belirttiler. Ayrıca öğretmen olduklarında badmintonu öğretebileceklerine inandıklarını belirttiler.

"*Sanırım bu ders amacına ulaştı. Nasıl oynayacağımızın yanı sıra nasıl öğreteceğimizi de öğrendik. Beden eğitimi öğretmen adayı olarak bence gerçekten çok önemli. Öğretmen olduğumda badmintonu öğretebilirim."*

Öğrenci 3, Görüşme

" *Bir çok şey söyleyebilirim. Örneğin, birbirimize öğrettik. Bir arkadaşımın hatasını gördüm ve onu düzeltmesine yardım ettim. Düzeltmeyi gösterirken bende öğrendim. Öğretmeyi sevdim."*

Öğrenci 6, Görüşme

Badminton dersi güncel alan bilgisi kavramsal çerçevesine göre tasarlandı. Kavramsal çerçevenin tüm alt boyutları derinlemesine alan bilgisi için önemlidir. Öğrencilerin açıklamalarına göre her alt boyutun önemi anlaşılmış görünmektedir.

*"Bence taktik boyutu öğretmenin eksik boyutudur. Teknik öğretilirken taktiğinde öğretilmesi gerektiğine her zaman inanmışımdır*.

Öğrenci 7, Görüşme

*"Taktik önemlidir. Teknikleri öğrenirken öğrencilerin anlamasına izin verir."*

Öğrenci 1, Görüşme

" *Badminton dersi gibi ders hiç almadım. Öğretim görevlisi derse geldiğinde ve bize açıklama yaptığında şaşırdırk. Herkes birbirine öğretecek? Nasıl yani? Sonra anladık. Ben arkadaşıma öğrettim o da bana. O öğrenci ben de öğrendim. İlk kez kendimi öğretmen hissettim. Ders bence çok etkiliydi."*

Öğrenci 4, Görüşme

Öğretim programının etkililiği araştırmacının alan notlarında da görülmektedir.

*" Bugün forehand ve backhand servisleri nasıl yapacağımızı ve nasıl öğreteceğimizi öğrendik. Öğrenciler yeni teknik tanıtımı için video gösterimini beğendiler. Ayrıca*

*eşli öğretim yöntemini de anladılar. Öğrencilerin birbirine öğretmekten keyif aldıklarını görebiliyordum. Sınıftaki etileşim üst düzeydeydi."*

Alan Notları, Hafta 3

<u>*Nasıl Öğreteceğini Öğrenme*</u>

Nasıl oynanacağının yanı sıra nasıl öğreteceğini öğrenmek bu öğretim prgramının amacıydı. Öğrenciler oynamaya alıştılar, ancak nasıl öğretileceğine yönelik tasarlanan herhangi bir ders almamışlardı öğrenciler. Eşli öğretimle birlikte nasıl öğreteceklerini de hafta hafta anladılar.

*" Badminton oynadım ve öğrettim. Bu ikisi de güzel. Kendimi öğretmen hissettim."*

*Öğrenci 11, Görüşme*

*" Bence belirli bir sporu anlamak için hem oynamak hemde öğretmeyi öğretmek çok öenmlidir. Ancak beden eğitimi öğretmenleri sadece teknik ve taktik öğretmeyi bilmekten fazlasını bilmelidirler."*

Öğrenci 8, Görüşme

*"Hayır, oynamak sadece yeterli değildir. Bir sporu nasıl öğreteceğimizi öğrenmeliyiz. Keşke diğer derslerde böyle tasarlansa."*

Öğrenci 2, Görüşme

Yarı yapılandırılmış görüşme sonuçları bazı öğrencilerin öğretmen olduklarında belirli bir sporu nasıl öğretecekleri konusunda endişelendiklerini göstermiştir.

*"Bu dersi aldığımda, anladım ki ben sadece basketbol ve badminton öğretebilirim. 15 yıl basketbol oynadım, sanırım öğretebilirim basketbolu. Sonra badminton öğretebilirim çünkü nasıl öğretebileceğimi öğrendim. Daha başka? Bu dersten sonra diğer sporları nasıl öğretebilirim endişelendim. Örneğin bir yıl önce hentbol dersi*

*aldım. Ama, öğretebileceğimden emin değilim. Ders güzeldi ama öğretme konusu mevzu olunca endişeleniyorum."*

Öğrenci 6, Görüşme

Okul beden eğitimi dersinde belirli bir sporu öğretmek, beden eğitimi öğretmenlerinin düşünmesine gereken bir konudur. Öğrenciler nasıl etkili badminton öğretebileceklerini öğrendiklerini belirttiler. Öğrenciler, okulda öğrencilerinin hatalarını düzeltmek için oyunlar düzenleyecebileceklerini belirttiler. Öğrenciler ders planının önemine de vurgu yaptılar.

