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Increasingly, graduate teaching *assistants* (GTAs) are not *assisting* faculty instructors, but finding themselves in the role of lead instructor, particularly in physical activity courses. Despite this responsibility, GTAs receive little or no pedagogical training and often feel unprepared to teach. Conversely, college and university physical education teacher education (PETE) programs grounded in constructivist principles provide a strong nurturing environment for teacher growth and are increasingly commonplace. Constructivist methods foster learners' active involvement by utilizing real-life learning situations that they perceive as relevant to their own lives – situations that are contextual and holistic. While constructivist PETE programs have been studied, constructivist kinesiology GTA training has not. Alignment (curricular elements reinforcing each other and fitting together logically) is a goal of constructivist teaching. Built on a pilot study that revealed the absence or poor articulation of three key curricular elements - student learning objectives (SLOs), learning cues, and teacher-provided feedback, this dissertation study was conducted to implement and evaluate a constructivist-oriented program to train new university GTAs to enhance their teaching effectiveness through alignment of these three elements.

This study utilized a qualitative research design, focusing on process, understanding, and meaning, rather than product. The sample was purposeful and non-probabilistic. The primary participants were 11 GTAs new to the physical activity instruction program at a public university in the United States. I led a three-hour constructivist-oriented training session with this group in the week preceding the fall semester, and observed each GTA teach on three occasions, offering feedback, mentoring, and support. I conducted one-on-one semi-structured interviews with each GTA, two undergraduate students taught by each GTA, and the director of physical activity

instruction. I analyzed the data (observation field notes, interview transcriptions, orientation/training documents, lesson plans, and syllabi) using constant comparison.

The training/mentoring intervention enhanced the ability of most GTAs to align SLOs, learning cues, and feedback in the *execution* (although much less so in the written planning) of their lessons. Most of the new teachers shared that the training session reduced their anxiety regarding their upcoming teaching assignment, and nearly all agreed or strongly agreed that the training had been useful, had increased their pedagogical knowledge, and had increased their self-confidence regarding their teaching. All the GTAs described the semester-long mentoring as beneficial, particularly because most were eager to receive feedback on their teaching performance. In turn, most undergraduate students interviewed expressed that they felt their instructor had been successful in presenting a well-sequenced curriculum that fostered their learning.

IMPLEMENTATION OF A CONSTRUCTIVIST-ORIENTED TRAINING FOR
KINESIOLOGY GRADUATE TEACHING ASSISTANTS

by

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CHAPTER I

INTRODUCTION

Graduate teaching *assistants* (GTAs), particularly in physical activity courses, are increasingly assuming the role of lead teacher rather than *assisting* faculty instructors (Russell, 2009). While comprehensive training programs greatly improve instructional effectiveness (Russell & Chepyator-Thomson, 2004), such programs are exceptionally rare (Savage & Sharpe, 1998) and the vast majority of kinesiology GTAs perceive themselves as inadequately prepared to teach (Russell, 2009). More than a third of colleges/universities surveyed offered no formal GTA training, and of those that did, 83% of programs lasted a single day or less and tended to focus on university policies rather than pedagogical knowledge (Roehrig, Luft, Kurdziel, & Turner, 2003). Higher education teacher education programs grounded in constructivist principles have grown increasingly commonplace (Beck & Kosnik, 2006), and learning theories, such as constructivism, may offer a framework for effective GTA training. Constructivism is comprised of a set of learning theories centered on individuals constructing their own knowledge while attempting to impart meaning to their worlds (Phillips, 1995). Learners' active involvement is fostered by real-life learning situations that they perceive as relevant to their own lives – situations that are contextual and holistic, rather than academic and piecemeal (Wiggins, 2015). This scenario may aptly describe GTAs who are eager to “survive” their first teaching experience (Rovegno, 1991). Student learning objectives, learning cues, and teacher-provided feedback are key curricular elements in successful physical activity lessons (Chen & Cone, 2003; Dyson, 2002; Rovegno, 1992b). Alignment (curricular elements reinforcing each other and fitting together logically) and sequencing (information is presented in a logical progression) are two goals of constructivist

teaching, as they provide meaningful context for instruction within the “big picture” (Beck & Kosnik, 2006). The purpose of this study was to implement and evaluate a constructivist-oriented GTA training program designed to foster the alignment of student learning objectives, learning cues, and teacher-provided feedback in GTA planning and teaching in physical activity courses. In the sections below I will briefly expand on the concepts just presented, before discussing them in much greater depth in the second chapter.

GTAs’ Evolving Role/GTA Training

In the past 25 years, the role of the GTA has evolved, a shift caused in part by expanded research demands on professors and rising student-staff ratios in most colleges/universities (Hopwood & Stocks, 2008). This is particularly true in physical activity courses, where Russell (2009) found that more than half of kinesiology GTAs surveyed were the teacher of record in at least one course rather than serving as assistants to experienced faculty. While some kinesiology GTAs have a pedagogy background, many are first-time teachers. GTA training for physical activity instructors greatly improves instructional effectiveness and teacher confidence when programs provide appropriate, consistent, formal, and systematic instructional support, mentorship, and evaluation (Russell & Chepyator-Thomson, 2004). Unfortunately, the literature indicates that such training programs are a rarity (Savage & Sharpe, 1998) and 85% of kinesiology GTAs surveyed perceived that they had received inadequate training (Russell, 2009). Roehrig et al. (2003) found that more than a third of colleges/universities surveyed offered no formal GTA training and, of those that did, 83% of programs lasted a single day or less. Despite the nearly universal notion that GTA training is a worthwhile pursuit, its implementation is inconsistent both in coverage and design (Chadha, 2013).

In contrast to physical education teacher education programs, in which a cooperating teacher or university instructor (or both) are on site during teaching candidates’ field experiences,

most novice GTAs hone their teaching skills in virtual isolation after the scant training they have received. Experienced faculty have little time to mentor them and, with their own obligations as graduate students, most GTAs have little time to *be* mentored (Davis & Minnis, 1993). While witnessing the modeling of good teaching practices is crucial for would-be teachers (Bullough & Gitlin, 1995), this experience is often non-existent for most GTAs. Left to their own devices, GTAs tend to teach as they were taught (Tabachnick & Zeichner, 1984), rather than employ current or innovative techniques. The lack of mentoring for GTAs suggests that fostering crucial pedagogical knowledge of immediate utility may be the most efficacious way to utilize the limited training time generally available. Constructivism may provide an appropriate framework for that training.

Constructivism

Behaviorism, historically the learning theory that guided conceptions of effective teaching in American schools, focuses on changing external behavior through reinforcement and repetition (Skinner, 1969). Constructivism challenged those notions and today is exceptionally influential in the world of education, both in the research literature and in practical applications (Beck & Kosnik, 2006). However, constructivism does not provide a particular curriculum or instruction. Instead it is a set of learning theories that serve as a lens through which teaching decisions are made (Fosnot, 2005). I will focus on four major tenets of constructivism: (a) learning is an active process of constructing knowledge; (b) learners construct knowledge in relation to their prior knowledge and experiences; (c) deep understanding and multiple connections between concepts support transfer of knowledge to other contexts; and (d) learning is socially constructed (Glaser, 1987; Rovegno & Dolly, 2006; Zuckerman, 2003). These tenets provide the framework for constructivist teacher education.

Constructivist Tenets Manifested in Teacher Education

While GTAs often receive limited instruction and support, college and university teacher education programs grounded in constructivist principles provide a strong nurturing environment for teacher growth and are increasingly commonplace (Beck & Kosnik, 2006). In short, teaching candidates in constructivist teacher education programs construct their knowledge of teaching primarily *by teaching*. I will now briefly touch on how the tenets of constructivism are manifested in constructivist teacher education. Rovegno (1992b) asserted that the abilities to provide content-specific feedback to students and break down tasks into easily-learned chunks result more from practical experience than from classroom instruction. Behaviorist approaches suggest that teaching candidates' previous experiences can be disregarded and overwritten by theories and practices taught and reinforced in a teacher education program. Conversely, in constructivist approaches, those existing conceptions are thought to play a major role as novice teachers negotiate and construct their own visions of themselves as teachers (Wright, 2001). Flexible, transferable knowledge can be fostered by teaching candidates constructing deep understanding and making multiple connections between teaching concepts (Rovegno & Dolly, 2006). Constructivist teacher education programs create a learning community that provides social and emotional support to novice teachers, fostering risk taking in teaching and developing ownership of their learning and their identities as teachers (Beck & Kosnik, 2006). Learning is personally meaningful because active involvement is fostered by real-life learning situations that are perceived as relevant to their own lives – situations that are contextual and holistic, rather than academic and piecemeal (Wiggins, 2015). If constructivist teacher education can provide a framework for GTA training, pedagogical knowledge that has relevance and immediate applicability in the GTA's own teaching may prove the optimal focus for the limited training time available.

Curricular Elements and Alignment

Student learning objectives, learning cues, and teacher-provided feedback are key curricular elements in successful physical activity lessons (Chen & Cone, 2003; Dyson, 2002; Rovegno, 1992b). Alignment is the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999). Alignment is a goal of constructivist teaching, in part, because it promotes curricular coherence by bringing clarity to each of the separate lesson components, presenting them in a logical and meaningful context within the “big picture” (Beck & Kosnik, 2006). Sequencing is the order in which curriculum is presented, either across one lesson (micro-sequencing) or across a semester (macro-sequencing) (Posner & Rudnitsky, 2001). Beane (1995) described a coherent curriculum as one that holds together and makes sense as a whole, suggesting that teachers can achieve curricular coherence by logically sequencing learning experiences and explicitly teaching the interconnections between them. For instance, one curricular element - feedback - fosters students’ ability to track their current performance (“How am I going?”) in relation to another curricular element - learning objectives - (“Where am I going?”), promoting adjustments in effort, direction, and strategy (Locke & Latham, 1990). Teachers can design instruction and learning activities that naturally elicit feedback in relation to learning objectives, and feedback builds on the base created by instruction (Kluger & DeNisi, 1996). A key element of physical activity instruction is the learning cue - a short phrase that describes a particular performance aspect of a skill (Buchanan & Briggs, 1998). The use of learning cues within feedback provides alignment and curricular coherence, as instruction and feedback are connected in a meaningful, consistent manner. The alignment of learning objectives, learning cues, and feedback can result in curricular coherence in physical activity lessons.

Purpose

The purpose of this study was to implement and evaluate a constructivist-oriented program to train university graduate teaching assistants (GTAs) to align three curricular elements in their planning and teaching in physical activity courses: student learning objectives (SLOs), learning cues, and teacher-provided feedback.

Research Questions and Design

The questions guiding this research were:

- (a) To what extent did GTAs implement an aligned and sequenced curriculum when teaching university physical activity courses?
- (b) In what ways did a constructivist-oriented training session and semester-long mentoring intervention enhance GTAs' ability to align SLOs, learning cues, and teacher-provided feedback?
- (c) In what ways did a constructivist-oriented training session and semester-long mentoring intervention impact GTAs' perceptions of their initial university teaching experience?
- (d) To what extent did the implementation of an aligned and sequenced curriculum impact undergraduate students' experiences in physical activity courses?

Findings from a pilot study (detailed in Chapter 3) conducted in 2015-16 at a public university in the southeastern United States guided my design for the current research. The pilot study revealed that three common curricular elements (student learning objectives, learning cues, teacher-provided feedback) that one might expect to see in a physical activity lesson were often absent or poorly articulated in GTA lesson plans and lesson implementation. These results informed the purpose of the primary study.

The primary study utilized a research design described by Merriam (2009) as basic qualitative research, focusing on process, understanding, and meaning, rather than product. The study utilized purposeful, non-probabilistic sampling (Patton, 2002), which is commonly used in

qualitative research, and the primary participants were 11 GTAs new to the physical activity program previously observed in the pilot. The intervention in this study was not a discrete event, but an ongoing, semester-long process in which I offered training, feedback, mentoring, and support. Apart from leading a three-hour constructivist-oriented training session in the week preceding the fall semester, I observed each GTA teach on three occasions (taking field notes for the first and third and completing a departmental observation form and checklist for the second). Near the end of the semester I conducted one-on-one semi-structured interviews with each GTA and two of their undergraduate students. I also interviewed the director of physical activity instruction, as he was present at the training session and was also observing GTAs throughout the semester as part of his usual responsibilities. All interviewees were made aware of the study's purpose and research questions before interviews were conducted, and the interviews focused on relevant aspects of those questions. I analyzed the data (observation write-ups, interview transcriptions, orientation/training documents, lesson plans, syllabi) using constant comparison (Glaser and Strauss, 1967), comparing units of data (Lincoln & Guba, 1985) to each other as they were gathered to reveal similarities, differences, patterns, and relationships. Categories were utilized to describe and then interpret the data, as I drew inferences and generated responses to the research questions (Miles & Huberman, 1994).

Assumptions

Several assumptions underlied this study. The first was that qualitative research methods were best suited to answer the research questions at hand. Through analysis of interviews, observations, and documents, I feel I've arrived at a richer and deeper understanding of the impact of the training intervention than could have been achieved through quantitative methods. Inherent in this assumption were beliefs regarding the motives and actions of the participants.

I expected that the GTAs would actively participate in training activities and give fair consideration to the feedback and mentoring that I provided during the semester. I believed that the GTAs had an inherent desire to apply themselves to their teaching and to try to increase their pedagogical skill set and improve their teaching performance across the semester. I presumed this improvement to be possible – that an intervention involving perhaps five hours or less of contact time across a semester *could* be impactful, and that constructivism *could* provide an effective framework for that training. While constructivist principles have been applied successfully in teacher education, I assumed they could also be effective under the differing circumstances that GTA training/mentoring presented. I believed that the GTAs and the director of physical activity would be forthcoming and truthful when interviewed and that two undergraduate students of each GTA would agree to be interviewed, and that those students would be forthcoming and truthful and understand the questions posed to them regarding alignment, sequencing, and curricular elements. Lastly, I felt that I could collect and interpret data and present findings in a reasonably fair and balanced manner despite my direct involvement training and mentoring GTAs.

Limitations

There were several limitations inherent in the study. The primary sample was small (11 GTAs) and non-probabilistic, making it highly unlikely that it would be representative of the wider population of university GTAs. Therefore, the findings may have limited or no applicability in other settings. The study was also limited by time considerations in terms of the initial intervention (the three-hour constructivist-oriented training session) and data collection (three observations/GTA). A longer training session, or a series of training sessions, had the potential to be more impactful, but the training session was limited to a single three-hour event to align with the expectations within the department being observed and the common procedure in

most other institutions of higher education. More frequent observations also had the potential to have a greater impact on teaching practices through feedback and mentoring, but I was limited by the time available to me for data collection (one semester) for 11 GTAs. Similarly, GTAs may have continued to experience effects of the training intervention in the following semester, but those effects could not be observed or recorded, as I was no longer physically present on campus.

Definition of Terms

Alignment - the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999).

Behaviorism - a systematic approach to the understanding of behavior, focused on observable and measurable aspects of learning and the association between stimulus and the learner's response (Parkay & Hass, 2000).

Conceptual Change - the learning process whereby fundamentally new concepts and relationships between concepts are developed through restructuring elements of existing concepts (Carey, 1999).

Constructivism - a set of learning theories centered on individuals constructing their own knowledge while attempting to impart meaning to their worlds (Phillips, 1995).

Curricular Coherence - a coherent curriculum holds together and makes sense as a whole. The various aspects are unified and interconnected and a larger, compelling purpose can be perceived by learners (Beane, 1995).

Graduate Teaching Assistant (GTA) – master's or doctoral candidates who assist experienced faculty in teaching or serve as lead instructor of courses of their own (Russell, 2009).

Intersubjectivity - a social learning process whereby two individuals approaching a problem or task, each with unique personal histories and ideas, negotiate a shared understanding through intellectual and social interaction (Vygotsky, 1997).

Learning Cue - a short phrase that describes a particular performance aspect of a skill (Buchanan & Briggs, 1998).

Process Feedback - describes how well a student performs the main procedure needed to create a product, or understand/perform a task (Hattie & Timperly, 2007).

Scaffolding - a means of providing support to students allowing them to learn more than could be learned independently (Sawyer, 2006).

Self Feedback - teachers' comments about learners' traits and affect, rather than their performance. It is *not* reflective feedback that students provide to themselves (Hattie & Timperly, 2007).

Self-regulation Feedback - teachers' perceptions of how well students self-monitor, self-direct, and regulate their actions towards a learning goal (Hattie & Timperly, 2007).

Sequencing - the order in which curriculum is presented, either across one lesson (micro-sequencing) or across a semester (macro-sequencing) (Posner & Rudnitsky, 2001).

Student Learning Objectives – goals that describe the knowledge/skill outcome that an instructor attempts to foster in a given lesson (Sadler, 1989).

Subjective Warrant - an expression of one's justification for wanting to be a teacher before entering the field that considers the naïve conceptions individuals hold about teaching (Lawson, 1983; Lortie, 1975).

Task Feedback - describes the teacher's perception of how well students perform, or demonstrate understanding of, an instructional task (Hattie & Timperly, 2007).

Teacher-provided Feedback - information provided by a teacher regarding aspects of a student's performance or demonstration of understanding (Hattie & Timperly, 2007). Hattie and Timperly identified four levels of feedback - task, process, self-regulation and self.

Transfer - the ability to flexibly apply knowledge in different contexts (Bransford & Schwartz, 1999).

Zone of Proximal Development - a theoretical learning space just slightly beyond the learner's current knowledge and/or skill set. Through the use of scaffolding or other assistance from a teacher or more experienced individual, learners achieve goals that were initially slightly beyond their reach (Berk & Winsler, 1995).

CHAPTER II

REVIEW OF THE LITERATURE

In this chapter I will examine the literature relevant to the current study of a constructivist-oriented training intervention for graduate teaching assistants (GTAs) who teach university physical activity courses. Constructivism is a set of learning theories centered on individuals constructing their own knowledge while attempting to impart meaning to their worlds (Phillips, 1995). I will discuss topical portions of the constructivist literature, including its historical background as well as the core tenets of constructivism and their manifestation in teaching and learning. Next, I will summarize relevant research comparing student-centered constructivist teaching and traditional teacher-centered teaching, later narrowing the focus to constructivist teaching and teaching strategies in physical education. I will consider constructivist teacher training programs in general education and physical education. I will examine the current state of GTA training programs, and consider the role that subjective warrant may play in the attitudes and prior knowledge of GTAs who teach university physical activity courses. Finally, I will consider how GTA training for physical activity instructors can explicitly foster the pedagogical knowledge required for aligning three crucial curricular elements (student learning objectives, learning cues, and teacher-provided feedback) in a coherent manner.

Constructivism

Scholars disagree whether Plutarch (46-120) or William Butler Yeats (1865-1939) is the source for the influential quotation, “Education is not the filling of a pail, but the lighting of a fire”. In either case, this quote from long before constructivism’s birth captured the essence of

what would eventually separate constructivism from the behaviorist theories of learning that previously dominated Western education.

Behaviorism and Constructivism. Historically, behaviorism has been the learning theory that guided conceptions of effective teaching and the structuring of American public schools. Over the last decades, cognitive psychologists have posited the theory of constructivism to challenge many of the tenets widely held by behaviorists (Shuell, 1986). Behaviorism is a systematic approach to the understanding of behavior, focused on observable and measurable aspects of learning and the association between the stimulus and the learner's response (Parkay & Hass, 2000). Methodological behaviorism (Watson, 1913) focused strictly on observable behavior, giving no consideration to cognitive process. Radical behaviorism (Skinner, 1974) largely pushed methodological behaviorism aside, and while it gave consideration to hypothetical constructs, verbal behavior was considered a learned behavior that did not provide evidence of underlying mental processes (Moore, 2000). Skinner (1974), the creator of behaviorist theory, advocated analyzing behavior in terms of the events that he believed caused its occurrence. He proposed an analogy between human behavior and Darwin's theory of natural selection (Ward, 2006). Skinner posited that much as the physical environment is the arbiter of which animal behaviors are reinforced and therefore repeated (those that lead to adaptation and an improved ability to survive) and which are not (those that lead to extinction), the consequences of human behavior choices determine if those behaviors will be repeated as well. At the core of what Skinner called operant behaviorism is the concept that behavior is controlled by the variables responsible for that behavior. Operant behaviorism posits that behaviors with positive consequences will tend to be repeated and behaviors with negative consequences will not (Skinner, 1937). Behaviorist educational practices therefore focus on changing external behavior through reinforcement and repetition (Skinner, 1969). In behaviorist education the teacher is at

the center of the learning process and the sole arbiter of what is right (and is rewarded) and what is wrong (and is punished) and there is no consideration for the learner's cognitive process.

Constructivism challenged these notions and placed the focus on the individual learner rather than the teacher.

Historical Background. Constructivism evolved from the work of two major figures in learning scholarship, Jean Piaget and Lev Vygotsky. Much of Piaget's research focused on identifying and defining stages of children's development (Piaget & Inhelder, 1969). While Piaget's notions regarding specific stages of child development do not resonate with modern day educators, a number of theories he developed during this process do. Piaget felt that children learn best when they actively seek their own solutions (Piaget, 1973), countering the behaviorist assertion that they should be passive recipients of knowledge. Even observing someone else perform a task, Piaget argued, has little meaning until the learners get a chance to perform the task themselves. After making discoveries students benefit from reflecting on those discoveries and discussing them with others. For this discovery process to occur students need to be personally engaged in their learning. Piaget (1971) believed that children perceive their environment and then represent it cognitively in their minds. While a tape recorder imprints audio information faithfully, without interpretation or bias, a human listener cannot absorb a lecture or lesson in an analogous fashion. When the learners construct their own understanding of information, based on previous knowledge and experience, each student is thought to "record" a different memory of the same lecture (Resnick & Williams-Hall, 1998). Piaget (1973) also developed concepts of schema, assimilation, and accommodation, which would later serve as cornerstones of constructivism. Piaget described schema as a pattern of thought that organizes categories of information and the relationships between and among them (Tuckey & Brewer, 2003). Piaget contended that children come to learning situations with naïve conceptions –

schema (often incomplete or inaccurate) that they have developed from their life experiences (Carey, 2009). Assimilation is the incorporation of new information or experiences into one's existing schema when the new information is relatively consistent with the learner's previous conceptions. Accommodation occurs when a learner either modifies an existing schema or forms an entirely new schema in response to new information (Omrod, 2012). I will discuss conceptual change (Carey, 1985), the process incorporating assimilation and accommodation and its impact on previously-held conceptions, in greater detail below. While Piaget was primarily interested in individual children and their internal thought processes, he did acknowledge the social aspects of learning and he felt that the quality of the social experience surrounding the acquisition of new information was likely to influence the acceptance of those ideas (Rovegno & Dolly, 2006). This social aspect of learning was where the second constructivist, Vygotsky, made his strongest contributions to constructivism.

Vygotsky (1987) agreed with Piaget's notion that children construct their own knowledge and contributed the concept that all cognitive skills have their origin in social interactions – no one learns in isolation. Vygotsky saw cognitive and social development as irrevocably intertwined (Wertsch, 1985). He posited that understanding and knowledge were best advanced by interacting with others in cooperative activities (Kozulin, Ginidis, Ageyev, & Miller, 2003). Such interactions allow students to develop their own views and to construct their own knowledge, rather than simply "receiving" knowledge in one-way interactions with an instructor, as generally occurs in behaviorist learning. Vygotsky (1986) described three constructs of social learning theories that continue to resonate with constructivist educators. The first, *scaffolding*, is a means of providing support to students allowing them to learn more than could be learned independently (Sawyer, 2006). Students are at the center of the process and are able to experience sufficient freedom to hypothesize, test, and reflect, while the teacher provides

guidance and creates scenarios fostering developmentally-appropriate learning through hands-on experiences (Fosnot, 1996). Related to scaffolding Vygotsky described a second social learning process as the *zone of proximal development* (Berk & Winsler, 1995). This is a theoretical learning space just slightly beyond the learner's current knowledge and/or skill set. Through the use of scaffolding or other assistance from a teacher or more experienced individual, learners achieve goals that were initially slightly beyond their reach. Vygotsky (1997) also identified *intersubjectivity* as the third social learning process whereby two individuals approaching a problem or task, each with unique personal histories and ideas, negotiate a shared understanding through intellectual and social interaction. While neither Piaget nor Vygotsky consciously created constructivism, their work laid the foundation for what it is today.

Major Tenets of Constructivism. Today constructivism is exceptionally influential in the world of education, both in the research literature and in practical applications in classes from pre-kindergarten to the graduate level (Beck & Kosnik, 2006). However, constructivism does not provide a particular curriculum or instruction. Instead it is a set of learning theories that serve as a lens through which teaching decisions are made (Fosnot, 2005). Constructivism encompasses a varied set of beliefs and cannot be distilled into a set of rigid guidelines for teaching (Webster, 2011). However, there are common elements regularly identified in constructivist teaching. I will focus on four major tenets of constructivism: (a) learning is an active process of constructing knowledge; (b) learners construct knowledge in relation to their prior knowledge and experiences; (c) deep understanding and multiple connections between concepts support transfer of knowledge to other contexts; and (d) learning is socially constructed (Glaser, 1987; Rovegno & Dolly, 2006; Zuckerman, 2003). While these tenets often overlap, I will discuss each separately.

Learning is an Active Process for Constructing Knowledge. Piaget's (1973) notion that children learn best when they actively seek their own solutions is at the core of constructivist

beliefs (Zuckerman, 2003), countering the behaviorist assertion that successful learning can occur when students are fairly passive recipients of knowledge. Therefore, constructivists advocate a student-centered learning environment in which the teacher acts as facilitator rather than lecturer (Fosnot, 1996). Wiggins (2015) asserted that students' active involvement is fostered by real-life learning situations that they perceive as relevant to their own lives – situations that are contextual and holistic, rather than academic and piecemeal. These situations present problem-solving opportunities and promote the construction of unique, individual understandings for learners. The teacher can facilitate this process by creating lessons and activities encouraging students to explore their world, discovering and constructing their own knowledge, setting and solving their own problems, and reflecting on and thinking critically about their solutions and the thought processes that led to them (Grennon-Brooks & Brooks, 1993). Constructivists advocate fostering learner's ability to examine and assess their own metacognitive processes (Resnick & Williams-Hall, 1998). When instructors explicitly teach self-monitoring and self-regulation, students can determine for themselves whether certain personal learning strategies should be continued, amended, or abandoned (Perkins & Salomon, 1989). Constructivists would argue, however, that before teachers design *any* learning experiences they should consider the prior knowledge and experiences that students already possess.

Learners Construct Knowledge in Relation to Their Prior Knowledge and Experiences. In contrast to behaviorists, constructivists actively consider learners' prior knowledge, experiences, beliefs, and conceptions when planning lessons (Wertsch, 1997). They argue that these factors provide the lens through which learners interpret new information and experiences (National Research Council, 1999), as one cannot impart meaning without an existing frame of reference. In his attempts to delineate stages of children's cognitive development, Piaget discovered that children often entered learning experiences with intuitive

conceptions (both accurate and inaccurate) already in place (Shuell, 1986). These conceptions can be deeply embedded and difficult to change, and their continued presence can have either a positive or negative effect on learning (Confrey, 1990). Constructivists posit that learning can be maximized when students' prior knowledge, experiences, and beliefs are solicited and directly addressed (Grennon-Brooks & Brooks, 2001), describing this process as conceptual change.

Conceptual change. Conceptual change is the learning process whereby fundamentally new concepts and relationships between concepts are developed through restructuring elements of existing concepts (Carey, 1999). Constructivists describe the intuitively-created notions held by novice learners as naïve conceptions, which may be accurate, incomplete, or invalid (Shuell, 1986). One example of a commonly-held invalid naïve conception is the shape of the Earth, which children often intuitively grasp as being flat (Vosniadou & Brewer, 1992). These naïve conceptions serve as schema for children - a pattern of thought that organizes categories of information and the relationships between and among them (Tuckey & Brewer, 2003). As discussed earlier, Piaget described assimilation as the incorporation of new information or experiences into one's existing schema when the new information is relatively consistent with the learner's previous conceptions, and described accommodation as a learner either modifying an existing schema or forming an entirely new schema in response to new information (Omrod, 2012). Rumelhart and Norman (1978) revised and expanded these concepts, describing three processes: accretion (building on accurate conceptions), tuning (tweaking somewhat inaccurate conceptions), and restructuring (replacing largely inaccurate conceptions). Carey (1985) posited that two types of restructuring can be identified – weak restructuring (new information enriches and elaborates existing schema) and radical restructuring (new information results in major anomalies for the learner, resulting in a paradigm shift to an entirely new schema). Constructivist educators foster conceptual change by determining the conceptions held by students and

implementing learning activities that confront invalid and incomplete conceptions and promote accretion, tuning, or restructuring, as appropriate (National Research Council, 1999).

Constructivists seek to foster knowledge that is flexible, meaning that it can be transferred to, and applied in, other contexts (Glaser, 1987).

Deep Understanding and Multiple Connections Between Concepts Support Transfer of Knowledge to Other Contexts. Constructivists argue that behaviorist teaching methods focused on rote memorization and repetition are unlikely to produce deep understanding or flexible knowledge (National Research Council, 1999). Conversely, constructivist educators foster students' deep understanding of ideas, and ability to make multiple connections between and among concepts (Fosnot, 1996). Educators can achieve this, in part, by explicitly teaching overarching principles involved with a concept, permitting students to organize knowledge as they construct it and reorganize, reorder, and flexibly apply it as needed (Bruner, 1960). Although constructivist teaching is student centered it is teacher facilitated, involving careful planning of activities that foster deep student thought (Prawat, 1992). Constructivists suggest that deeper understanding is abetted by students' perceiving relevance and immediate applicability in what they are learning, as well as unity and clarity in the way that new information is presented (Fosnot, 1996). They assert that each learning experience should be overtly holistic with a meaningful goal at its core, which will lend relevance to the experience and provide coherence for the learner.

Coherence. Beane (1995) described a coherent curriculum as one that holds together and makes sense as a whole. The various aspects are unified and interconnected and a larger, compelling purpose can be perceived by learners. In a coherent curriculum, the teacher provides content that has immediate value to students and enables them to clearly identify the relationships between and among topics and how those topics relate to overarching learning goals. Teachers

can achieve curricular coherence by sequentially organizing learning experiences and explicitly teaching the interconnections between them, enabling students to observe knowledge accumulation. Teachers' implementation of proper sequencing and organization can foster students' examination of their metacognitive processes providing insight into *how* they are learning. Teachers can promote curricular coherence by choosing content that continually fosters a sense of purpose and meaning for students, enabling them to explore, making sense of their experiences, and constructing knowledge. The tenets of constructivism and curricular coherence are tightly intertwined and often overlap, and an overarching goal of a coherent constructivist curriculum is promoting transfer.

Transfer. Transfer is the ability to flexibly apply knowledge in different contexts (Bransford & Schwartz, 1999). Constructivist teachers can promote knowledge flexibility by connecting and organizing chunks of information around specific concepts and principles, encouraging learners to rearrange these chunks when transferring knowledge to other contexts (Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger, 1987). Similarly, Redish (2004) viewed learning as the creation of associations between concepts and posited that multiple associations promote transfer. Hatano and Greeno (1999) described transfer as the application of existing knowledge to novel problems, differentiating between horizontal learning (applying existing knowledge and associations within an existing model) and vertical learning (creating a new model through the rearrangement of existing associations). Constructivist teachers value transfer as an educational goal and can promote it by facilitating deep understanding of the material and its underlying and abstract principles. Teachers can scaffold transfer by guiding students through knowledge applications in different contexts and explicitly teaching the conditions under which a given concept or principle can be applied in a fresh context (National Research Council, 1999).

Scaffolding reintroduces the social construction of learning, the final tenet of constructivism that I will address.

Learning is Socially Constructed. Vygotsky's (1986) assertion that all learning is socially constructed resonates strongly through constructivist teaching methods, encouraging both teacher-student interaction and peer interaction. Through peer dialog students learn to synthesize and summarize their own ideas, explicitly making their points to each other as they explain and justify their beliefs (Slavin, 1996). Social learning allows students to arrive at a deeper understanding of concepts because they have talked through them, increasing their chances of retaining the material. Vygotsky's (1997) concept of intersubjectivity is promoted in constructivist teaching, as students bring unique schema to the learning experience which can be relayed to their peers through social discussions, debates, and negotiations (Dean, Hubbell, Pitler, & Stone, 2012). Students may achieve deeper understanding by weighing the differing opinions and viewpoints of their peers. At this point I will consider concerns regarding constructivism that have appeared in the literature.

Concerns Regarding Constructivism. Constructivism has grown increasingly influential in the realms of educational theory and practice. Fensham (1992) described the constructivist view of learning as the largest psychological influence on science curriculum. Fosnot (1996) pointed out that most contemporary reforms advocated by national groups of educators were based on constructivist theory and that teacher education standards were heavily influenced by constructivist concepts. The sweeping implementation of constructivist teaching methods, particularly those related to radical constructivism (Von Glaserfeld, 1987), however, raised concerns for some scholars (Matthews, 2002). Radical constructivism is a dramatic rethinking of the concept of knowledge, suggesting that a purely objective representation of reality was not possible, as there are no means to access an observer-independent world (Von

Glaserfeld, 1987). Therefore, the lack of a rationally accessible extra-experiential reality causes one's "world" to be drawn strictly from one's experiences. Thus learners pragmatically construct knowledge that is viable in relation to their experience, not in relation to an inaccessible reality. However, dissenters argue that radical constructivism is a relativist doctrine, in which organizing one's own world has replaced striving for ontological reality (Fleury, 1998; Wheatley, 1991). Suchting (1992) suggested that constructivism confuses belief with knowledge and that even mass agreement brought about by social knowledge construction is of little value without an ontological anchor. He provides the once widely-held notion that the sun rotates around the earth as an example of fallacious socially-constructed knowledge.

In addition to concerns regarding the perceived relativism of constructivist theory, some scholars questioned the practicality of singular implementation of constructivist teaching practices. Confrey (1990) pointed out that educators adhering to constructivist teaching methods rigidly avoid direct transmission of knowledge, even with curricular material that did not lend itself in any viable means to experiential learning. Confrey discussed the impracticality of teaching abstract concepts via constructivist means, or teaching in the cellular, molecular, or atomic realms, in which school laboratory equipment could never sufficiently provide experiential learning. Confrey suggests that direct teaching may be an educator's best option under certain conditions. While constructivism has taken deep root in education theory and practice, some concerns remain.