*"Dersten sonra anladım ki beden eğitimi öğretmeni olduğumda ne yapmam gerektiğini anladım. Bir öğrencim oynarken hatalarını görüp düzeltmeyi öğrendim. Okul beden eğitimi dersinde badminton öğretirken modifiye edilmiş oyunlar kullanmayı planlıyorum."*

Öğrenci 3, Görüşme

*" Öğretim görevlisinin dersi nasıl işlediğini gözlemledim. Dikkat ettim öğretim görevlisi derse hep hazır geldi. Bu hafta ne öğreteceği hazırdı. Anladım ki ders planı oldukça önemliymiş. Beden eğitimi öğretmeni olduğumda bende dikkat edeceğim."*

Öğrenci 9, Görüşme

Araştırmacının alan notları öğretim programının amacını desteklemektedir.

*"Hafta hafta öğrenciler birbirine öğretmeye alıştı. Hataları düzeltmeyi gösterirken kendi hatalarını da düzelttiklerini farkettim. Öğretmek motivasyonlarını arttırdı."*

Alan Notları, Hafta 5

*Öğretim görevlisinin alan bilgisi*

Beden eğitimi öğretmen yetiştiren kurumlardaki öğretim görevlilerinin fiziksel aktivite ve spor derslerinde GAB ve ÖAB alt boyutlarında yeterli düzeyde sahip olması beklenmektedir. Öğrenci görüşmelerinin sonuçlarına göre badminton dersi

öğretim görevlisi badminton öğretebilmek için yeterli GAB ve ÖAB'ne sahip olduğu görülmektedir. Bulgulara göre, öğrenciler öğretim görevlisinin alan bilgisinin derin ve etkili olduğunu göstermektedir. Bu yüzden badmintonu hem oynama hem de öğretme açısından öğrendiler.

*" Yeni bir beceriyi öğretmek için video kullanan öğretim görevlisini ilk kez gördüm. Bana oldukça etkileyici geldi. Yeni tekniğin basamaklamasını ilk kez video da gördüm. Sonra öğretim görevlisi gösterdi. Ve oynadık ve birbirimize öğrettik."*

Öğrenci 11, Görüşme

Araştırmacıların alan notları badminton öğretimi için GAB ve ÖAB'nin önemini desteklemektedir. Araştırmacı dersi alan öğrenci sayısı kortların kapasitesinden daha fazla olsa bile organize edebilmektedir.

*" Bugün, kortların kapasitesinden fazla öğrenci vardı. Kortları modifiye ettim ve öğrencileri ona göre böldüm. Sonrasında farklı uygulamalar kullandım."*

Alan Notları, Hafta 4

*" Bu hafta drop vuruşunu gösterdim. Gerçekten zor bir tekniktir. Öğrenciler iyi yapamadılar, ve motivasyonları düştü. Sonrasında drop vuruşu ile ilgili bir oyun organize ettim. Oyun hoşlarına gitti. Daha sonra drop vuruşunu daha iyi gerçekleştirdiler."*

Alan Notları, Hafta 6

## TARTIŞMA

Bu çalışmanın amacı, Ward'ın alan bilgisi kavramsal çerçevesine göre tasarlanan badminton öğretim programının beden eğitimi öğretmen adaylarının badminton alan bilgisi düzeyine etkisini incelemektir. Alan yazındaki çalışmalara göre beden eğitimi öğretmenleri yada öğretmen adaylarının alan bilgisi düzeylerinin başarılı kabul edilmesi için toplam soruların en az % 70'ini doğru cevaplaması beklenmektedir

(Castelli & Williams, 2007; South Carolina Department of Education [SDE], 2000). Tartışma kısmı 3 araştırma sorusuna göre tasarlanmıştır.

**Araştırma Sorusu 1.** Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının GAB düzeylerine etkisi nedir?

Bu çalışmada, öğretim programları sonrasında GAB düzeyleri istatistiksel olarak anlamlı farklı bulunmuştur. Ayrıca deney grubu beden eğitimi öğretmen adaylarının skorları karşılaştırma grubu skorlarından daha iyi bulunmuştur. Karşılaştırma grubu GAB son test bulgularına göre kurallar, görgü ve güvenlik kuralları skoru % 51.4; teknik ve taktik alt boyutu için % 37.7 olarak bulunmuştur. Deney grubu son test bulgularına göre kurallar, görgü ve güvenlik kuralları skoru % 82.2; teknik ve taktik alt boyutu için % 78.3 olarak bulunmuştur. Bu bulgulara göre deney grubu öğrencileri beklenen alan bilgisi (> % 70 ve üzeri) düzeyine ulaşmıştır. Diğer taraftan karşılaştırma grubu öğrencileri her iki alt boyutta da yeterli alan bilgisine sahip olamamışlardır.