Summary of Behaviorism and Constructivism. In summary, behaviorism and constructivism have strongly influenced educational teaching and learning over the last century. Behaviorism is a systematic approach to the understanding of behavior, focused on observable and measurable aspects of learning and the association between stimulus and response made by the learner (Parkay & Hass, 2000). In contrast, constructivism is a set of learning theories

centered on individuals constructing their own knowledge and imparting meaning to their world (Phillips, 1995). Constructivism evolved from the work of two major figures in learning scholarship, Jean Piaget and Lev Vygotsky. Four major tenets of constructivism discussed were: (a) learning is an active process of constructing knowledge; (b) learners construct knowledge in relation to their prior knowledge and experiences; (c) deep understanding and multiple connections between concepts support transfer of knowledge to other contexts; and (d) learning is socially constructed (Glaser, 1987; Rovegno & Dolly, 2006; Zuckerman, 2003). Constructivist educators foster conceptual change, the learning process whereby fundamentally new concepts and relationships between concepts are developed through restructuring elements of existing concepts. Teachers promote conceptual change by examining the conceptions held by students and implementing learning activities that confront invalid and incomplete conceptions and promote accretion, tuning, or restructuring, as appropriate (National Research Council, 1999). Curricular coherence is tightly intertwined with constructivist teaching. A coherent curriculum is one that holds together and makes sense as a whole, in which various aspects are unified and interconnected. Learners can perceive a larger, compelling purpose in a coherent curriculum (Beane, 1995) and constructivist teachers actively promote transfer, the ability to flexibly apply knowledge in different contexts (Branford & Schwartz, 1999). Despite the concerns of some scholars, constructivism is exceptionally influential in the world of education, both in the research literature and in practical applications in classes from pre-kindergarten to the graduate level (Beck & Kosnik, 2006) and provides the theoretical framework for the current study.

Research on Constructivist Education

In this section I will examine four studies comparing constructivist teaching methods to traditional, lecture-based, counterparts in college/university settings. Taken together, these studies

support the efficacy of teaching practices informed by the four major tenets of constructivism discussed above. I will highlight evidence of these teaching practices as I summarize each study.

Viiri (1996) compared the efficacy of student learning of the force concept in a traditional course and one informed by constructivist principles. First-year engineering students at Finnish technical institutes participated (N=369). The constructivist course's framework mirrored that of the traditional course (lecture, without a student-centered aspect). However, the curriculum was designed to achieve the constructivist goal of confronting naïve conceptions that first-year students tend to hold (some of which are contrary to the laws of Newtonian physics). Students in the constructivist course demonstrated better understanding of one aspect of the force concept (dominance) but retained their non-Newtonian (in other words, naïve, incomplete, or inaccurate) conceptions of the other aspect (impetus) in a manner similar to students in the traditional course. Viiri hypothesized that while focusing on students' pre-conceptions in designing a course may promote learning to a degree, combining that approach with a student-centered facilitation (such as group discussions, or experiential learning) might be the optimal approach for confronting students' naïve conceptions of the force concept. These findings support the constructivist teaching practice of eliciting students' prior knowledge and confronting naïve conceptions that are invalid, inaccurate, or incomplete. The constructivist course material was specifically designed to address naïve conceptions and resulted in better understanding of one aspect of the force concept.

Lord (1999) compared traditional teacher-centered and constructivist student-centered teaching methods in an undergraduate environmental science course. He taught two sections of the course (total student enrollment, n=91) in a traditional, lecture-based fashion and two sections (n=90) in a constructivist manner that involved students working in groups of four on thought-provoking scenarios, critical-thinking questions, and concept maps. The sections met for equal

amounts of time and initial grade point average and gender breakdown were essentially identical in the two groups. Lord utilized the “5 Es” method (Bybee, 1993) in the constructivist sections, creating lessons that included engagement, exploration, explanation, elaboration, and evaluation. There was essentially no lecture element, as most discussions were student directed and the teacher primarily acted as facilitator. Near the conclusion of each class meeting, one randomly-chosen representative from each group of four students took a short quiz, with all group members receiving the resulting grade. Groups were allotted time to review material to prepare for the quizzes, which resulted in the students explaining the material to each other. Across the semester the instructor administered three exams and grades were significantly higher in the constructivist sections (9%, 11%, and 15% higher, respectively). A standard semester-end university course evaluation revealed that the majority of the students in the traditional sections found the course to be “very hard and overly exacting”, while the majority of the students in the constructivist sections thought the course was “interesting and enjoyable”. A small number of students in the constructivist sections did express some concerns, however, including the belief that the class moved more slowly than it needed to, given the material. Perhaps the most relevant finding was that scores were nearly equal on exam questions that involved simple recall, but the constructivist sections far outperformed the traditional sections on questions requiring interpretation, analysis, and critical thinking. These findings support three of the constructivist teaching practices under discussion. The design of the constructivist sections caused students to be more actively engaged in the learning process, constructing rather than receiving knowledge, and this practice correlated with higher exam scores. Students in the constructivist sections demonstrated deeper understanding of the material, based on their performance on questions requiring interpretation, analysis, and critical thinking. Lastly, the efficacy of fostering social construction of knowledge

was supported by the higher exam scores in the constructivist sections in which group interaction was an integral practice.

Christianson and Fisher (1999) compared undergraduate student learning of diffusion and osmosis in three classroom settings – two traditional large lecture (hundreds of students)/small laboratory (up to 24 students) classes and one smaller class (n=30) that used a discussion-based format informed by constructivist theory utilizing inquiry teaching and discovery. The researchers administered the Odom and Barrow Diffusion and Osmosis Diagnostic Test (Odom & Barrow, 1995), a validated instrument developed using constructivist theory (naïve conceptions commonly held by students were used as distractors) as a pre- and post-test. Students completed this instrument by answering paired questions, the first dealing with content and the second examining the student's reasoning behind choosing a given response to the first question. The paired questions provided insight into learners' cognitive processes and deeper understanding. While there was no significant difference in pre-test scores, the constructivist class significantly outperformed the other two classes on the post-test, particularly on questions requiring complex reasoning. It should be noted that there were many uncontrolled variables in this study, including different amounts of time devoted to the course (the constructivist class met for additional time and communicated via a software package outside of class), different topics being covered in each curriculum, and a large difference in student/teacher ratio. The authors suggested that these variables be taken as a cluster indicative of a constructivist approach to teaching biology and that their study supports the belief that these methods promote deeper understanding (although they felt that breadth may need to be sacrificed to achieve depth). These findings support the use of constructivist teaching practices (in this case, inquiry teaching and discovery) that foster an active learning process and construction of knowledge. They support the constructivist teaching practice of eliciting students' prior knowledge and confronting naïve conceptions that are invalid,

inaccurate, or incomplete, as common naïve conceptions were an integral feature of the testing instrument. Lastly, the constructivist students' superior performance on questions requiring complex reasoning supports the constructivist practice of fostering deep understanding and the paired-answer method utilized in the testing instrument supports the practice of overtly teaching learners to reflect on their metacognitive processes.

Yuen and Hau (2006) compared the efficacy of teacher-centered and constructivist teaching methods for student learning in a single undergraduate educational psychology course, examining the learning processes and higher-level learning outcomes related to each method. A lesson was considered teacher-centered if the teacher was the sole source of information and provided no opportunity for student input. Conversely, constructivist lessons focused on students actively solving authentic and relevant problems through teacher-student and peer interactions. A class of 74 students participated and data included 68 individual interviews, researcher observation of all class meetings, and student assignments. The data were qualitatively analyzed for student knowledge gain and the retention and use of relevant knowledge. Students demonstrated superior ability to recall information, offer critiques, and generate ideas when material was taught in a constructivist manner. The authors suggested that constructivist teaching promoted deeper processing of the material and better activation of the students' prior knowledge. They also hypothesized that the superior performance was caused in part by the similarity between the structures of the students' knowledge construction and the manner in which the knowledge was applied or transferred to tasks. These findings support all four constructivist teaching practices under discussion, as the constructivist lessons fostered active learning, utilized students' prior knowledge, promoted deep understanding and multiple connections of concepts, and provided opportunities for the social construction of knowledge, resulting in superior ability to recall information, offer critiques, and generate ideas. These studies provide evidence for the

efficacy of constructivist teaching methods. At this point I will narrow the focus of the constructivist teaching discussion to the realm of physical education.

Constructivist Teaching in Physical Education

Constructivist teaching methods have been increasingly utilized in physical education settings (Rovegno & Dolly, 2006). In this section I will describe four physical education curricular models informed by constructivism – the Movement Approach, Sport Education, Sport for Peace, and Teaching Games for Understanding (TGfU), and consider how constructivist principles are manifested in each.

The Movement Approach (Hoffman, Young, & Klesius, 1981; Logsdon, Alleman, Clark, & Sakola, 1986; Rockett & Owens, 1977) represented a major departure from traditional team-sport-based curriculum. The Movement Approach is not a single curricular model, but a series of divergent models with similar principles that focus on developmental movement in a variety of games, dance, and gymnastics contexts (Rovegno, 1992a). In the Movement Approach activities are designed to promote success for all students, rather than just highly-skilled ones who often dominate in a traditional curriculum. Apart from improving motor performance, goals include students gaining cognitive understanding and affective appreciation of the meaning of movement. Core constructivist principles include students being independent learners who solve movement problems through exploration and experience, and teachers facilitating deeper understanding by asking open-ended questions to guide students through the process of constructing their own knowledge. In the 21st century, The Movement Approach continues to be widely used, particularly in elementary and middle school physical education (Allison & Barrett, 2000; Graham, 2008; Graham, Holt/Hale, & Parker, 2004). These curricula focus on movement themes – groups of movements that can be applied in a wide variety of games, gymnastics, and dance contexts, rather than movements taught only within the isolated context of a given sport (Chen,

Rovegno, & Iran-Nejad, 2002). The theme approach fosters learners' ability to deeply understand and apply skills in different and novel contexts, which promotes transfer of knowledge.

Sport Education (Siedentop, 1994; Siedentop, Hastie, & Van de Mars, 2004) and Sport for Peace (Ennis, 1999) are two constructivist curricular models in which social learning plays a primary role. Sport Education is a curriculum model that provides authentic and educationally rich sport experiences within a physical education setting (Siedentop, 1994). Sport for Peace incorporates the structure of Sport Education with peace education theory (Carson, 1992), resulting in a curriculum centered on self and social responsibility (Ennis, 1999). Both models focus on students socially constructing knowledge in groups with the teacher acting primarily as a facilitator. In each of these models, students are collectively responsible for creating a learning and playing environment that is interdependent, and social aspects (treating all participants with respect and valuing their contribution to the class regardless of their level of sport skill) are deeply valued. In both models experiential engagement is extremely important and the social skills of negotiation and reconciliation are of immediate value to the students and can be transferred beyond physical activity settings to social situations involving teamwork and compromise. Experiential engagement is facilitated by the teacher allowing the students a degree of autonomy (something rarely seen in traditional behaviorist teaching models) and providing them the opportunity to resolve their own issues.

TGfU is perhaps the strongest manifestation of constructivist teaching and learning in physical education across all three learning domains (psychomotor, affective, and cognitive). TGfU is a physical education curricular model that facilitates a deep, holistic understanding of games through the use of social interaction and the fostering of higher order thought (Bunker & Thorpe, 1982). Kirk and MacPhail (2002) described the constructivist underpinnings of TGfU, noting that teachers consider students' prior learning and experiences, as well as their current

developmental level, modifying activities accordingly. Learners are actively engaged (both mentally and physically) and solve problems through social interactions (primarily group discussions). TGfU is student centered but teacher facilitated, as teachers are challenged to design specific tasks that guide the independent explorations of their students and focus students' attention on tactical concepts within various activities. In TGfU games are rarely played in the traditional manner, as team size, playing area, scoring systems, and rules are modified to pinpoint and promote specific learning objectives. Light and Fawns (2003) described the constructivist nature of TGfU, specifically the action/discussion cycle that facilitates analysis, reflection, and critical thinking (game play is followed by group discussion that fosters cognitive processing of the strategies central to the day's lesson). In TGfU the teacher facilitates group discussion by asking open-ended questions about how and why strategic choices are made. Rather than practicing sport skills in isolation (as a behaviorist class might), TGfU focuses on learning skills in a more holistic manner and in a more natural setting (but one that has been modified from the "real game" in order to facilitate learning). In TGfU teachers foster flexible knowledge, as students learn to apply skills in a wide variety of game contexts specifically designed to promote critical thinking, which in turn promotes transfer of knowledge. While the four physical education curricular models I've discussed are unique in many ways, they all share underlying constructivist learning principles.

Research on Constructivist Teaching in Physical Education

Ennis (1991) described how two expert physical education teachers used inductive and deductive strategies to encourage student metacognition in their elementary classes. Both teachers used the movement-oriented physical education curriculum that combines Laban's movement framework with mechanical principles that are typically applied in elementary school science (Logsdon et al., 1986). Metacognitive skills were explicitly taught, including attention

focusing, information gathering, information organizing, comparison, and analysis. Teaching these skills in a content-general manner may promote transfer to other disciplines, reinforcing learning strategies used in other classes and enabling physical education to make a strong contribution to students' cognitive development. Students created movement patterns integrating basic locomotor skills (jumping, hopping, leaping) into sequences. The teachers provided students with learning cues - short phrases derived from critical elements of the skill - for each movement, which also served as criteria for good performance. The teachers routinely focused student attention on the movement patterns, prompting gathering of information for self- and peer-assessment. The students used the criteria learning cues to analyze performance and suggest potential improvements. The teachers encouraged student conclusions regarding strategies related to the movements and useful ways to categorize movements. The teachers employed scaffolding to enhance students' metacognitive skills of performance self-monitoring and self-regulating. The teachers used deductive strategies (providing the students with the common learning cues for basic locomotor skills) and inductive strategies (such as asking open-ended questions about successful strategies for dodging using locomotor skills). This study illuminates a key component of student-centered teaching that is sometimes misunderstood. Ennis pointed out that while the individual students, their unique previous experiences, and their means of constructing knowledge are at the center of the lesson, this is by no means laissez faire teaching. The teachers were challenged to structure tasks that explicitly taught metacognitive skills and continually drew the students' attention to key elements in the monitoring and regulating processes. The findings illustrate the application of numerous constructivist teaching methods in a physical education setting, particularly in regards to active learning, deep understanding via metacognitive analysis, and the social construction of knowledge through peer interaction.

In a qualitative case study, Ennis (2008) considered curricular coherence in one elementary school physical education program. She examined student perceptions of curricular coherence and its influence on their value of the content, and considered how teachers can design a coherent physical education curriculum that connects with and engages students. Ennis observed numerous lessons in two units, “ball skills” and “Scooter City”, and noted that many students saw limited utility and relevance in the first unit, feeling that the ball skills were transferable only to playing basketball. The “Scooter City” unit involved replications of a number of aspects that students found immediately relevant in their own lives, including negotiating city traffic, earning money, and deciding where and how to spend it. Students placed greater value on the “Scooter City” unit because of its relevance to their current experiences. Ennis concluded that coherent curriculum should demonstrate imaginativeness, usefulness, and a web of connections. She posited that students should be able to imagine a learning activity within a particular context and find it useful beyond the immediate educational setting. She pointed out that students’ valuation of curriculum is often independent of teacher’s intended valuation and knowledge that is immediately applicable to students’ current situations is likely to be most valued. Finally, she suggested that the topics raised in any given lesson or unit should resonate together for the students, rather than be interpreted as disconnected entities. Ennis’ findings align with Beane’s (1995) description of a coherent curriculum and demonstrate the relevance of coherence in physical education curriculum.

Dyson (2002) conducted a case study that focused on one particular aspect of constructivist teaching, cooperative learning. Dyson explored the teacher perspective and student responses to a cooperative learning program in elementary physical education. In accordance with the constructivist principle that social skills must be explicitly taught, the unit focused on positive interdependence, individual accountability, face-to-face interactions that promote

learning, interpersonal and small groups skills, and group processing. Based on the work of Perkins (1999), the curriculum focused on developing each student as an active, social, and creative learner. Dyson (2002) conducted a pre-interview with the teacher, gathering biographical data and information on previous teaching experiences, and a post-interview investigating the teacher's perceptions of the program implementation. Dyson concluded that cooperative learning promotes a more holistic curriculum across the three traditional learning domains (psychomotor, affective, and cognitive). Dyson observed that motor skills were enhanced by learning cues – short phrases derived from critical elements of the skill. Students commented that the alignment of goals and learning cues enabled effective peer feedback. Students were able to determine when peers were meeting performance goals and they provided reinforcing and/or prescriptive feedback. Dyson found that rote memorization of learning cues was not in itself effective. He concluded that students being actively and cognitively engaged when observing their peers' performance fostered improved motor skills via social interaction. Dyson suggested that cooperative teaching may take longer to establish and implement than traditional physical education. He added that teachers must feel comfortable relinquishing a degree of control for cooperative methods to foster deeper understanding. Dyson's findings support constructivist principles regarding the efficacy of social learning for promoting deeper understanding as well as illustrating how learning cues, goals, and effective feedback can be aligned to foster learning in physical education.

Chen and Cone (2003) described how students' critical thinking skills regarding movement were inspired and elicited by an expert teacher in 16 dance lessons via task design, task presentation, and instructional strategies. This study offers strong support for student-centered teaching requiring more involved and creative planning than traditional teacher-centered instruction. The use of creative dance is especially pertinent, since the elementary school

children observed would likely be unable to create meaningful movement without instructional strategies and scaffolding from their teacher and would potentially have their free expression muted by traditional behaviorist teaching methods. The researchers found that scaffolding that included sequential open-ended tasks and learning cues enabled students to create original and divergent movements and to refine the quality of their dance and expression. The data support the constructivist tenets that critical thinking needs to be explicitly taught and that optimal learning occurs in the zone of proximal development (Vygotsky, 1986), but effective scaffolding is required for challenging goals to be met.

Chen and Cone (2003) called for an overarching instructional strategy involving the sequencing of learning tasks to promote curricular coherence. Each task that follows another needs to be connected in a logical way that is apparent even to young children. They found that in the movement responses' refinement stage, teacher feedback utilizing learning cues and imagery is crucial to success and these cues and imagery should harken back to already-provided instruction to foster coherence. Feedback was found to be most beneficial when it reflected the open-ended nature of the task. For example, when the students created and refined their own "spaghetti dance", the teacher's feedback was open-ended (asking the students to determine if their bodies looked like uncooked spaghetti and how this could be accomplished) and revisited the imagery that was presented earlier in the lesson. The researchers concluded that the alignment of open-ended tasks, learning cues, and instructional scaffolding led to divergent and original movement responses that the students could not have created on their own, or in a teacher-centered learning environment. Chen and Cone (2003) concluded that the children's movement responses were a product of the design and employment of specific instructional strategies and that manipulation of task constraints (such as limiting variables to focus the students' attention) and the use of learning cues were crucial to optimal learning. These findings

support the efficacy of constructivist principles regarding learning being an active process of knowledge construction centered around learners and the principle that knowledge is socially constructed. The findings also reinforce the efficacy of learning cues.

Instructional scaffolding was the primary focus when Chen, Rovegno, Cone, and Cone (2012) described how a second-grade class was taught to design games that integrated movement and mathematics. A physical education teacher and classroom teacher worked together with 20 students using a curriculum based on constructivist principles, which were manifested in a logical progression of tasks, multiple instructional techniques, and a learning objective that was meaningful to the students. Scaffolding was provided throughout the unit (five lessons in the gym coupled with one in the classroom) and took the form of constraining tasks, modeling solutions, and routinely prompting children to complete the task. The unit began with an exercise designed to elicit prior knowledge while simultaneously providing scaffolding for the next step in game design. Students were prompted to write down movements they were already familiar with in one column and mathematical terms they knew in another. The teachers then prompted the students to experiment with combining movements and mathematical terms. The students performed this activity in groups and after experimentation and teacher feedback they were prompted to refine their games. As with other studies discussed above, a great deal of preparation went into the creation of student-centered activities in which student independence and creativity could be maximized. The teachers explicitly taught and modeled a variety of social interaction strategies, including discussion techniques, how to ask peers questions, and how to provide cues. The teachers created an extensive list of scaffolding strategies that allowed for feedback to remain open-ended in nature, such as asking students to explain their game, asking neutral questions that fostered student reflection, and providing suggestions to maximize social cooperation (taking turns, changing roles, and making certain that everyone in the group participated). Experienced,

expert teachers using extensive preparation were able to create student-centered lessons that adhered closely to constructivist principles and led to a more meaningful learning experience and a deeper level of understanding.

Chen and Rovegno (2000) compared the constructivist teaching practices of three expert and three novice physical education teachers during a set of three elementary school dribbling lessons taught by each. The researchers developed and validated the Education Games Observation Rubric (EGOR) specifically for this study. The constructivist teaching strategies (all teachers in the study used a constructivist curriculum) measured by the rubric included engaging students in exploratory, self-regulated, and cooperative learning activities as well as prompting student-centered practices including deciding their own tasks and objectives, generating their own questions, and seeking their own solutions. Further strategies included asking thought-provoking open-ended questions that foster critical thinking, guiding students to elaborate on their thoughts, structuring learning around a “big picture”, guiding students to work together, and creating learning experiences that activate prior knowledge while being meaningful to students’ daily lives. The researchers found that novice teachers could encourage students to discuss and share their ideas about movement tasks, but expert teachers were far more likely to facilitate self-regulation and critical thinking and to link new learning to prior knowledge and emerging relevance. Expert teachers also demonstrated strategies for guiding students’ social interactions, while novice teachers were more likely to put students into teams and assume that teamwork would naturally follow. As in Ennis’s study above (1991), expert teachers were able to guide and facilitate students’ ability to self-regulate, a major component of metacognitive processing. Expert teachers were also able to demonstrate connections between acquiring knowledge and applying it and could actively facilitate social construction of knowledge.

Chen and Rovegno (2000) conducted two interviews with each teacher. In the first interview, held before the dribbling unit began, the researchers inquired about the teachers' backgrounds and their beliefs about teaching, learning, and teaching practices (in constructivist terms, the teachers' prior knowledge was elicited). In the second (post) interview, teachers described their rationale for their strategies for providing students with opportunities to be responsible for their own learning, their construction of planned learning experiences that built on students' prior knowledge and current skill levels, and their guiding of students through cooperative interactions. Novice teachers were much more likely to provide direct feedback (such as a reminder to not slap at the ball while dribbling) than to foster the students' metacognitive process by asking open-ended questions. Expert teachers allowed students to create their own dribbling obstacle courses while novice teachers maintained control over activities. The implications of the study suggest that physical education teacher education programs can use scaffolding to promote pre-service teachers' constructivist teaching methods fostering student self-regulation, guiding students to reflect and think critically, linking previous student experiences and prior knowledge to new information, and explicitly guiding students to cooperate with each other. While this study was not specifically about constructivist teacher education practices, it does act as a lead-in to that discussion.

Constructivist Teacher Education

College and university teacher education programs grounded in constructivist principles have grown increasingly commonplace (Beck & Kosnik, 2006). Richardson (1997) pointed out that constructivist approaches to teaching and teacher education are predominant in scholarly and practitioner journals. While traditional teacher education methods take a behaviorist approach, tending to indoctrinate new teachers into the profession in a regimented fashion, constructivist teacher education facilitates pre-service teachers constructing knowledge based on their

experiences, before and during the program. In these programs teaching candidates do not passively receive pedagogical knowledge, they actively control their own development as teachers (Beck & Kosnik, 2006). The major tenets of constructivism already discussed in this review provide much of the framework for these teacher education programs and I will now consider those tenets as they apply within that framework.

Learning is an Active Process of Constructing Knowledge. Piaget argued that observing someone else perform a task has little meaning until learners get a chance to perform the task themselves (Piaget, 1973). It is a constructivist belief that experience is irreplaceable when actively constructing knowledge, a point made by John Dewey nearly 80 years ago (Dewey, 1938). Dewey explained that principles (such as those introduced in a teaching methods course) remain abstract until they are put into practice by the learner and resulting consequences can be assessed. While traditional teacher education tends to follow a pattern of students studying theory first then applying it later, constructivist approaches integrate theoretical study and practical application (Beck & Kosnik, 2006). This holistic approach fosters deeper, more meaningful resonance of teaching theory for novice teachers, promoting experimentation while putting theory into practice and assessing the results. This approach also serves to remind teaching candidates that teaching theory and practice are open to constant reflection, modification, and refinement (Cothran, 2001). Napper-Owen (1996) noted a gap between novice teachers knowing “that” (understanding a pedagogical technique) and knowing “how” (being able to put that technique into practice). Shulman (1987) posited that practical pre-service teaching experiences lead directly to gains in pedagogical content knowledge – the teacher skill set that blends knowledge of subject matter, *how* to teach, and how students learn. Rovegno (1992b) asserted that the abilities to provide content-specific feedback to students and break down tasks into easily-learned chunks result more from practical experience than from classroom instruction.

In short, teaching candidates in constructivist teacher education programs construct their knowledge of teaching primarily *by teaching*. Like all novices entering a new learning situation, teaching candidates bring previous knowledge, experiences, and conceptions to their teacher education training.

Learners Construct Knowledge in Relation to Their Previous Knowledge. Much as children begin kindergarten with naïve conceptions about the rising and setting of the sun (Vosniadou & Brewer, 1992), pre-service teachers enter their new role having experienced a great many teachers, often forming their similarly intuitive notion of “good teaching” based on these experiences. Schoonmaker (2002) pointed out that these previous experiences are both positive and problematic for new teachers. They can be a useful reference point and a source of worthwhile information, but they can also cause new teachers to self-limit their style or approach to teaching. Kirk (1988) described the “residual ideologies” that novice teachers bring from their experiences as students and how the mindset created by past experiences can influence faith in the viability of alternative approaches. Novice teachers often emulate the approach of someone who has taught them (Lortie, 1975). Just as kindergarteners may be reluctant to accept that it is the Earth’s movement causing the sun to “set”, novice instructors may be equally reluctant to deviate from patterns of teaching they grew up with, even if they are presented with evidence that other methods are more effective (Rovegno, 1992b). Constructivist teaching methods call for naïve conceptions to be confronted (Vosniadou & Brewer, 1992) and the same holds true for constructivist teacher education. Samaras (1998) described an assignment for teaching candidates in which they provide their notions and doubts about teaching and discuss influential teachers or critical incidents that have helped to form their notions of teaching. This reflective exercise allows novice teachers to examine their personal history and better understand how their concepts of teaching have evolved. Behaviorist approaches suggest that teaching candidates’ previous

experiences can be disregarded and overwritten by theories and practices taught and reinforced in a teacher education program. Conversely, in constructivist approaches, those existing conceptions are thought to play a major role as novice teachers negotiate and construct their own vision of themselves as teachers (Wright, 2001). Curtner-Smith (1997) argues, however, that teaching candidates *can* construct fresh knowledge that is in conflict with pre-existing conceptions (such as novice physical educators shunning the elitist ideology they sometimes bring from competitive athletics). The subjective warrant is an expression of one's justification for wanting to be a teacher *before* entering the field and considers the naïve conceptions individuals hold about teaching (Lawson, 1983; Lortie, 1975).

Subjective warrant. Lortie (1975) examined the socialization process that teaching candidates experience, while Lawson (1983) built on Lortie's work narrowing the focus to physical educators. In much the same way that constructivism acknowledges the role of the individual's previous life experiences, subjective warrant is an expression of one's justification for wanting to be a physical educator and one's understanding (be it naïve, incomplete, or accurate) of what that entails. Lawson argued that the socialization of physical educators does not begin when they secure a teaching position or enter a PETE program. The socialization of a physical educator is a life-long process. Those who choose to pursue teaching physical education and physical activity tend to have had many positive experiences in athletics, physical education classes, and physical activity in general and often point to specific teachers or coaches as their reason for choosing the discipline (Templin, Woodford, & Mulling, 1982). In much the same way that constructivism posits that students are never "blank slates", Lawson (1983) pointed out that aspiring physical educators are not without many preconceptions of their own.

Subjective warrant impacting GTAs. While PETE students and GTAs teaching physical activity courses are likely to have differing career goals, it is reasonable to suggest that these

students have had similar positive experiences with sports, physical education, and physical activity. They bring years of socialization and notions of what constitutes good teaching and socially acceptable behavior in a physical activity setting. Rather than the lengthy preparatory period that a pre-service physical education teacher experiences, new GTAs, today, are more likely to experience only a single day of orientation before teaching their first class, with only a portion of the orientation devoted to pedagogical methods (Russell, 2011). Once the semester is underway, GTAs often work in a vacuum, getting only occasional support and very limited feedback from more experienced faculty (Rikard & Nye, 1997). With only a modicum of pedagogical training provided to them, GTAs tend to rely on their memories of their own physical education and athletic experiences, often emulating their previous teachers and coaches rather than understanding and relying on current pedagogical methods (Lawson, 1983; Russell, 2011).

Socialization of Teachers into Physical Education. Lawson (1983) identified three stages of socialization for physical educators. The first, *acculturation*, begins as early as an individual's first exposure to physical activity and sports and continues until the individual chooses the field of kinesiology. Generally, a series of positive experiences leads to a potential interest in pursuing an area of the field. For future physical educators, *professional socialization* follows, as PETE programs provide knowledge, skills, values, and sensitivities. Upon graduation and the securing of a first job, *further socialization* occurs, as new teachers adjust to their new surroundings encountering varying degrees of discontinuity between their pre-service and in-service experiences. For GTAs lacking background in pedagogy, the second and third phases of socialization occur almost simultaneously. After a brief training period that provides a small degree of socialization regarding expectations and common practices, GTAs must quickly adjust to the realities of their teaching experience, which may or may not align with the training they just received. Templin et al. (1982) found that physical educators, on average, tend to make up

one of the most conservative disciplines, often embracing their existing practices over potential innovation. Left to function in relative isolation, it is not surprising that GTAs will often rely heavily on the methods of those teachers and coaches who have been influential in their lives (Russell, 2011).

An individual's subjective warrant, developed over a lifetime, is resistant to change, which is why Lortie (1975) suggested that biography and pre-teaching experiences may be more important than any teacher training program. Lawson (1983) asserted that successful induction occurs when a teacher's inaccurate subjective warrant is replaced by a self-image built on a fresh commitment to new ideology, knowledge, and skill. Returning to the construction of knowledge, I will now consider the constructivist goal of fostering deeper understanding and the formation of flexible knowledge that can be transferred to fresh contexts.

Deep Understanding and Multiple Connections Support Transfer to Other Contexts. Lave (1988) suggested that every teaching experience is situated – the teacher, the students, the content, and the context are interwoven and cannot be accurately considered in isolation. Teaching that is effective in one context may be ineffective in another. Therefore, it is a primary goal of constructivist teacher education to facilitate flexible pedagogical knowledge that can be effectively transferred to other contexts. Flexible, transferable knowledge can be fostered by teaching candidates constructing deep understanding and making multiple connections between teaching concepts (Rovegno & Dolly, 2006). Warner (1957) posited that with development, knowledge becomes more differentiated (details become clearer to the learner) and the connections between concepts grow deeper and more complex. Constructivist teacher educators can scaffold candidates' ability to connect concepts that are often confusing and disconnected for novice teachers, specifically by explicitly teaching broader issues and overarching principles (Rovegno, 1992b). Deeper understanding and multiple connections that

foster flexible knowledge construction are promoted by teacher education curricula and training programs that are aligned.

Alignment. Alignment is the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999). The alignment of program elements brings additional clarity to each of the separate components, presenting them in a logical and meaningful context. Similarly, a constructivist teacher promotes alignment in a semester-long curriculum or even in a single lesson. An aligned lesson breaks learning progressions into smaller steps while framing instruction logically and overtly within broader, long-term objectives (Sebren, 1995). The learning objectives in an aligned lesson are a logical extension of semester-long learning objectives, and match up with the learning activities, learning cues, and teacher-provided feedback in that lesson. The components are tied together in a logical manner that is evident to the learners (Rovegno, 1998). Students also benefit from aligned curricular materials being utilized in a logical sequence. Sequencing is the order in which curriculum is presented, either across one lesson (micro-sequencing) or across a semester (macro-sequencing) (Posner & Rudnitsky, 2001). A well-sequenced curriculum is presented in a manner in which one piece logically builds upon another. The final tenet of constructivist teacher education that I will discuss is the social construction of knowledge.

Knowledge is Socially Constructed. The social construction of knowledge is a cornerstone of constructivism (Vygotsky, 1978). Learning is often an interaction between a more knowledgeable or skilled individual and a relative novice. The more knowledgeable individual may take on the role of teacher or mentor, providing scaffolding that enables the novice to learn in the zone of proximal development (Cobb, 1994). In constructivist teacher education programs, the establishment of a social learning community consisting of university professors, cooperating teachers, and teaching candidates is crucial for success (Prawat, 1992). Such a learning

community provides social and emotional support to novice teachers, fostering risk taking in teaching and developing ownership of their learning and their identities as teachers (Beck & Kosnik, 2006). Doutis and Ward (1999) pointed out that pre-service and novice teachers also learn a great deal from their peers, and Ward and O'Sullivan (1998) described how novice teachers learn, particularly pedagogical knowledge, from their students, as these new teachers begin to discern the efficacy of their teaching practices. The alignment of teaching elements (such as student learning objectives, learning cues, and teacher-provided feedback) is part of the pedagogical knowledge that this experience helps to provide.

Research on Constructivist Teacher Education

In this section I will describe the findings of five studies related to constructivist teacher education and training, and in each case I will identify the major tenets of constructivism that findings support.

Bacon and Bloom (1995) described how a traditional graduate teacher education program was recast using holistic constructivist principles. This revision was a response, in part, to O'Loughlin's (1992) contention that the fundamental challenge for constructivist teacher educators is fostering novice teachers' ability to experience the power of constructing their own knowledge and taking ownership of their learning. It was also in response to Wiggins' (1989) call for authentic assessment of novice teachers via application of their knowledge and understanding through a real-life product, performance, or exhibition, rather than an academic exercise centered on information recall. Bacon and Bloom (1995) spearheaded an innovative teacher education program at their university with authentic assessment manifested in a portfolio graduate students created while teaching. To ensure personal meaning, students were actively involved in creating their projects based on experiences they were already passionately involved in. The program required university course work to address actual problems from the

students'/teachers' own classrooms. These projects were designed with a strong social learning component, as students interacted with university instructors, colleagues at work, and peers in class. University instructors provided formative assessment throughout the project, turning student "errors" into learning opportunities and promoting fresh insights through student reflection. The students/teachers in the program expressed a sense of ownership of their coursework and found their projects personally meaningful. These findings support the efficacy of constructing knowledge through meaningful experiential tasks that promote deeper understanding of pedagogical knowledge and the importance of the social construction of knowledge between novice teachers and university instructors (who facilitate rather than lecture).

Feiman-Nemser and Buchmann (1989) described the experiences of four elementary education students in two university teacher education programs over a two-year period. Their research was informed by constructivist principles, the authors considering the conceptual change that teaching candidates were expected to experience in their programs, the beliefs that teaching candidates entered the program with, and the subjective warrant or social knowledge construction involved. One program offered a limited field experience, while a sizable portion of the second program took place at a local elementary school where undergraduate teaching candidates observed, assisted, and eventually taught. The findings support the efficacy of the tenets of constructivist teacher education. The teaching candidates in the limited field experience program reported a lack of opportunity to apply theories described in class readings, which obscured the import of those theories. The teacher candidates' previous life experiences impacted their responses to certain assigned readings. For example, one teaching candidate interpreted a reading on disadvantaged minorities' unequal access to learning through the lens of her childhood experiences with migrant farm workers and concluded that poetry held little meaning for this socio-economic group, so perhaps it should not be taught to them at all. Two teaching candidates

equated freedom of expression with the avoidance of textbooks and in turn failed to provide any meaningful structure when assigning textbook-free creative projects to students. In general, the student teachers had difficulty aligning activities and learning objectives and seeing the “big picture” that Beck and Kosnik (2006) described as central to an aligned curriculum. Feiman-Nemser and Buchmann (1989) suggested that these shortcomings were manifestations of a lack of articulation between academic coursework and field experience. These findings support the constructivist tenets that teaching candidates’ previous experiences will impact their interpretation of course materials and that alignment of the various elements in a teacher education program into a coherent whole is crucial to student learning. The findings also exemplified the common mistaken belief that equates student-centered teaching with a lack of structure. Lastly, the findings support the belief that there is no viable substitute for hands-on experience for emerging teachers.