Karşılaştırma grubu düşük alan bilgisi performansı genel eğitimde kimya, matematik ve edebiyat alnlarında görülmektedir (Ball, 1990; Bergquist & Heikkinen, 1990; Depaepe et al., 2015; Shedd, 2011). Örneğin matematik alanında Kleickmann ve arkadaşları (2013) matematik öğretmen adaylarının ilk yıl ve son yıl alan bilgisi düzey farklılıklarını incelemişlerdir. Bulgular matematik öğretmen adaylarının alan bilgisi düzeyi beklenen seviyenin altında olduğunu göstermektedir. Kimya alanında ise örnek olarak Faikhamta ve arkadaşları (2006) kimya öğretmen adaylarının kimya alan bilgisi seviyesi mezun olduklarında kimya öğretebilecek düzeyin oldukça altında kalmaktadır. Shedd (2011) edebiyat alanında yaptığı çalışmada benzer düşük alan bilgisi performansı tespit etmiştir.

Beden eğitimi alanında da benzer düşük alan bilgisi seviyesi alan yazında görülmektedir (Capel & Katene, 2000; İnce & Hunuk, 2013; Martin, 2008). Santiago ve arkadaşlarının (2012) sağlıkla ilgili fiziksek uygunluk üzerine yaptığı çalışmada

katılımcıların sağlıkla ilgili fiziksel uygunluk alan bilgisi seviyeleri beklenen % 70 doğru cevap oranını yakalayamamışlardır. Benzer çalışma İnce ve Hunuk (2013) tarafından gerçekleştirilmiştir. Çalışma benzer şekilde düşük sağlıkla ilgili fiziksel aktivite alan bilgisi tespit etmiştir.

Deney grubu katılımcıları beklenen alan bilgisi düzeyine ulaşmışlardır. Benzer yüksek alan bilgisi performansı alan yazındaki matematik, kimya, edebiyat çalışmalarında görülmektedir (Oleson, 2010; Welder, 2007; Yamnitzky, 2010). Alan bilgisine odaklanan belirli bir öğretim programı uygulandığında alan bilgisinin arttığı görülmektedir.

Matematik alanında yapılan çalışmalarda uygulanan öğretim programının matematik öğretmeni yada matematik öğretmen adaylarının alan bilgisi seviyesini istenen seviyeye ulaştırdığı sonucuna varılmıştır (Oleson, 2010; Welder, 2007; Yamnitzky, 2010). Kimya alanında yapılan çalışmalar da benzer sonuçlar bulunmuştur (Khourey-Bowers, & Fenk, 2009; Sanger, 2007). Edebiyat alanında ise liderlik (Olsen, 2010) ve kompozisyon (Robertson, 2011) alan bilgisi çalışmalarında benzer yüksek alan bilgisi performansları tespit edilmiştir.

**Araştırma Sorusu 2.** Uygulanan badminton öğretim programının beden eğitimi öğretmen adaylarının ÖAB düzeylerine etkisi nedir?

ÖAB son test bulgularına göre karşılaştırma grubunun doğru cevap skorları, öğrenci hataları için % 31.8; öğretim tasarımı ve sunumu alt boyutu için % 11.3 olarak saptanmıştır. Deney grubunda ise öğrenci hataları alt boyutunda skor & 81.6 ve öğretim tasarımı ve sunumu alt boyutunda ise % 72.4 olarak bulunmuştur. ÖAB bulgularına göre deney grubu öğrencileri beklenen alan bilgisi düzeyine ulaşırken karşılaştırma grubu öğrencileri her iki alt boyutta da istenen alan bilgisi düzeyine ulaşamamıştır.

Düşük alan bilgisi performası matematik ve beden eğitimi alanlarında da görülmektedir (Aslan-Tutak & Adams, 2015; Ball et al., 2008; Ho & Lai, 2012). Örneğin, Ho ve Lai (2012) matematik öğretimindeki ÖAB'ne ayrılan zamanı incelemişlerdir. Bulgular karşılaştırma grubu ile aynı doğrultudadır.