Florio-Ruane and Lensmire (1990) utilized a constructivist perspective in describing the experiences of undergraduate teaching candidates completing a writing methods course while teaching writing in an elementary school practicum. The researchers examined the attitudes, pedagogical knowledge, and preconceptions that the teaching candidates entered the experience with and how those factors sometimes led to frustration. The teaching candidates had had positive experiences as young students, prompting them to want to teach at an elementary level. However, the teaching candidates demonstrated minimal knowledge of how writing is learned by children, utilized limited categories for understanding the forms and functions that children’s writing might take, and considered direct instruction their primary teaching tool. Across the semester, teaching candidates became aware that most students begin to write before receiving any formal schooling – they bring naïve conceptions to the learning experience. Teaching candidates began accounting for prior knowledge and also broadened their concepts of types of

texts and purposes of writing. The teaching candidates began the semester with limited and rigid categories that focused on genres of writing, rather than purposes *for* writing. Lastly, teaching candidates became more aware that writing is a social rather than solitary process. These constructivist practices have been shown to result in more effective writing (Graves, 1983).

Florio-Ruane and Lensmire (1990) observed that transitioning from traditional, teacher-centered, approaches to writing (that most teaching candidates had experienced as students) to a student-centered, constructivist approach was often difficult. Many teaching candidates were reluctant to move away from teaching via direct instruction and were more comfortable being the recipients of direct instruction when in the college classroom as well. Teaching candidates created lesson plans that leaned heavily on modeling a particular form of writing (such as a letter) followed by students essentially replicating their model. Teaching candidates had much more difficulty with teaching function (rather than form) and many could not create exercises that provided just enough structure to achieve learning objectives without impinging on student creativity and independence. Teaching candidates were initially uncomfortable with integrating social learning into writing, despite greater opportunities for revision and interaction with an audience. Some teaching candidates viewed group work as an abdication of responsibility by the instructor (be it their college instructor, or themselves in their practicum setting). The researchers interpreted this resistance as a manifestation of the preconceptions (subjective warrant) the teaching candidates had about the writing teacher's role, based on their previous experiences as students. The course instructors confronted this resistance by creating field assignments that specifically required teacher interaction with small groups of students. The course instructors also integrated information from other courses, such as those in child development, which offered insight into the intuitive and often logical (although incorrect) manner in which young children spell. Many of the teaching candidates grew to see student "mistakes" as a window into the

students' metacognitive process, an insightful and valuable epiphany. Teaching candidates slowly became secure in giving a degree of control over to the students. The findings of this study illustrate how large a role previous knowledge and experience can play when new knowledge is formed. The teaching candidates were initially reluctant to move away from what Kirk (1988) described as the "residual ideologies" of their experiences as students, including a resistance (based on their negative preconceptions) to student-centered social learning.

Grossman and Richert (1988) analyzed self-reports of six novice teachers during their final year of college preparation and first year of teaching. The novice teachers came from three different disciplines (science, math, English) and two different teacher education programs. The researchers examined the teachers' perceptions of the types of knowledge gained from coursework and practical teaching experiences. Teachers expressed that coursework provided conceptions of the subject matter and a sense of pedagogical ideas. Field experiences provided general pedagogical knowledge such as classroom management and organization (what one teacher called "survival skills") as well as familiarity with what students commonly understand/misunderstand. While teachers stated that coursework has the potential to strongly influence their conceptions of subject matter, 55% of increased subject matter knowledge derived from field experiences. While teachers initially felt that college coursework and their high school education provided a solid background in subject matter, their content knowledge grew substantially because field experiences impelled them to have a deeper and clearer understanding of the material they taught. The teachers grew to appreciate how material that came easily to them as students could be challenging for children who were not as well versed, interested, or motivated as they had been. The researchers pointed out that many new teachers misjudge the difficulty of their chosen subject matter, basing their impressions on their own positive experiences as students. The teachers' field experiences provided understanding of students who

“don’t get it” and how variety in teaching methods can assist these learners. Some teachers expressed concern over a lack of specific means for applying theories in their coursework and commented that they were more interested in practical concerns (such as finding a workable lesson plan to implement on a given day) than in pondering theory. While acknowledging the supporting roles of coursework and theory, these findings exemplify the constructivist principle that hands-on experience is an irreplaceable aspect of teacher education. Students’ previous positive academic experiences were a temporary impediment to their ability to teach material that had come easily to them. Practical experience promoted the pedagogical knowledge necessary for teaching students of all levels of ability and motivation.

Summers and Kruger (1994) described the impact of a constructivist training program on in-service primary level teachers’ ability to demonstrate understanding of the concepts of force and energy with a scientific view. Initial interviews revealed that many teachers lacked knowledge in this area and held unscientific views similar to those of their students. Many of the teachers relied on intuitive interpretations of force and energy which led to naïve conceptions. The researchers’ goal was developing teachers’ lasting, scientific understanding of these concepts. The researchers delineated 16 profile components, identifiers of scientific understanding of force and energy. The training program was based on numerous constructivist principles, including examination of prior knowledge and preconceptions, implementation of active and collaborative learning, and use of anchoring and bridging analogies to teach counter-intuitive concepts. An anchor is a concept firmly understood by the learner and a bridging analogy shares features with the anchor and the target concept. Analogous reasoning fosters understanding of the salient features in the target concept (Clement, 1993).

Summers and Kruger (1994) utilized a four-stage training model informed by Clement (1987) and Driver (1988) which included elicitation of in-service primary-level teachers’ and

their students' views and pre-conceptions, identification of dissatisfaction with those views, generation of a better view through restructuring, and application/practice of the new views. The training resulted in all teachers moving towards scientific views of force and energy, as measured by frequency of correspondence (the percentage of the teachers' views that aligned with the scientifically-accepted view). In post-interviews conducted between 6 and 12 months after the training, many teachers described how they used the training framework with their own students when teaching science, particularly the use of initial elicitation of previous knowledge when a new set of concepts was introduced. While most constructivist teacher education research focuses on pre-service teachers, Summer and Kruger's (1994) study of *in-service* teacher training has implications for pre-service teacher training as well. These findings support the efficacy of all four constructivist tenets that I have discussed. The teachers actively constructed their new knowledge of force and energy through the confrontation of their naïve conceptions by the program instructors. The teachers gained a deeper understanding of the material through the multiple connections of bridging analogies and were aided by collaborative, social learning. Many of the teachers made practical use of their learning experience by applying it to teaching similar concepts to their students. I will now narrow the focus of research on constructivist teacher education to the realm of physical education teacher education (PETE).

Research on Constructivist Physical Education Teacher Education (PETE)

McMullen, van der Mars, and Jahn (2014) described how an optional PETE course utilizing a social constructivist framework fostered a sense of ownership of student learning and promoted deeper conceptual connections. Five pre-service teachers collaborated with the course instructor to organize, plan, execute, and promote an early morning physical activity program at a local high school. The course framework promoted ownership of learning, social knowledge construction, and active learning through an authentic (rather than academic) experience. Shortly

after establishing the framework of the course, the instructor stepped back, facilitating rather than leading. The pre-service teachers were wholly responsible for creating and implementing the program and its promotion, transitioning from passive participants to active learners.

Observations, documents, and participant interviews were qualitatively analyzed and ownership emerged as the primary theme. As hypothesized, the course's structure and the manner in which it was taught promoted ownership of learning. The pre-service teachers commented positively on the unique experience of "running" their own course and saw their peers as teammates rather than classmates. While the course instructor ceded a great deal of control, she worked diligently at facilitating student learning in a proactive, reflective, and strategic fashion. The findings support the efficacy of numerous constructivist tenets, including the active process of knowledge construction and promotion of ownership through holistic experiential learning, the role of the teacher as facilitator, and the social construction of knowledge.

Sebren (1995) described seven pre-service teachers' reflective experiences and knowledge development during a field-based elementary physical education methods course. The pre-service teachers implemented the movement approach (Logsdon et al., 1986) and met with the researcher for regular audiotaped teaching reflections. The researcher observed lessons and interviewed each teacher at the beginning, middle, and end of the semester. Sebren (1995) used Shuell's (1990) framework of knowledge development to describe the pedagogical knowledge development of the pre-service teachers. Shuell identified an initial phase of learning (marked by learners' memorization of conceptually-isolated bits of information), an intermediate phase (learners begin to conceptually interconnect information), and a terminal phase (learners integrate knowledge structures).

Sebren (1995) examined four areas of the pre-service teachers' knowledge development. She observed that their initial class management knowledge focused on maintaining control,

rather than facilitating learning (placing them at the lowest phase in Shuell's framework). Over the course of the semester the student teachers began to see how class management techniques directly impact learning. In terms of subject matter knowledge, student teachers were also at Shuell's first phase, having trouble sequencing lessons in a logical fashion, sometimes teaching a variety of motor skills in a completely disconnected manner. The pre-service teachers' coursework provided very little applicable knowledge of learners (placing teachers at the lowest phase again), but their practical experience provided a great deal of information about the common mistakes students make, students' overall capabilities, particular aspects they find difficult or easy to learn, and how they typically approach learning. One pre-service teacher was frustrated that the children, told to pause, would freeze and remain in place, when his intention was for the pause to be brief. He eventually came to understand that the children were equating his request to pause with pausing a video game (where the screen remains frozen), an example of experiential learning for the pre-service teacher. As the semester wore on the pre-service teachers began to value planning lessons based on the students' previous knowledge and their current level of skill, both of which needed to be ascertained beforehand. Sebren (1995) noted an area where little development was evident – the application of pedagogical content knowledge in the moment. The pre-service teachers struggled with analyzing and responding to the children's attempts at movement and were unable to adjust on the fly to class-wide under- or over-achievement, or to offer effective prescriptive feedback to students having difficulty. The findings illustrate the development that novice teachers using constructivist methods may encounter. The teachers' initial desire to maintain control and complete activities often supersedes realizing learning objectives and planning aligned lessons. The findings suggest, however, that over time practical experiences can facilitate achieving these teaching goals.

Rovegno (1992a) described the experiences of eight PETE students who implemented the movement approach (Hoffman et al., 1981; Logsdon et al., 1986) during their elementary practicum. She identified aspects of the movement approach model that proved problematic for the student teachers and knowledge acquisition mechanisms related to the problematic aspects. The teaching candidates' physical education student experiences had been in traditional curricula, so the movement approach represented a complex departure. Rovegno (1992a) identified what the PETE students found confusing in their implementation of the movement approach, why they were choosing to implement those particular aspects, and how they learned the problematic material in their coursework. She found that the student teachers struggled to teach beyond a surface level, having particular difficulty with deeper content objectives and the relationship between movement variety and movement quality. While the PETE students could see how movements (such as jumping) were prevalent in all dance, gymnastics, and games, they often failed to understand the different functions of movement in the three areas (movement being expressive and aesthetic in dance, aesthetic and functional in gymnastics, and functional and effective in games). This led to an inability to provide appropriate feedback for student movement.

The PETE students had been exposed to varying functions of movement in their coursework, but had not gained sufficient understanding of the concept to practically apply it. The PETE students tended to rigidly compartmentalize aspects of movement, making it impossible for them to seek both variety and quality of movement in the same lesson. When lesson planning, they focused on activities to *do* rather than objectives to *achieve* and they had difficulty creating lesson content that spoke to the overarching objectives of the curriculum. The PETE students oversimplified and overgeneralized the need for guided discovery in place of direct instruction, which they interpreted as a rigid guideline to "not tell children what to do".

The implications for PETE programs include direct confrontation of student misconceptions of the nature of guided discovery and explanations of when direct instruction may be appropriate or necessary. PETE programs can scaffold student teacher efforts to foster deeper learning and create meaningful learning objectives that are achieved through appropriate activities. While this material is covered in coursework, in practical settings novice teachers struggle to establish objectives and create activities to achieve them, tending to choose activities first followed by (often ineffective) attempts at deriving objectives from them.

Two further studies by Rovegno (1993a, 1993b) focused on other aspects of the experience of these same eight PETE students (plus four additional PETE students). In the first of these two studies Rovegno (1993a) described how students' previous knowledge of and experiences with physical education, sports, and physical activity impacted their openness to teaching a constructivist curriculum (the Movement Approach). All the PETE students had experienced traditional sports-centered physical education in their pre-college education. Since teachers, left to their own devices, tend to teach as they were taught (Tabachnick & Zeichner, 1984), the transition to teaching a more complex and interactive, student-centered curriculum involved radical restructuring. The majority of the PETE students shared that they had expressed doubts about the validity and necessity of the Movement Approach when first entering the PETE program. One overarching objective of the PETE program was to draw out the previous experience of the students and to have them critique the teaching and curriculum that they had experienced. Many of the students had not previously considered the drawbacks of a traditional program – long lines for activities, elimination of less-skilled or less-aggressive students, an elitist approach that had a universal standard for success, and a lack of attention to cognitive objectives. Through learning activities designed to stimulate critical thought, all the PETE students grew to value the movement approach over the traditional approach. For those students

who worked with cooperating teachers versed in the movement approach, their practical experience served to pull together all the pieces of the program into a cohesive whole. For those who worked with traditional cooperating teachers, they found resistance, even mocking, and their teaching approach was marginalized within their physical education departments in the same manner that physical education is often marginalized among the learning disciplines. Still, all 12 PETE students, regardless of practicum placement, found the cognitive processing ingrained in constructivist curriculum to be a crucial part of their approach to teaching. The pre-service teachers had their students think, solve problems, discover, explore, make decisions, and create their own games, activities, and movement sequences. These findings exemplify the importance of addressing previous knowledge and experience, particularly in teaching candidates. Students with positive physical education and sport histories became aware of negative experiences that lesser-skilled students endure and how a constructivist curriculum could be beneficial for all students, not just the most skilled or aggressive.

In the second of the two associated studies Rovegno (1993b) described what and how the 12 PETE students learned about teaching game play and strategy in a movement approach. Nearly all the PETE students developed partial or inaccurate conceptions about teaching game tactics within the Movement Approach. Among the reasons for these misconceptions were the overgeneralization of the contrast between the traditional and movement approaches and an overreliance on bottom-up thinking when planning lessons and unit progressions. Despite extensive coursework taken with a faculty devoted to the Movement Approach, the PETE students had difficulty developing a deep understanding that would allow them to flexibly apply the approach in a variety of teaching environments. Having been convinced that there were numerous drawbacks to the traditional approach (see study above), PETE students embraced the Movement Approach but often wound up overgeneralizing the contrast between the two. Since

team sports are the cornerstone of the traditional approach, PETE students equated team sports with bad teaching and saw them as something to be avoided. Many PETE students also saw tactics as an extensive of competition, which they felt they had been taught to avoid. While some of the student teachers saw competitive games as an opportunity for practiced skills to be applied in an authentic setting, others saw games as a reward, or as a way to stave off student boredom after practicing skills for extended periods of time. Only one student teacher saw games as an opportunity to explicitly teach basic invasion game tactics, such as moving to open space and maintaining possession of the ball. Some student teachers saw tactics as an extension of “elitist” sports and felt that only students who chose to participate in extracurricular athletics needed to be aware of them. The student teachers felt that fluency in team sports was not a goal of the Movement Approach, as they had been taught to focus on concepts and skill themes *across* sports rather than individual sports as compartmentalized units. As a result, the student teachers were ill-prepared to create unit plans culminating in concepts or skills being applied in a variety of modified sports games. The student teachers tended to identify a skill theme to teach, then choose random tasks related to the skill (a bottom-up approach), rather than first identifying the overarching goal of the unit and creating a progression of activities to achieve that goal. The findings reveal how the implementation of a constructivist curriculum can be a challenging and lengthy process for novice teachers, particularly those who possessed a subjective warrant from traditional K-12 physical education programs. The tendency to overgeneralize is a tempting option for PETE students seeking a degree of simplification when feeling overwhelmed with information when teaching in a strikingly different manner than they were taught. To this end, constructivist teacher educators strive to make the role of overarching unit goals clear and provide scaffolding to PETE students as they attempt the more challenging task of creating top-down, rather than bottom-up, lessons.

Rovegno (1998) further described how four physical educators (one experienced, two relatively new, and one student teacher) responded to problematic aspects of implementing the Movement Approach in one elementary school. Rovegno gathered data over a three-year period, including 11 weeks of observation, 15 formal interviews, and daily informal interviews in the departmental office. The three less-experienced teachers faced three problematic aspects of implementing the curriculum: knowing when to give information to children and when to withhold it, knowing the entirety of the curricular approach and how components connect, and possessing pedagogical content knowledge in sufficient depth and detail. Newer teachers were initially very concerned about providing too much information or structure which they saw as the antithesis of a student-centered approach. They often felt that they must elicit information from students using open-ended questions and failing to get desired answers they were reticent to simply provide information to move the lesson forward. The teachers were also reluctant to offer feedback, even when student-designed games did not make sense or meet learning objectives. Initially, the new teachers also struggled with connecting their lesson objectives with longer-range objectives. The student teacher in particular felt that he did not give adequate attention to the quality of student movement, as he was concerned (as novices often are) with safety, discipline, and simply keeping students on task. As the two relatively new teachers grew more comfortable with the constructivist curriculum and leaned on the more experienced teacher, they gained the ability to design activities to focus the students' attention and constrain tasks to foster learning. They also came to realize that some information could be directly related when open-ended questions failed and that teacher-provided feedback can aid constructivist learning, particularly when it refocuses cooperative tasks that have drifted away from learning objectives.

Based on these findings, Rovegno (1998) suggested six key ideas for novice and relatively new physical education teachers who utilize a constructivist curriculum. The six key

ideas were: (a, b) Ask “Why am I teaching this activity?” and “Where is it going?” in order to situate the content within the larger curriculum; (c) Look deeply into activities to see what learning content they may contain; (d) Focus on constraining tasks in which students can make decisions, explore, solve problems, or be creative; (e) Watch children carefully to study their learning process; and (f) Know that there are times to attempt to elicit information from students, but also times to simply provide it. While these ideas can be applied with in-service teachers, they also can be taught explicitly as part of a constructivist PETE program.

Rovegno (1991) described the experiences of seven undergraduate PETE students in a field-based teaching methods course. The students planned, taught, and reflected on, elementary physical education lessons while working with a teacher educator. Uniquely, there was no cooperating teacher present during any lessons. This qualitative study focused on the knowledge restructuring that the PETE students experienced. Restructuring is the rearrangement of knowledge (Rumelhart & Norman, 1978) that represents the most radical aspect of conceptual change. Reconstructing occurs when knowledge that once seemed reasonable and useful becomes unsatisfactory and a more viable explanation of a phenomenon is sought. Rovegno’s (1991) initial interview with each student delved into their prior experiences with teaching, coaching, and participating in physical activity. The open-ended questions that followed concerned how the students had come to learn about subject content, teaching, and children, as well as what concerns and beliefs they held about those three areas.

The course was almost entirely experiential as all activities had immediate application for the PETE students with the elementary school children. Interviews revealed two major structural changes in the students’ knowledge and attitudes about teaching. In early attempts at teaching, the students were content to simply get all the activities in the lesson plan completed and “survive” the lesson. They gave little to no thought to learning objectives or the effectiveness of

their teaching. Over the course of the semester the students began to actively promote student learning and to restate, refine, or simplify information that students were slow to absorb. They also began to provide feedback on student skill performance, which was another area that had gone unnoticed in “survival mode”. The second major restructuring involved how the students perceived the children, particularly those who were less eager to participate or met with less success. Initially, the student teachers felt that many students were simply lazy or misbehaving. The teacher educator helped the student teachers see the relationship between their lesson presentation and the children’s behavior. The student teachers came to realize that dull or unclear teaching presentations could be the *cause* of off-task student behavior. The student teachers, with their personal histories of positive, successful, and rewarding experiences in physical activity, came to understand the mindset of students who are less motivated and have often met with failure or frustration. The student teachers described how they grew much less judgmental and much more empathetic toward these children. These findings have implications for PETE instructors, particularly in constructivist programs. They suggest that pedagogical theory and knowledge of any degree of complexity are not likely to be actively applied by novice teachers until they evolve beyond “survival mode”. They also suggest that positive past experiences with physical activity may leave novice teachers ill-prepared for relating to less-skilled and less-motivated students and that PETE programs should confront their pre-conceptions.

Rovegno (1992b) published a second article focused on this same group of PETE students and their instructor in this methods course. The purpose was to describe what, and how, PETE students learned during their field experience, what knowledge they felt was salient, and how this knowledge developed. All seven PETE students reported that their development of pedagogical content knowledge was salient and that this development manifested itself in their evolving ability to differentiate in terms of the relationship between individuals, tasks, and the

environment. At the beginning of their experiences the PETE students focused on general content and had difficulty breaking content down into a series of progressions. While their coursework had provided them with information about teaching skills, they had difficulty predicting what the children would be able to do and what would prove untenable. They also struggled with analyzing the movement efforts of the children, failing to provide effective feedback, even with skills they were adept at themselves. The PETE students were initially only able to focus on one aspect of movement quality at a time, which limited their attempts at providing feedback. Rovegno observed that the practical knowledge the PETE students gained across the semester was situated and experiential. She suggested that there is a limit to how well coursework can prepare students to teach, since every context is situated differently. Despite the best efforts of teacher educators to bridge the chasm between coursework and practical experiences, these findings support the constructivist tenet that experiential engagement is irreplaceable. They also support the findings of the other studies I've considered here, with regards to the evolution of novice teachers' abilities. While PETE programs, regardless of their ideology, offer extensive training for future educators, graduate teaching assistants (GTAs) receive training that is far more limited and in some cases non-existent.

Graduate Teaching Assistant (GTA) Training

In this section I will discuss the evolution and current state of GTA training and then consider the impact that constructivist tenets can have on GTA training going forward. In the past 25 years the teaching responsibilities of graduate assistants have greatly expanded, in part because of increased research demands on professors (leaving less time for teaching) and increased student-staff ratios in most colleges/universities (Hopwood & Stocks, 2008). Park (2004) noted that GTAs are generally seen as acceptable alternatives to full-time faculty in certain courses, as they have a degree of subject knowledge, are inexpensive to employ, and tend to be

professionally flexible and adaptable. In return, GTAs receive much-needed funding and gain teaching experience which may assist them in securing a full-time faculty position after graduation. The term “assistant”, however, now applies less and less. Russell (2009) found that more than half of GTAs surveyed were the teacher of record for a course or courses. Bamber (2008) found that while higher education faculty and administration are in almost universal agreement that GTA training programs are a worthwhile endeavor, existing programs tend to be anecdotal in nature, lacking theoretical basis. The literature reveals, in fact, that concerns with a lack of GTA training and gaps in existing training abound.

Roehrig et al. (2003) found that more than a third of colleges/universities surveyed offered no formal GTA training and of those that did, 83% of programs lasted a single day or less. They reported that GTA training experiences, for those who get them, range from the fairly common half-day university-wide orientation session focused on institutional policies with no departmental training, to the rare ongoing university-wide training coupled with a semester-long (usually one credit) course focused on teaching practices and methods. Sharpe (2000) found similar results in the United Kingdom, as 44% of GTAs surveyed reported no training at all and more than 50% of GTAs who received training classified it as poor. Lueddeke (1997) concluded that the majority of GTAs are likely to be unprepared to teach and lack the self-confidence to do so successfully. Despite the nearly universal notion that GTA training is a worthwhile pursuit, its implementation is inconsistent both in coverage and design, and existing programs are rarely evaluated for efficacy (Chadha, 2013).

Educational administrators, scholars, and GTAs offer different ideas about what a quality GTA training program should contain and how it should be oriented. While program designers often wish to focus on theory, GTAs tend to vehemently eschew theory and prefer practical information that will abet “surviving” their first teaching experience (Chadha, 2013). Nyquist

and Wulff (1996) identified three stages of GTA development which they suggest should be considered in the design of a training program. They posited that GTAs will first have concerns about themselves (their dress, their department) and “survival”, then exhibit concerns about their teaching skills, and lastly have concerns about student learning. Isaacs and Parker (1997) suggested that GTAs will be incapable of reaching the second and third stages until they achieve a level of personal comfort in front of a class, temporarily making theory, teaching philosophies, and reflective practices relatively moot points. Sharpe (2000) proffered a training program aligned with Nyquist and Wolff’s stages, utilizing a series of checklists and management techniques to promote “survival” in initial training, followed by seminars/workshops dedicated to teaching and learning practices and finally instruction focused on student learning outcomes. Using a constructivist lens, Shosh and Zales (2007) suggested tight alignment between training and teaching experiences, fostering the parallel and intertwined development of practice and theory. Similarly, Etkina (2000) promoted constructivist learning strategies for GTA training, including the modeling of guided questioning and problem solving, the use of group assignments focused on assessing student work, and the discussion of previous teaching experiences and conceptions of good teaching. I will now consider GTA training specifically for physical activity instructors.

GTA Training for Physical Activity Instructors. GTA training for physical activity instructors greatly improves instructional effectiveness and teacher confidence when programs provide appropriate, consistent, formal, and systematic instructional support, mentorship, and evaluation (Russell & Chepyator-Thomson, 2004). Unfortunately, the literature indicates that such training programs are a rarity (Savage & Sharpe, 1998). Russell (2006) found that the majority of GTA training programs for physical activity instructors do not provide meaningful instructional developmental opportunities, effective leadership, or supervision. Rikard and Nye

(1997) found that kinesiology GTAs were often undertrained and undersupported in their teaching, leading to concerns about the quality of instruction that undergraduate students in these courses receive. GTAs themselves shared these concerns.

Russell (2009) surveyed more than 500 kinesiology GTAs and his findings reinforce concerns related to GTA training, preparedness for teaching, institutional/departmental support, and performance evaluation. The majority of GTAs (85%) perceived that they had received inadequate training and 75% taught in departments that either did not offer or did not require a course focused on teaching skills and socialization as college-level instructors. The majority of GTAs (89% and 79%, respectively) found that institutional and departmental developmental support processes had a low impact on their instructional effectiveness. Instances of supervisor support were minimal as 30% of GTAs had one formal meeting with their supervisor each semester, while 50% had met with their supervisor only once in the previous academic year. Performance evaluation was also a concern as 85% of GTAs stated that student course evaluations were their sole means of instructional effectiveness evaluation. GTAs (84%) felt that teaching experience (as opposed to training) improved their teaching effectiveness. Furthermore, they felt that their teaching and socialization were more impacted by their fellow GTAs (identified by 65% of GTAs as impactful) than departmental faculty (25%), GTA supervisors, (22%) and administration (9%). The social construction of GTAs' teaching knowledge, and the seemingly limited role that experienced educators play in it, is another area of concern.

Social Construction of Knowledge in GTA Training. In contrast to PETE programs, in which a cooperating teacher or university instructor (or both) are on site during field teaching experiences, most novice GTAs hone their teaching skills in virtual isolation after the scant training they have received. Experienced faculty have little time to mentor them and with their own obligations as graduate students, most GTAs have little time to *be* mentored (Davis &

Minnis, 1993). While witnessing the modeling of good teaching practices is crucial for would-be teachers (Bullough & Gitlin, 1995) and a sense of community where ideas can be shared and where experienced faculty are seen as resources (Beck & Kosnik, 2006) are paramount in a constructivist teacher education program, these elements are often non-existent for most GTAs. The lack of mentoring for GTAs suggests that fostering crucial pedagogical knowledge of immediate utility may be the most efficacious way to utilize the limited training time generally available. I will now consider such crucial pedagogical knowledge - the alignment of teaching components in a physical activity lesson, and discuss how this alignment can be promoted through a constructivist GTA training program for physical activity instructors.

Alignment of Teaching Components

Alignment is the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999). Here I will focus on alignment within a given lesson, rather than across a semester-long curriculum. Alignment is a goal of constructivist teaching, in part, because it promotes curricular coherence by bringing clarity to each of the separate lesson components, presenting them in a logical and meaningful context within the “big picture” (Beck & Kosnik, 2006). An aligned lesson breaks learning progressions into smaller steps while framing instruction logically and overtly within broader objectives (Sebren, 1995). There are several lesson components impacting learners’ perceptions of alignment and coherence. One component, teacher-provided feedback, is particularly influential. I will now examine the role of teacher-provided feedback, and then discuss the alignment of feedback with learning objectives and instruction, particularly within a physical activity context.

Teacher-Provided Feedback

Teacher-provided feedback (referred to simply as “feedback” henceforth) is information provided by a teacher regarding aspects of a student’s performance or demonstration of

understanding (Hattie & Timperly, 2007). Sadler (1989) described feedback as a mechanism that enables teachers and learners to fill the gap between what students currently understand and what they desire to understand. Meta-analyses by Hattie, Biggs, and Purdie (1999) and Kluger and DeNisi (1996) identified effect sizes of .40 and .38, respectively, for feedback's impact on student learning. Magill (2010) pointed out that authors of physical education teacher education textbooks routinely value feedback in the student learning process. However, the term "feedback" is very broad, and describes a complex process with a variety of levels and manifestations. Kluger and DeNisi (1996) found that feedback is most impactful when it directly reflects specific goals (such as learning objectives). Good and Brophy (1986) specified that feedback that is impactful to student learning is task relevant (related to previous instruction, such as learning cues) and non-evaluative (not attached to summative evaluations, such as a grade). These findings support the import of aligning feedback with learning objectives and instructional tasks and using it as a means of formative (rather than summative) assessment. Before discussing alignment further, I will consider the levels of feedback.

Levels of Feedback. Hattie and Timperly (2007) identified four levels of feedback - task, process, self-regulation and self, and their model (depicted in Figure 1) will provide the framework for my discussion. There is a hierarchal relationship among the first three levels, as complexity and cognitive engagement increase from one to the next. The deeper understanding that constructivist educators value is related to the second and third levels (process and self-regulation).

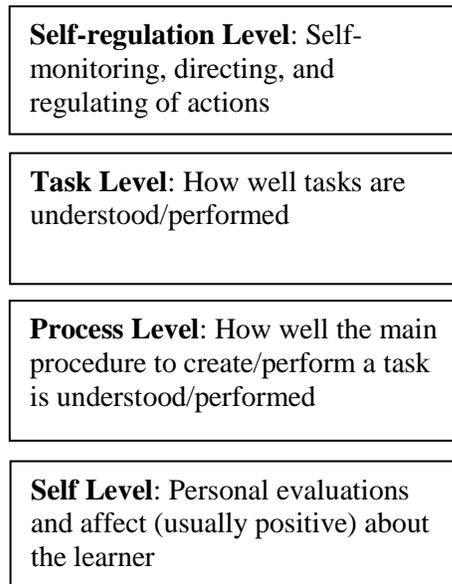


Figure 1. Hattie and Timperly's (2007) Levels of Feedback.

Task feedback. Task feedback describes the teacher's perception of how well students perform, or demonstrate understanding of, an instructional task (Hattie & Timperly, 2007). It is often as simple as the teacher identifying correct/incorrect student responses. Task feedback is more likely to positively impact student performance on simple, rather than complex, tasks (Balzer, Doherty, & O'Connor, 1989). Simple task feedback often has a more positive effect on learning than complex task feedback (Kulhavy, White, Topp, Chan, & Adams, 1985). However, task feedback is most effective when designed to spur students' higher level thinking, promoting examination of processing (such as choosing new strategies to employ) and enhancement of self-regulation. In the psychomotor domain that is central to physical education, there is rarely a correct/incorrect dichotomy for performing a physical task, particularly when the learning objective is related to the means (demonstration of proper form) rather than the result (such as making/missing a basketball shot). Therefore, task feedback alone is unlikely to fully align with

learning objectives related to the use of proper form unless it elicits questions about the *process* of performing the task.

Process feedback. Process feedback describes how well a student performs the main procedure needed to create a product, or understand/perform a task (Hattie & Timperly, 2007). It can also refer to students' ability to identify and perform underlying tasks, or to extend the given task or transfer information to related tasks. Process feedback involves deeper levels of student understanding than task feedback, and relates the task to the environment in which it is performed (Balzer et al., 1989). Process feedback can describe students' ability to construct meaning, consider relationships, and cognitively process information. In the realm of physical education, process feedback may offer information about students' ability to respond to changes in their environment (the location of the ball or opponents) or to make strategic decisions. Process feedback may also describe the efficacy of students' strategies for detecting their own errors in performance and comments on their ability to apply knowledge/skill to related or novel tasks (Purdie, Hattie, & Douglas, 1996). The creation of flexible knowledge that can be transferred to other tasks and contexts is a primary goal of constructivist education.

Self-regulation feedback. Teachers' perceptions of how well students self-monitor, self-direct, and regulate their actions towards a learning goal are referred to as self-regulation feedback (Hattie & Timperly, 2007). It includes information related to students' ability to act autonomously and to self-evaluate. It may include information about how students seek, accept, and utilize feedback (Zimmerman, 2000) and their recognition of when to seek and accept help (Butler & Winne, 1995). Self-regulation is the most cognitively complex of Hattie and Timperly's (2007) four levels and they noted that more effective learners tend to self-regulate and monitor their own performance far better than less effective learners, who tend to rely heavily on feedback from external sources. The promotion of learners' self-regulation aligns with the

constructivist tenets of learners actively constructing their own knowledge and achieving deep understanding of concepts via multiple connections. Kluger and DeNisi (1996) assert that self-regulation feedback is effective to the degree that it eventually leads learners back to applying themselves to the original task, albeit with improved strategies, error-detection, and self-management.

Self feedback. Despite what the name implies, self feedback does not describe reflective feedback that students provide to themselves. Instead, self feedback involves teachers' comments about learners' traits and affect, rather than their performance (Hattie & Timperly, 2007), such as "You are so nice". Feedback that lacks task information, even in the form of praise or extrinsic rewards, does not promote long-term learning (Deci, Koestner, & Ryan, 1999; Wilkinson, 1981). Brophy (1981) found self feedback rarely leads to commitment to learning goals, enhanced self-efficacy, or better understanding of a task. Despite its lack of efficacy, teachers continue to utilize self feedback (Bond, Smith, Baker, & Hattie, 2000), often intermingling it with (and diluting the positive impact of) task feedback. There is a strong consensus among education scholars that teachers should avoid self feedback altogether (Hattie & Timperly, 2007). At this point I will consider the alignment of feedback with learning objectives and instruction.

Aligning Feedback with Other Teaching Components

While feedback is an integral component of effective physical education lessons, it is not a panacea nor can it function in isolation. Feedback fosters student learning when it is aligned with other important lesson components and close alignment of these components promotes curricular coherence (Beck & Kosnik, 2006). In the sections below I will discuss the alignment of feedback with learning objectives and instruction.