Beden eğitiminde ise düşük performansın nedeni olarak beden eğitimi öğretmen yetiştiren kurumlardaki ÖAB'ne ayrılan zaman gösterilebilir. Bulgulara paralel alan yazında bazı çalışmalar bulunmaktadır (İnce et al., 2012; Kim et al., 2015; Ward et al., 2012; Ward et al., 2013). Örneğin, Ward ve arkadaşları (2013) uluslararası alan bilgisi çalışmasında ÖAB'ne ayrılan zaman oldukça düşüktür. Benzer sonuç Türkiye için yapılan çalışmada da görülmektedir (İnce ve arkadaşları, 2012).

Deney grubundaki yüksek performana benzer sonuçlar matematik ve beden eğitimi alanlarındaki çalışmalarda görülmektedir (Bair & Rich, 2011; Ho & Lai, 2012; McCoy, 2011). Örneğin, McCoy (2011) yaptığı çalışmada matematik öğretmen adaylarının ÖAB seviyelerini incelemiştir. Bulgulara göre uygulanan öğretim programı katılımcıların ÖAB seviyelerini arttırmıştır.

ÖAB seviyesinin artması pedagojik alan bilgisini arttırmaktadır. Beden eğitimi alanında yapılan çalışmalarda ÖAB arttırılan öğretmenlerin pdagojik alan bilgisi seviyeleri artmıştır (Kim, 2015; Lee, 2011; Iserbyt, Ward, & Li, 2015; Sinelnikov, Ward, Kim, Ko & Li, 2014). Örneğin Kim (2015) volleyball ÖAB öğretim programının beden eğitimi öğretmenlerinin pedagojik alan bilgilerine etkisini incelemiştir. Çalışma sonuçlarına göre ÖAB arttırılan beden eğitimi öğretmenlerinin pedagojik alan bilgileri artmştır.

**Araştırma Sorusu 3.** Deney grubu öğrencilerinin badminton öğretim programı hakkındaki düşünceleri nelerdir?

Yarı yapılandırılmış sorular 12 deney grubu öğrencisine soruldu. Bulgulara göre öğrenciler öğretim programını etkili ve başarılı bulduklarını belirttiler. Ayrıca

kullanılan yöntemleride etkili bulduklarını ifade ettiler. Öğrenciler badmintonu hem oynamayı hem de öğretmeyi öğendikleri için kendileri öğretmen gibi hissettiklerini belirttiler.

Alan bilgisi kavramsal çerçevesinin yakın zamanda alan yazında yer alması nedeniyle yeterince çalışma bulunmamaktadır.

Sonuç olarak, Ward'ın yeni alan bilgisi kavramsal çerçevesine göre tasarlanan öğretim programı beden eğitimi öğretmen adaylarının öz güvenini arttırmıştır.

**SONUÇ**

Bu çalışmanın amacı, Ward'ın alan bilgisi kavramsal çerçevesine göre tasarlanan badminton öğretim programının beden eğitimi öğretmen adaylarının badminton alan bilgisi düzeyine etkisini incelemektir. Bu doğrultuda çalışmadan üç sonuç elde edilmiştir.

Birincisi, beden eğitimi öğretmeni yada beden eğitimi öğretmen adaylarının badminton alan bilgisini ölçecek geçerli ve güvenilir bir ölçüm aracı geliştirilmiştir. Bu amaçla doğrultusunda badminton bilgi erişi testi geliştirilmiştir. Pilot çalışmayla kontrol edilen bu testin geçerliliği ve güvenilirliği sağlanmıştır.

İkincisi, son zamanlarda yapılan çalışmalarda alan bilgisi arttırıldığında beden eğitimi öğretmenlerinin pedagojik alan bilgisi de artmıştır (Iserbyt, Ward, & Martens, 2015; Kim, 2015; Ward, Kim, Ko & Li, 2014). Ancak çok az sayıda çalışma doğrudan beden eğitimi öğretmen adaylarının alan bilgisini ölçmektedir. On haftalık tasarlanan badminton öğretim programı uzman bir grup tarafından tasarlanmıştır. Öğretim programı tutarlılığı test edilmiştir. Öğretim programı aynı hafta sayısında deney ve karşılaştırma gruplarına uygulanmıştır. İki program arasında % 93 oranında tutarlılık saptanmıştır. Çalışmaya katılanların ön test bulguları 0 sayısına yakındı. Bu durum katılımcıların dersten önce badminton bilgilerinin

olmadığını göstermektedir. Uygulanan programlar sonrasında deney grubu öğrencileri beklenen alan bilgisi düzeyine (% 70 ve üzeri) ulaşırken karşılaştırma grubu öğrencileri istenen düzete ulaşamamıştır. Alan yazındaki çalışmalardaki bakış açısına göre alan bilgisi arttırılan öğretmen yada öğrencilerin pedagojik alan bilgisinin artması beklenmektedir.