Aligning Feedback and Learning Objectives. Sadler (1989) described feedback as a mechanism that enables teachers and learners to fill the gap between what students currently

understand and what they desire to understand. In education, what is aimed to be understood is routinely expressed as a learning goal (in the long term) or a learning objective (in the short term) – I will use learning objective in this discussion. Hattie and Timperly (2007) suggested that feedback provides answers to three crucial student questions – “Where am I going?”, “How am I going?”, and “Where to next?” It is impossible to answer these questions successfully without the statement of clear, specific learning objectives. Feedback fosters students’ ability to track their current performance (“How am I going?”) in relation to learning objectives (“Where am I going?”), promoting adjustments in effort, direction, and strategy (Locke & Latham, 1990). Earley, Northcraft, Lee, and Lituchy (1990) found that using process feedback in conjunction with setting learning objectives is a powerful way to shape students’ task strategies. Locke and Latham (1984) found that specific objectives promote learning in part because they enhance teachers’ ability to focus and direct feedback. Feedback related to objectives promote students’ goal-directed actions and leads to greater persistence in the face of obstacles (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Tortschel, 2001). Locke and Latham (1984) found that learning objectives and feedback are most effective when both include specific criteria for success. Those criteria can be presented to students via instruction.

Aligning Feedback and Instruction. Much as effective feedback is impossible without learning objectives to guide it, feedback is equally ineffective without the framing of an instructional context. Although feedback is effective when addressing students’ faulty interpretations of teacher instruction, it is of little value in response to a complete lack of understanding (Hattie & Timperly, 2007). Feedback builds on the base created by instruction (Kluger & DeNisi, 1996). A combination of appropriately challenging tasks and extensive task feedback positively impacts student engagement and achievement (Black & William, 1998). Teachers can design instruction and learning activities that naturally elicit feedback in relation to

learning objectives. They can create a learning environment that fosters students' error detection skills and self-regulation through the implementation of activities that consider students' current performance and common mistakes (Hattie et al., 1996). Physical activity instruction routinely consists of demonstration by teacher or peer, imparting of learning cues, and applied practice (Magill, 2010).

Learning cues. A learning cue is a short phrase that describes a particular performance aspect of a skill (Buchanan & Briggs, 1998). Learning cues (“align elbow and knee”, “flick your wrist”, “reach for the rim”) provide steps for achieving learning objectives (“students will be able to shoot a free throw with age-appropriate form”). They support lesson alignment by breaking learning progressions into smaller steps (Sebren, 1995). Learning cues provide a convenient framework for expressing feedback to students. Teachers can point out which cues are being properly executed and which need attention as means of answering the “How am I going?” question (Hattie & Timperly, 2007). The use of learning cues within feedback provides alignment and curricular coherence, as instruction and feedback are connected in a meaningful way to create a consistency of experience for students (Darling-Hammond & MacDonald, 2000). Butler & Winne (1995) suggested that feedback can bring learners' attention to the relationship between a cue and the probability of success if the cue is properly enacted.

Aligning Feedback Summary. Alignment is the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999). Alignment is a goal of constructivist teaching, in part because it promotes curricular coherence by bringing clarity to each of the separate lesson components, presenting them in a logical and meaningful context within the “big picture” (Beck & Kosnik, 2006). Feedback is information provided by a teacher regarding aspects of a student's performance or demonstration of understanding (Hattie & Timperly, 2007) and is a mechanism for filling the gap between what is currently understood and

what is aimed to be understood (Sadler, 1989). Hattie and Timperly (2007) identified four levels of feedback – task, process, self-regulation, and self. Task feedback describes how well students perform, or demonstrate understanding of, a task. Process feedback describes how well a student performs the main process needed to create a product, or understand/perform a task. Self-regulation feedback describes how well students self-monitor, self-direct, and regulate their actions towards a learning goal. Self feedback involves personal evaluations by teachers related to learners themselves and their traits and affect, rather than their performance, and is generally ineffective in promoting learning.

Findings support the import of aligning feedback with learning objectives and instruction (Good & Brophy, 1986; Kluger & DeNisi, 1996). Feedback fosters students' ability to track their current performance (“How am I going?”) in relation to learning objectives (“Where am I going?”) so adjustments in effort, direction, and strategy can be implemented (Locke & Latham, 1990). Feedback builds on the base created by instruction (Kluger & DeNisi, 1996) and a combination of appropriately challenging assignments and extensive feedback positively impacts student engagement and achievement (Black & William, 1998). Learning cues are short phrases used in instruction that describe a particular performance aspect of a skill (Buchanan & Briggs, 1998). The use of learning cues within feedback provides lesson alignment and curricular coherence, as instruction and feedback are connected in a meaningful way to create a consistency of experience for the students (Darling-Hammond & MacDonald, 2000). Good and Brophy (1986) determined that feedback associated with summative assessment does not promote learning, while feedback provided as formative assessment is effective. Hattie and Timperly (2007) suggest that formative assessment via feedback helps to answer the “Where to next?” question, as teachers informally evaluating and assessing students' understanding and skill informs students' strategy and skill performance adjustments. The alignment of learning

objectives, learning cues, and feedback can result in curricular coherence in physical activity lessons.

Implications for GTA Training for Physical Activity Instructors. In stark contrast to extensive PETE programs for K-12 physical educators, the majority of GTA training programs for university physical activity instructors do not provide meaningful instructional developmental opportunities, effective leadership, or supervision (Russell, 2006). Roehrig et al. (2003) found that more than a third of colleges/universities surveyed offered no formal GTA training, and of those that did, 83% of programs lasted a single day or less. While program designers often wish to focus on theory, GTAs tend to vehemently eschew theory and prefer practical information that will abet “surviving” their first teaching experience (Chadha, 2013). Wiggins (2015) asserted that learners’ active involvement is fostered by real-life learning situations that they perceive as relevant to their own lives – situations that are contextual and holistic, rather than academic and piecemeal. Therefore, GTA training must be immediately relevant to the teaching role GTAs are about to experience. In the limited time generally made available, GTA training informed by constructivist tenets explicitly fostering the alignment of learning objectives, learning cues, and feedback in physical activity lessons may provide pedagogical knowledge GTAs are likely to find meaningful and immediately applicable. Beyond simple “survival”, GTAs may also experience increased professional self-confidence and undergraduate student learning may be positively impacted.

CHAPTER III

METHOD

The purpose of this study was to implement and evaluate a constructivist-oriented program to train university graduate teaching assistants (GTAs) to align three curricular elements in their planning and teaching in physical activity courses: student learning objectives (SLOs), learning cues, and teacher-provided feedback.

Research Questions and Design

The questions guiding this research were:

- (a) To what extent did GTAs implement an aligned and sequenced curriculum when teaching university physical activity courses?
- (b) In what ways did a constructivist-oriented training session and semester-long mentoring intervention enhance GTAs' ability to align SLOs, learning cues, and teacher-provided feedback?
- (c) In what ways did a constructivist-oriented training session and semester-long mentoring intervention impact GTAs' perceptions of their initial university teaching experience?
- (d) To what extent did the implementation of an aligned and sequenced curriculum impact undergraduate students' experiences in physical activity courses?

In the two sections of this chapter, I will describe both the pilot study and the primary study. In the subsections below, I will introduce the pilot study's purpose and research questions, then describe its research design, sampling procedure, and participants. I will lay out the pilot study's time line, detailing data collection and data analysis. Finally, I will discuss the results of the pilot study and conclude with a summary considering the implications for the larger study. I will introduce the subsections of the primary study at the top of that section. While the two

studies share numerous commonalities, I have attempted to avoid redundancy as much as reasonably possible in describing them here.

Pilot Study

The purpose of the pilot study was to examine and describe how graduate teaching assistants (GTAs) utilized and aligned curricular elements when instructing university physical activity courses. A further purpose was to collect data that would inform a GTA training program. The pilot study was guided by the questions:

- (a) What curricular elements were evident/absent when GTAs taught university physical activity courses?
- (b) In what ways did GTAs align or fail to align the curricular elements evident in their lessons?

Pilot Study Design. I utilized a research design described by Merriam (2009) as basic qualitative research, focusing on process, understanding, and meaning, rather than product. Denzin and Lincoln (2005) state that qualitative researchers study phenomena in their natural settings and the context in which learning occurs is a crucial element of constructivism (Vygotsky, 1986). I examined GTA teaching practices as they naturally occurred in undergraduate physical activity classes, observing GTAs' curricular element inclusion and alignment in lesson design and implementation.

Sample Selection. The sample was drawn from the GTAs in the physical activity program at a mid-sized (undergraduate enrollment approximately 16,000), public university in the southeastern United States. The sample for the pilot study was a convenience sample, as I was a GTA at that time, assisting the director of physical activity instruction in observing, mentoring, and formally assessing the teaching performance of my fellow GTAs.

Participants. The participants were 12 GTAs (5 female) who taught physical activity courses. All GTAs were pursuing post-graduate degrees (seven master's/five doctoral) in various areas of kinesiology. While four of the GTAs possessed undergraduate degrees in pedagogy, only two had taught professionally in an educational setting before this assignment. Four GTAs were international students (English was not their primary language). In informal conversations, most GTAs shared that they had coached children in sports settings, coordinated physical activity at children's camps, or worked as personal trainers, in lieu of formal teaching experience.

Time Line. The week before the fall semester began, new GTAs were required to attend a half-day university-wide orientation (focused primarily on university policies) and a half-day physical activity department training session (focused in part on preparing a syllabus). I did not observe either orientation. During the fall semester I observed two lessons each by seven GTAs. The first observation occurred in September or early October and a second observation occurred near the end of the semester in November. During the spring semester I observed one lesson by each of the remaining (five) GTAs. The lessons were either 50 or 75 minutes long depending on how many times a week (3 or 2, respectively) the course met.

Data Collection. In anticipation of each observation, the GTA was required to submit a lesson plan to me via e-mail. During each observation I took field notes by hand. Immediately following each lesson, I met privately with each GTA for 10-30 minutes to discuss my impression of their lesson, including my assessment of their use and alignment of curricular elements. I took field notes during these discussions. Within 24 hours of each observation I utilized my field notes to complete a formal teaching observation form. The form was provided by the kinesiology department and is included in Appendix A. I chose to provide an additional narrative with each form, summarizing my comments and adding further observations and considerations. I e-mailed completed forms to the GTA and the director of physical activity instruction within 24 hours. In

the case of the second observations in the fall semester, I followed the same procedure but did not complete a formal observation form, as only one was required per semester by the department.

Data Analysis. Glaser and Strauss (1967) developed the process of constant comparison, which remains an influential means of analyzing qualitative data. As the name implies, units of data are constantly compared to each other as they are gathered to reveal similarities, differences, patterns, and relationships. Lincoln and Guba (1985) described a unit of data as the smallest piece of information that can stand by itself in a meaningful way, revealing insight relevant to research questions. These units of data are arranged in a manner that allows them to be read, re-read, sifted, and reorganized. While complex retail software packages are available for performing qualitative data analysis, Merriam (2009) suggested that word processing software with a search function can be equally effective and easier to use, particularly for smaller studies. As I gathered data (lesson plans, field notes, formal observation forms) I created a computerized database using Microsoft Word software (Version 16.0.7070.2026).

Once a database was created, I began open coding. Open coding involves the assignment of a category to a unit of data (Glaser & Strauss, 1967). This coding process is described as “open” because categories need not be terms drawn from the existing research literature (although they can be). Codes can be words used by the participants (particularly if those phrases tend to recur) or the words of the researcher. As the data were constantly reexamined, codes were combined, eliminated, and molded into hierarchies. Corbin and Strauss (2007) describe this process as axial coding or analytical coding. They equate categories with buckets that hold units of data that have similar characteristics. Using the search and cut/paste functions, computer files containing all data units with a particular code were created. Once pilot study data collection was completed and data analysis was the singular focus, categories were identified to describe and interpret the data and then to make inferences and generate theories regarding the pilot study’s

research questions (Miles & Huberman, 1994). Categories were linked in a manner that attempted to explain the relationship between them.

Pilot Study Results

Curricular Elements. In general, three common curricular elements (SLOs, learning cues, teacher-provided feedback) that one might expect to see in a physical activity lesson were often absent or poorly articulated in GTA lesson plans and lesson implementation. SLOs were absent from most lesson plans and were rarely overtly presented during lesson implementation. The lesson plans provided by the GTAs varied widely – from formal plans four pages in length, to a series of bullet points describing planned activities, to a few vague sentences contained within an e-mail. Most GTAs equated planning with an itinerary of activities and failed to delineate any learning objectives at all. One GTA teaching a weight training course wrote, “I’ve taken up more of a supervisory role” in lieu of providing objectives or a schedule of activities. A swim instructor provided a detailed breakdown of how much time and how many laps would be devoted to each stroke, but failed to provide any learning objectives. Two GTAs with undergraduate degrees in pedagogy provided vague learning objectives – “Learn the fifth movement” and “The students will success (sic) in practicing at least 3 different individual manipulated basketball movements”. Only one GTA, a badminton instructor with a physical education teaching degree, provided a detailed learning objective that was observable and assessable involving students’ ability to apply tactics related to returning to center and forcing one’s opponent to move.

In some cases, unstated SLOs implicit within lessons became apparent as the lesson was taught. A soccer instructor had provided only a skeletal list of activities as a lesson plan, but the underlying principle the activities shared (students being able to constantly move around the playing area to maintain appropriate spacing) became evident to the students as the lesson

unfolded. When I met with the GTA after class, he was surprised to realize that he had subconsciously pieced together activities supporting a single learning objective. While his coaching background in soccer and volleyball had seemingly provided him with some planning tools, a lack of teacher training left him without the pedagogical vocabulary to express his ideas. He shared with me that he found preparing for his first class meetings “terrifying”, and that he gave his students “free play” at those meetings because he felt that his brief orientation had left him unready to prepare a lesson plan or teach.

Learning cues (short, memorable phrases that describe one aspect of performing a skill) are commonly used in physical education and physical activity lessons. They were almost completely absent from the lesson plans provided. One instructor included a “review of cues” as an activity, but failed to specify the cues to be reviewed. Most instructors simply listed activities to perform without providing the accompanying cues. However, more than half of the instructors utilized learning cues when implementing their lessons. One weight training instructor in particular was exceptionally proficient in this regard, as his formal observation reveals below.

Pseudonyms are used here and throughout this manuscript.

When demonstrating in front of the entire class, a small group, or even a single student, Ralph uses a wide variety of useful learning cues. Rather than simply name the muscles that need to be engaged, many of Ralph’s cues began with “Think of it as ...”, such as getting under the bar as gravity brings it down, rather than defying gravity to push it up. These unique cues strike a chord with the students, who put them to immediate use.

Other instructors, however, relied very heavily on demonstration without providing accompanying learning cues. In a number of post-lesson conversations I expressed my concern to GTAs that visual demonstrations without audible learning cues are not inclusive of all types of learners and I encouraged them to provide auditory cues as well. This issue was particularly apparent for the international GTAs, who universally expressed a lack of self-confidence in

presenting learning cues in English and felt that physical demonstration was far more effective. As with SLOs, numerous GTAs (even some who used learning cues extensively in their teaching presentations) lacked pedagogical vocabulary, unsure of what learning cues *were* until the term was explained to them.

Evidence of teacher-provided feedback varied greatly between lessons. The weight training instructor who expressed that he had “taken up more of a supervisory role” provided virtually no feedback in his first observed lesson. His weight training colleague who was successful with the provision of learning cues (see above), however, was equally successful in providing feedback: “The feedback Ralph provided (and I believe he provided individual feedback to every one of the 20 or students during the period) was insightful, useful, and balanced nicely between positive reinforcement and prescriptive suggestions.” Instructors in volleyball, basketball, and badminton provided some feedback during practice activities, but ceased entirely during competitive play. A martial arts instructor felt that he could not provide individual feedback during instruction, as it would distract the other students trying to follow his lead through a series of movements. Overall, feedback, when provided, tended to be complimentary and vague (“Good job!”, “Way to go!”, “That’s the way to do it!”). In two cases, instructors limited themselves almost entirely to providing prescriptive feedback, failing to point out what aspects of the skill were being executed correctly. Overall, while there was great variety between instructors, these three curricular elements (SLOs, learning cues, teacher-provided feedback) that one would expect to see in physical activity lesson plans and lesson implementations were often absent or poorly articulated. I will now consider how these variables were aligned.

Alignment of Curricular Elements. Alignment is the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999). The ability to align curricular elements in a holistic manner is a crucial aspect of constructivist teaching and aligned

curricular elements will exhibit internal consistency. Since many GTAs struggled with including or articulating key curricular elements, it is not surprising that alignment of these elements was infrequently seen. SLOs were rarely expressed, making their alignment with learning cues and feedback relatively rare. The soccer instructor mentioned above managed to align his implicit learning objective related to spacing with the learning cues and feedback that he provided, using cues such as “Pass and move to open space”, and providing detailed feedback to individual students regarding their spacing. The badminton instructor successfully aligned her learning objectives related to tactics with learning cues (“Return to center”) and feedback (“Way to mix your shots to move your opponent around”). Her second learning objective, however, “Demonstrate competency in skills (review of clear, drop shot, and smash) and apply them to a game of badminton” was not supported in her lesson plan by any learning cues for these skills, and she rarely provided feedback regarding the physical execution of these shots (as compared to the tactical choice of utilizing them).

One basketball instructor provided the longest lesson plan of any of the GTAs, including lengthy scripted portions for instruction, but she did not provide learning cues in her lesson plan or lesson implementation (thus her feedback could not be aligned with her learning cues and tended to be vague and complimentary when presented). Two of the weight training instructors were proficient in providing feedback that harkened directly back to the learning cues that they had provided during instruction (“Remember to keep your back straight”, “Where do we want our hands on the bar?”). As discussed earlier, numerous instructors failed to include one or more of these curricular elements entirely, making alignment of them impossible.

Pilot Study Summary. Three common curricular elements (SLOs, learning cues, teacher-provided feedback) that one might expect to see in a physical activity lesson were often absent or poorly articulated in GTA lesson plans and lesson implementation. Therefore, it is not

surprising that alignment of these variables was infrequently seen. It appears that the two half-day orientations the new GTAs attended did not adequately address pedagogical skills, leaving a few even fairly successful instructors without the vocabulary to identify curricular elements and explicitly align them. In at least one case, the orientations left a GTA feeling overwhelmingly unprepared to teach. These findings suggest that a training/mentoring program explicitly teaching these three curricular elements and means for aligning them might lead to more successful teaching experiences for GTAs.

Primary Study

The purpose of this study was to implement and evaluate a constructivist-oriented program to train university graduate teaching assistants (GTAs) to align three curricular elements in their planning and teaching in physical activity courses: student learning objectives (SLOs), learning cues, and teacher-provided feedback.

Research Questions and Design. The questions guiding this research were:

- (a) To what extent did GTAs implement an aligned and sequenced curriculum when teaching university physical activity courses?
- (b) In what ways did a constructivist-oriented training session and semester-long mentoring intervention enhance GTAs' ability to align SLOs, learning cues, and teacher-provided feedback?
- (c) In what ways did a constructivist-oriented training session and semester-long mentoring intervention impact GTAs' perceptions of their initial university teaching experience?
- (d) To what extent did the implementation of an aligned and sequenced curriculum impact undergraduate students' experiences in physical activity courses?

In the subsections that follow, I will describe the design of the study and the rationale for choosing it, and explain the sample selection while describing the participants and setting. Next,

I will provide details of the three-hour training session and introduce the time line for data collection across the semester, describing types of data collected to answer research questions. I will describe the data analysis process, which, to some degree, occurred concurrently with data collection, as is standard practice in qualitative research (Bogdan & Biklen, 2007). I will next discuss issues related to credibility, consistency, and transferability, and finally describe the potential biases that I brought to this research.

Research Design. As in the pilot study, I utilized basic qualitative research (Merriam 2009). Since I utilized constructivism, which values deep understanding of the process through which learners construct meaning (Rovegno & Dolly, 2006) as a theoretical framework, qualitative research was highly appropriate as a research design choice. Merriam (2009) describes qualitative research's foci as how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences.

Sample Selection. The sample was drawn from the same physical activity program at a mid-sized (undergraduate enrollment approximately 16,000), public university in the southeastern United States utilized in the pilot study. The study utilized purposeful, non-probabilistic sampling (Patton, 2002), which is commonly used in qualitative research. Non-probabilistic sampling is appropriate when research questions are not focused on quantifiable outcomes and allows for information-rich cases. Patton (2002) describes use of a "typical" sample in qualitative research, purposefully choosing a sample that is reasonably representative of a typical situation practitioners/researchers may experience. A typical sample provides a greater opportunity for applying findings in other (similarly "typical") settings and it was reasonable to describe the physical activity department in this study as typical of a mid-sized, public university.

Participants. There were 16 GTAs present at the three-hour training session that I provided. Three GTAs who had been observed as part of the pilot study the previous year

completed the training session but had no further involvement in the primary study. One new GTA arrived halfway through the training session and was therefore not considered for further participation in the study beyond that day. One new GTA who completed the training session was dropped from further participation after she failed to confirm my first class visit or to provide a lesson plan to me. The remaining 11 GTAs new to the physical activity program in the Fall 2016 semester were the primary participants in the study (see Table 1). While teaching was not the primary concern of the new GTAs, they approximate a teaching cohort, as they entered the program together and shared initial experiences. Cohorts of teaching candidates in various stages of their education have participated in numerous qualitative studies focused on constructivist-oriented physical education teacher training (Rovegno, 1992a, 1992b, 1993a, 1993b). The physical activity director was the gatekeeper (Patton, 2002) of the program and he facilitated this research and was interviewed. I also interviewed two undergraduate students taught by each of the eleven participating GTAs. Aside from being the researcher, I was also a participant in this study. I administered the GTA training and observed and mentored the 11 participating GTAs through the semester.

Table 1. GTA Biographical Information.

Second-Year GTAs (3)								
Pseudonym	Gender	Degree Sought	Nation	Fall 2016 PA Courses	Previous Teacher Education	Previous Coaching Education	Previous Teaching Experience	Previous Coaching Experience
Myrna	Female	MS – Sport and Exercise Psychology	Israel	Tennis Basketball Jogging	Bachelors In Pedagogy	4 years (part of PETE program)	5 years	4 years
Ronald	Male	MS – Sport and Exercise Psychology	USA	Soccer Volleyball	None	National Volleyball Certification	Math sub, Conditioning & Soccer in 2015- 2016	Extensive volleyball and soccer
Tien	Female	PhD - Unknown	Korea	Swimming	(Did not complete form)	(Did not complete form)	Swimming in 2015- 2016	(Did not complete form)

First-Year GTAs excluded from study (2)								
Pseudonym	Gender	Degree Sought	Nation	Fall 2016 PA Courses	Previous Teacher Education	Previous Coaching Education	Previous Teaching Exp.	Previous Coaching Exp.
Linda	Female	Unknown	Korea	Swimming, Tae Kwon Do	(Did not complete form)	(Did not complete form)	(Did not complete form)	(Did not complete form)
Wanda	Female	PhD – Community Youth Sport Development	USA	Weight Training/ Conditioning	(Answer Unclear)	(Answer Not Relevant)	Sports & Recreation Administration Course	Basketball Camps, Afterschool Programs

First-Year GTAs included in study (11)								
Pseudonym	Gender	Degree Sought	Nation	Fall 2016 PA Courses	Previous Teacher Education	Previous Coaching Education	Previous Teaching Experience	Previous Coaching Experience
Virginia	Female	MS – Exercise Physiology	USA	Soccer, Weight Training/ Conditioning	None	None	“Teacher Cadet” Senior Year of High School	Soccer – Youth Camps, High School
Fred	Male	MS – Exercise Physiology	USA	Weight Training/ Conditioning	None	Certified Strength & Conditioning Specialist	None	Strength and conditioning coach, personal trainer, swim instructor
Lily	Female	PhD – Pedagogical Kinesiology	China	Tae Kwon Do, Badminton	“Yes”	“Yes”	3 years plus in China	Coached while getting degree
Paul	Male	MS – Sports and Exercise Psychology	USA	Soccer	None	“Online Video for High School Coaches”	None	Soccer – Assistant High School Varsity Coach
Miranda	Female	MS - Nutrition	USA	Swimming	None	USA Swimming Certification (Online Course)	None	Extensive swim coaching (5 years plus)
Glenn	Male	MS – Sport and Exercise Psychology	USA	Volleyball	None	None	None	Volleyball - 4 years college club coach
Jimmy	Male	PhD – Exercise Physiology	USA	Swimming	Single Day Graduate Teaching Orientation in Master’s Program	“Conditioning Theory Class”	Teaching as Master’s Student (Fitness)	Swimming, Triathlon
Sarah	Female	MS – Sport and Exercise Psychology	USA	Jogging	None	None	None	None
Cynthia	Female	MS – Sport and Exercise Psychology	USA	Basketball, Soccer	Training Development (Corporate)	Certified Crossfit Trainer, Basketball Coaching Certification	Camp counselor for basketball, soccer, baseball	Grade school soccer, Middle school basketball
Robert	Male	PhD – Sport and Exercise Psychology	USA	Basketball	None	None	None	None
Akira	Male	PhD – Applied Neuro-mechanics	Japan	Weight Training/ Conditioning	None	None	Teaching assistant as Masters student	3 years middle school basketball

Setting. All orientations, training, observations and interviews took place on the campus of the aforementioned university. The university-wide GTA orientation took place in a large lecture hall with stadium seating and a stage and was attended by hundreds of GTAs from all departments within the university. Per university policy, GTAs were required to attend and could not access their courses online if they failed to do so. The departmental orientation for physical activity instruction took place in a much smaller environment – a conference room with a large table that seated approximately 20 people. (I use the term “departmental” here and throughout this document, but technically the director of physical activity instruction and the GTAs he supervises constitute a somewhat informal sub-division of the kinesiology department faculty, rather than a department unto themselves.) The three-hour orientation in the morning was followed by my three-hour training session after lunch, which took place in the same room. This setting did not allow for any physical activity. During the course of the semester, I observed physical activity lessons in a variety of settings on campus. The director of physical activity instruction shared with me that “None of the facilities that we use for our program directly belong organically to the Department of Kinesiology”. In light of this fact, badminton, basketball, and volleyball classes met in the athletic practice facilities used by the university’s basketball and volleyball teams, and weight training/conditioning classes met in the weight training room otherwise reserved for interscholastic athletes. Soccer classes met on an athletic field adjacent to the building where most physical activity courses were taught. The university’s wellness and recreation center was also utilized, as swim classes met at the natatorium inside the building, and weight training/conditioning courses met on a volleyball/basketball court there in the latter half of the semester (when conditioning was the focus). The wellness and recreation center also served as an alternative space for soccer and jogging classes during inclement weather. Jogging class normally met outdoors and made use of much of the campus. Virtually all post-observation

meeting with GTAs, and interviews with undergraduate students, took place near just-completed classes. This included the corners of gyms, the “wet” classroom adjacent to the pool, and the lounge areas in the athletics building and the wellness and recreation center. The interviews were private in the sense that no one was near enough to overhear, but public in the sense that they were in open areas, often where others were being physically active. My interview with the director of physical activity instruction took place in private in his office on campus.

Time Line. The intervention at the heart of this study consisted of a discrete event (a three-hour training session) coupled with an ongoing, semester-long mentoring process. Here is the time line covering 16 weeks (the week preceding the semester and the 15 weeks of the semester).

Week 1

1 – I observed the day-long university-wide orientation for new GTAs. I took field notes and obtained a copy of the program that listed the speakers and topics.

2 – I attended the half-day physical activity instruction departmental orientation. I took field notes and gathered documents provided by the director to the new and returning GTAs. I met the GTAs and obtained their consent to participate in this study.

3 – Later that day, I conducted a three-hour constructivist-oriented GTA training (described below) emphasizing instruction in the three targeted curricular elements.

Week 2

1 - GTAs taught their first two or three (depending on how often their course met) class meetings. I did not observe these meetings, as I felt they were likely not to be representative of typical physical activity lessons (focusing instead on ice breakers, course expectations, syllabus, etc., rather than physical activity).

2 – I electronically collected course syllabi from all new GTAs.

Weeks 3-6

I observed each GTA teach one lesson. I requested and received a lesson plan beforehand from the GTA for this and subsequent observations. I met with each GTA afterward for 10-30 minutes to provide feedback and offer mentoring. Observations were not scheduled if physical activity was not planned (written tests, etc.).

Weeks 7-10

I observed a second lesson for each GTA. I met with each GTA afterward for 10-30 minutes to provide feedback and offer mentoring. I used my field notes to complete a written formal observation and checklist and provided those to the GTA and the physical activity instruction director within 24 hours via e-mail.

Weeks 11-14

I observed a third lesson for each GTA. I met with each GTA afterward and conducted an audio-recorded interview lasting from 10-30 minutes. In most cases, I also interviewed two undergraduate students from that class at that time. On two occasions, I interviewed undergraduate students in the evening for their convenience. The undergraduate interviews lasted 5-30 minutes.

Week 16

I interviewed the physical activity program director in his office. This interview lasted just over one hour.

Description of the GTA Training. I will present a summary of the GTA training here. An in-depth lesson plan for the GTA training appears in Appendix B. The training ran, as scheduled, for three hours. The training took place on the same day as the departmental orientation (which occurred in the morning). While a lengthier training would likely have had a greater impact, I chose to limit the training to three hours to align with the reality of most

university programs (Russell, 2011), potentially increasing the transferability of findings. This was also the amount of time the physical activity director felt he could allot me, as the schedule only allowed for one and a half days of departmental orientation/meetings. Since my training was almost exclusively focused on pedagogy, this topic was not directly addressed by the director, who primarily covered departmental policies, safety, special needs accommodations, attendance policies, and the logistics of managing one's course online.

Learning Objectives. The learning objectives for the training were as follows: At the conclusion of the training, GTAs will be able to: a) identify and describe the personal motivations, influential teachers/coaches, and critical incidents that have contributed to their subjective warrant for teaching physical activity courses; b) identify curricular elements (demonstration, individual practice, SLOs, etc.) and provide justifications for those they find integral to a physical activity lesson; c) explain curricular coherence and the alignment of curricular elements within a lesson; d) create SLOs that are observable and assessable; e) generate effective learning cues that align with SLOs; and f) express effective teacher-provided feedback that is aligned with students learning objectives and learning cues.

Training Activities. The constructivist-oriented training began with introductions, encompassing name, area of graduate study and degree being pursued, courses to be taught in the coming semester, and previous teaching/coaching experiences (see Table 1). This was followed by a "Think-Pair-Share" (Lyman, 1981) activity focused on subjective warrant (why GTAs aspire to teach in the long term, what short-term teachers [those not aspiring to teaching careers] expect to derive from their teaching experience, influential teachers/coaches and critical incidents, and doubts/concerns regarding teaching). In "Think-Pair-Share" activities, learners are provided with a question to think about, then relate their responses to a partner, then share information with the entire group. This exercise is constructivist in two ways – it addresses the previous knowledge,

experiences, and teaching conceptions of the participants, and it promotes social learning through paired work (Samaras, 1998; Vygotsky, 1986). I then led the GTAs in a brainstorming session, eliciting curricular elements integral to a successful lesson and asking them to provide justifications for including each. GTAs were asked to explain their understanding of curricular coherence and the alignment of curricular elements, and to discuss why these factors may be crucial to learning. These activities are constructivist because they are student-centered and elicit information regarding alignment and coherence, which are concepts central to constructivist teaching (Beck & Kosnik, 2006). There was a ten-minute break at this point.

I began the second half of the training with a slide presentation providing information on constructivism, subjective warrant, curricular coherence, SLOs, learning cues, feedback, and alignment of these three curricular elements. This direct presentation of information represented a deviation from the constructivist nature of the training session. I chose this path primarily because of the time constraint involved, and because each topic had already been, or soon would be, experienced by the GTAs via constructivist exercises. Under certain circumstances, direct presentation of material may be the most effective means of conveyance, even for those instructors who embrace constructivist methods (Rovegno, 1998). This presentation was followed by an exercise completed in groups of three. The groups were asked to choose a concept or set of skills related to physical activity and to create three observable and assessable SLOs, three or more learning cues for each of three skills, and three hypothetical feedback statements (for three students having different levels of success) aligning SLOs and learning cues. I walked from group to group during this activity, answering questions and checking on progress. Each group produced a written document that was collected for later data analysis. It was my plan that each group would present their work to the other groups via a mock-teaching session (with physical activity being exceptionally brief or pantomimed, due to the constraints of time

and location). This exercise would have been constructivist in its promotion of social learning in a group setting (Vygotsky, 1986) and its experiential nature (Dewey, 1938). However, the mock-teaching session had to be cut, as the allotted three hours had nearly elapsed. The training session concluded with a verbal closure stimulated by a series of questions that served to assess if the learning objectives of the training had been met. These questions are provided in Appendix B. Each GTA completed a brief, anonymous, written survey regarding the training (see Appendix C) before departing.

Data Collection. In qualitative research the researcher is the primary instrument of data collection and analysis (Merriam, 2009). As detailed in the time line above, there were three methods of data collection – documents, observations, and interviews.

Documents. Documents, both pre-existing and created specifically to gather data, are often a rich source of information in qualitative research (Merriam, 2009). Documents can provide insight into the culture surrounding a particular program under study. Documents collected in my research included the materials provided to GTAs at the university-wide and departmental GTA orientations, the course syllabi created by GTAs, written exercises completed during GTA training, a satisfaction survey completed by GTAs at the end of the three-hour training session, and GTA plans for observed lessons.

Observations. Observations conducted in the field are also a rich source of data (Merriam, 2009) and are integral to most qualitative research. I observed the primary participants (the GTAs) in multiple contexts (receiving training, teaching, reflecting), including their interactions with each other and with secondary participants (the program director, the undergraduate students in their courses, and the researcher). Merriam (2009) states that the answer to the question of “What should be observed?” is driven by a study’s theoretical framework, purpose, and research questions. In that regard I was observing through a

constructivist lens, gathering data that related to the GTAs' previous knowledge and experiences, their ability to construct their own meaning of new information and experiences, and their ability to apply their knowledge to the alignment of curricular elements. I recorded my impressions of the GTA training session immediately after it concluded, and had a non-participating colleague take field notes during the event as well. The majority of my observations came via three scheduled visits to each GTA's physical activity class. Merriam (2009) provides a list of general items to focus on that guided my observations: the physical setting, the participants, activities/interactions, conversations, and subtle factors that may be seen but not heard. More specifically, my lesson observations focused on the alignment of SLOs, learning cues, and teacher-provided feedback. My observations were captured in hand-written field notes, which I typed up in narrative form as quickly as possible after each observation (Patton, 2002). I provided a completed departmental observation form and checklist (see Appendix G and Appendix H) to the GTA and the director via e-mail within 24 hours after the second observed lesson (this being their "formal", university-required, observation, for the semester). In the pilot study I added a narrative to each observation form, summarizing my comments and offering additional observations and considerations. Since the observation form did not specifically discuss SLOs or learning cues (the checklist did), they were addressed within the narrative which I continued to add.

My observations began with the two mandated orientations that the GTAs attended before the semester