Son olarak, öğretim programının etkililiğini görmek için 12 deney grubu öğrencisine yarı yapılandırılmış görüşme yapılmıştır. Görüşme ve araştırmacı alan notlarına göre öğrenciler derste kullanılan eşli öğretim ve video gösterimi yöntemlerini etkili bulmuşlardır. Öğrenciler öğretim programını etkili, başarılı ve eğlenceli bulduklarını belirttiler.

## Beden Eğitimi Öğretmen Yetiştiren Kurumlar için Tavsiyeler

Çalışma bulgularına göre deney grubu öğretmen adayları beklenen alan bilgisi düzeyine ulaşmışlardır. Beklenen alan bilgisi seviyesi değerlendirilmesi gerekir. Bu amaçlara ulaşmak için beden eğitimi öğretmeni yetiştirme kurumlarına yada öğretim görevlilerine tavsiyeler;

1. Beden eğitimi öğretmen yetiştirme programlarındaki fiziksel aktivite ve spor derslerinde GAB ve ÖAB içeren şekilde tasarlanmalıdır.
2. Bu çalışmaya göre eğer öğretim görevlisi derin alan bilgisine sahip olursa, pedagojik alan bilgileri artmakta ve öğrencilerin alan bilgisi seviyesi artmaktadır.
3. Beden eğitimi öğretmen adaylarının GAB ve ÖAB alt boyutlarının her ikisinden de yeterli düzeyde sahip olması için eşli öğretim yöntemi tavsiye edilmektedir. Bu yöntem öğretim programı süresince hem öğrenmeyi hemde öğretmeyi uygulamak için yararlı bulunmuştur.
4. Beden eğitimi öğretmen yetiştiren kurumlarda GAB'nin yanı sıra ÖAB'ne ayrılan zaman arttırılmalıdır.

## Politika Yapıcılar için Tavsiyeler

Çalışma, beden eğitimi öğretmen yetiştiren kurumlardaki fiziksel aktivite ve spor derslerinin GAB ve ÖAB alt boyutları içeren şekilde tasarlanması gerektiğini göstermiştir.

Türkiye'deki beden eğitimi ve spor politikasında GAB'ne ayrılan zamanın fazla, ÖAB'ne ayrılan zamanın ise oldukça yetersiz olduğu görülmektedir (İnce et al., 2012). Derinlemesine alan bilgisine sahip olmak için yeterli düzeyde ÖAB'ne zaman ayrılmalıdır. Bu nedenle, beden eğitimi öğretmeni yetiştiren kurumlardaki fiziksel aktivite ve spor dersleri için öğretim programı politikaları gözden geçirilmeli ve ÖAB dahil edilmelidir.

## Öğretim Programı Geliştiriciler için Tavsiyeler

Bu çalışma, beden eğitimi öğretmen yetiştiren kurumlardaki fiziksel aktivite ve spor derslerindeki alan bilgisi düzeyi, özel olarak geliştirilen bilgi erişi testleri kullanarak ölçülebileceğini göstermiştir.

1. Öğretim programı geliştiricilere beden eğitimi öğretmeni yada beden eğitimi öğretmen adaylarının alan bilgisi düzeyini belirleyecek farklı fiziksel aktivite dersleri için bilgi erişi testi geliştirmeleri tavsiye edilmektedir.
2. Bilgi erişi testi geliştirilirken belirtke tablosu ve uzman görüşü kullanmak geçerli ve güvenilir bir test geliştirmek için önemlidir ve benzer testler geliştirmeyi planlayan araştırmacıların benzer yöntemi kullanması tavsiye edilir.
3. Program geliştiricilerin alan bilgisi testi geliştirirken GAB için çoktan seçmeli sorular; ÖAB için ise kısa cevaplı ve açık uçlu sorular kullanması tavsiye edilir.

## APPENDIX F: SAMLE QUESTİONS OF BADMINTON CONTENT KNOWLEDGE TEST

### GENEL ALAN BİLGİSİ

### Kurallar, Görgü ve Güvenlik Kuralları

1-) Aşağıdakilerden hangisi Badminton sporunda kategorilerden biri değildir?

a. Tek Erkekler
b. Çift Kadınlar
c. Karışık Tekler
d. Tek Kadınlar

2-) Standart bir badminton sahasının boyu.... ve eni... metredir.

a. 14.10 boyu / 6.00 eni
b. 13.20 boyu / 7.10 eni
c. 13.40 boyu / 6.10 eni
d. 14.20 boyu / 7.00 eni

3-) Badmintonda filenin en yüksek yeri, kort yüzeyinden itibaren, kortun merkezinden ... m ve çiftler taraf çizgileri üzerinden ... m olmalıdır.

a. 1.52 / 1.55
b. 1.55 / 1.52
c. 1.45 / 1.52
d. 1.42 / 1.55

4 -) Kurallara göre aşağıdakilerden hangisi oyun esnasında fileye temas edebilir?

a. Raket
b. Oyuncunun vücudu
c. Tüytop
d. Oyuncunun elbisesi

5 -) Badminton'da kural dışı davranışlar sergileyen bir oyuncuyu başhakem önce uyarmak yolu ile ikaz etmiştir. Kural dışı davranışlara devam eden oyuncuya başhakem .... kart gösterir. Kural dışı davranışa devam ederse..... kart gösterir. Hala kural dışı davranışa devam ederse başhakem turnuva başhakeminden ..... kartı alır ve oyuncuyu oyundan ihraç eder.

a. Beyaz / Sarı / Kırmızı
b. Sarı / Kırmızı / Siyah
c. Sarı / Mavi / Gri
d. Kırmızı / Gri / Siyah

6 -) Bir Badminton turnuvasında aşağıdaki görevlilerden hangisinin olması zorunlu değildir?

a. Turnuva başhakemi
b. Başhakem
c. Servis hakemi
d. Çizgi hakemi

7 -) Oyun esnasında tüytopun içeride ya da dışarıda olduğuna karar verilemedi. Bu durumda ne yapmak gerekir?

a. Let (tekrar) kararı ile servisin tekrar atılması
b. Bir taraf sayıyı kazanana dek tartışmak
c. İzleyenlere sormak
d. Oynamaya devam etmek

8 -) Hangisi Badminton'da sportmenliğe yakışan davranış değildir?

a. İyi vuruş sonrası rakibi tebrik etmek
b. Rakip hazır olmadığında servisi kullanmamak
c. Vuruş çizgiye yakın düştüğünde sayının tekrar edilmesini istemek
d. Rakibin hazır olup olmadığını kontrol etmek

9 -) Bir oyuncu, sayıyı karşı taraf kazandığında tüytopu rakibine nasıl vermesi beklenir?

a. Diğer sahaya doğru tüytopu filenin altından atmak
b. Tüytopu servis atacak oyuncuya doğru file altından atmak
c. Diğer sahaya doğru tüytopu hızlıca göndermek
d. Tüytopu file üzerinden servis atacak oyuncuya doğru atmak

10-) Oyun sırasında, diğer sahadan tüytop sahaya girerse oyuncunun ne yapması beklenir?

a. Diğer korttaki oyuncu topu hızlıca alır ve oyun devam eder
b. Let kararı ve diğer korttaki oyuncunun topu almasına izin verir
c. Diğer korttaki oyuncu topu hızlıca alır ve diğer korttaki servis atan oyuncuya gönderir
d. Oyun devam eder ve tüy top yere düştüğünde let kararı verilir

11 -) Bir badminton müsabakasında, hakem sporcuların sakatlanmalarını önlemek amacıyla müsabaka öncesi ne kadar ısınma süresi verir?

a. 15 dakika
b. 10 dakika
c. 3 dakika
d. 30 saniye

12 -) Badminton'da güvenlik açışından bir sporcu raketi ile tüytopa vururken aşağıdakilerden hangisini yapamaz?

a. Aldatma hareketi
b. Raketin çerçevesi ile vurma
c. Karşı sahadaki tüytopa vurma
d. Kesme (slice) vuruşu yapma

**Teknik ve Taktik**

TEKNİK

1-) Badminton'da vücudun hangi bölümü vuruşlarda en fazla güç sağlar?

a. Dirsek
b. Bilek
c. Sırt
d. Gövde

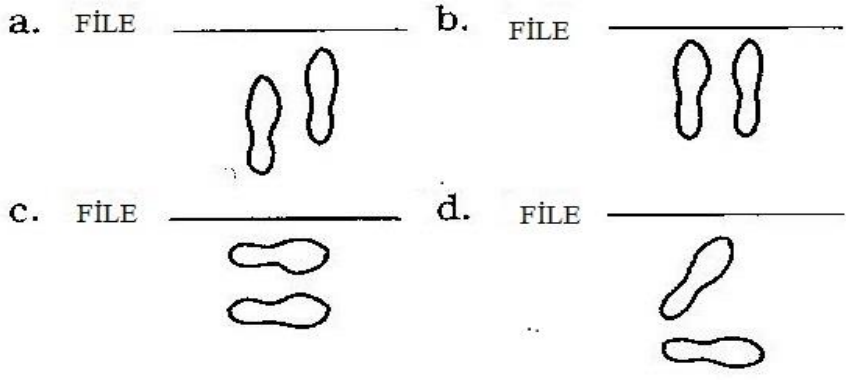
2 -) İyi bir bilek hareketi vuruşa ne katar?

a. Kontrol
b. Yer alma
c. Güç
d. Çabukluk

3 -) Aşağıdakilerden hangisi Badminton'da temel tutuşlardan olan "forehand" tutuşunu doğru şekilde ifade eder?

a. Gevşek ve rahat
b. Sıkı ve Gergin
c. Bir çekici tutuyormuş gibi sıkı ama gevşek
d. Gevşek ama Gergin

4 -) Badminton 'da hazır pozisyonda olan bir oyuncunun fileye doğru ayakları aşağıdaki şekillerden hangisini almalıdır? (Sağ elini kullanan oyuncu)



TAKTİK

1-) Aşağıdakilerden hangileri kortun en uzak noktasında olsanız dahi rahatlıkla yapılabilecek vuruşlardır?

a. Clear ve Smaç
b. Drop ve Smaç
c. Clear ve Drop
d. Drive ve Drop

2 -) Bir oyuncunun her vuruştan sonra ne yapması, oyunun devamında kendisine avantaj sağlar?

a. Tüytopun nereye gittiğine bakmak ve takip etmek
b. Sahanın merkezine dönmek
c. Fileye doğru koşmak
d. Arka köşelere doğru koşmak

3 -) Bir oyuncu "Drop" vuruşunu hangi amaçla en etkili şekilde kullanabilir?

a. Rakibi hücumda tutmak için
b. Rakibi savunmada tutmak için
c. Rakibi fileye dokunması için zorlamada
d. Vuruş sonrası toparlanmak için

4 -) Bir oyuncu "Clear" vuruşunu hangi amaçla en etkili şekilde kullanabilir?

a. Sayı kazanmak için
b. Rakibi bıktırmak için
c. Rakibi sahanın uzak noktasına göndermek ve zayıf vuruş yapmasını sağlamak için
d. Rakibi savunmada tutmak için

**ÖZELLEŞMİŞ ALAN BİLGİSİ**

1 2 3 4

1. Yukarıda bulunan görsellerde temel servislerden biri olan “Backhand” kısa servis kullanan bir öğrenci/sporcu görmektesiniz.

a. Görsellerde gördüğünüz öğrencinin/sporcunun en önemli hatası nedir?
.....
.....

b. Bu hatayı sürekli uyarmanıza rağmen devam ettiren bir öğrencinize/sporcunuza nasıl bir düzeltme yöntemi uygularsınız. Açıklayınız.
.....
.....

2. Ortaokul beden eğitimi dersinizde badminton uygulaması ve öğretimi gerçekleştirdiğinizi düşünün. Öğrencilerinizden Ahmet “Clear” vuruşu için tüytop ile raketi buluşturamamaktadır.

a. Öğrencinizin tüytop ile raketi baş üstünde buluşturamamasının teknik olarak nedenleri neler olabilir? (En az iki neden belirtiniz)

.....

.....

b. Clear vuruşunu düzeltmek için uygulanabilecek iki etkinlik örneği belirtiniz.

.....

.....

c. Clear vuruşunda, raket ve tüytopun başlangıçtan buluşma noktasına dek geçen süreci teknik yönleriyle anlatınız.

.....

.....

.....

## APPENDIX G: INTERVIEW QUESTIONS

1. Kendinizi tanıtır mısınız?

2. Katıldığınız öğretim programı öncesi kendinizi geliştirmek için Badminton sporuna yönelik faaliyetlere (seminer, kongre, panel, vb.) katıldınız mı? Neden?

Cevap evet ise;

- Ne tür bir faaliyetti ?
- Ne kadar sürdü?
- Bu faaliyetin kişisel gelişiminize katkısı olduğunu düşünüyor musunuz? Neden?

3. Katıldığınız Badminton öğretim programı hakkında ne düşünüyorsunuz?

4. Sizce bu programın güçlü yönleri nelerdir?

5. Sizce bu programın geliştirilmesi gereken yönleri nelerdir?

6. Badminton öğretiminde kurallar, görgü kuralları ve güvenlik bilgisi öğretimi sizce ne kadar önemli? Anlatır mısınız?

7. Sizce Badminton teknik öğretiminin yanı sıra taktik öğretiminin de önemi nedir? Neden taktik bilgisi beden eğtimi öğretmen adayları için önemlidir?

8. Üniversitede öğretilen fiziksel aktivite derslerinde sadece teknik ve taktik öğretimi yeterli midir? Neden

9. Sizce öğretmen adayları Badminton dersi alıp bu dersi öğretmen olduklarında uygulamada ne tür zorluklarla karşılaşabilirler? Bu zorluklarla nasıl başa çıkmalıdırlar?

10. Öğretmen adayı öğretmen olduğu zaman Badminton dersi verirken öğrencilerinin yapabileceği muhtemel hatalar konusunda ne kadar bilgi sahibi olmalıdır?

11. Bu hatalara yönelik çözüm yöntemleri olmalı mıdır yoksa genel bir öğretim yöntemi kullanarak sorunu çözmeli midir? Neden?

12. Bir öğretmen adayının Badminton ile ilgili bir tekniği başlangıcından bitişine kadar bilmesi ve bu süreçte karşılaşılan zorluklarla başa çıkabilmesi öğretmen adayının dersteki etkinliğini ne derece arttırır? Neden?

## APPENDIX H: A SAMPLE OF RESEARCHER'S FIELD NOTES

### Hafta 7

7. hafta dersine 3. Sınıf ta katılım yüksekti, 1. Sınıfta orta düzeyde katılım gerçekleşti. Vize sınavı sonrası ilk hafta olması neden olabilir. Derste "DROP" tekniğini göstermekti amacım. Ancak drop tekniğini uygulamak için karşı taraftaki kişinin tüytopu filenin ön tarafından yüksek ve geriye göndermesi gerekiyordu. O sebeble file önünden tüytopun geriye ve yüksek gönderilmesi tekniği olan "LOB" tekniğini de göstermem gerektiğini düşündüm. Aslında amacım eğer ihtiyaç duyulursa göstermekti. Dersin başlangıcında Drop tekniğini gösterdim ve muhtemel hataları Sunuş yoluyla ve beyin fırtınası ile bulmaya çalıştık. Verimliydi. Tekniğin uygulanmasında ise zorlandıklarını farkettim. Çünkü ilk baş üstü vuruş CLEAR da kuvvet uyguluyorduk, bu teknikte ise yumuşak ve minimum düzeyde kuvvet kullanmalıydık. Uygulamada zorlandıklarını fark ettim. Bu durum öğrencilerin birbiri ile etkileşimini de azalttı çünkü herkes kendiyle ilgileniyordu. Drop vuruşunun devamlılığını sağlamak için tüytopun yüksekten gelmesi gerekiyordu ancak bunu nasıl yapacaklarını bilmedikleri için topun havada kalma sayısı azaldı ve ders verimsizleşmeye başladı. Hemen müdahale ederek "LOB" tekniğini gösterdim. Video izleme ve hareketin ön hazırlıklarını sağlayan uygulama sonrası DROP ve LOB tekniklerini birlikte kullandık. Daha etkili oldu. Bir şeyi fark ettim, BİREYSEL FARKLILIK kavramını biraz unuttuğum. 3. Sınıflarda derste yetenekli ve kolay öğrenen bir öğrenci DROP vuruşunu yapamıyordu. Arkadaşının yardımı ve benim düzeltmelerime rağmen olmadı. Öğrenci bana " Hocam bir şeyi yapmak için üzerime gelindiğinde yapamıyorum, bana süre verin bir sonraki ders yaparım" dedi. O an öğrencileri tanımak gerekliliğini hissettim. Bunun için ders dönemi başlamadan derste yapılacak uygulamalarda kime nasıl bir tutum ve davranış göstermek gerektiğine yönelik bir ön anket ya da açık uçlu soru sorulabilir. Derste kazanım anlamında etkili olduğunu söyleyebilirim. Etkileşim dersin sonuna doğru daha iyiydi. Not kaygısı dersin motivasyonunu etkileyeceğini hissettim. Bazı teknikler birbirinin tersi ve uygulamada birbirlerine ihtiyaç duydukları için birlikte öğretilmesi daha uygun olacaktır.

## APPENDIX I: TEZ FOTOKOPİSİ İZİN FORMU

**ENSTİTÜ**

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

**YAZARIN**

Soyadı : Devrilmez
Adı : Erhan
Bölümü : Beden Eğitimi ve Spor

**TEZİN ADI** (İngilizce) : Impact of a badminton course designed for common and specialized content knowledge of prospective teachers

**TEZİN TÜRÜ** : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☐

**TEZİN KÜTÜPHANEYE TESLİM TARİHİ**: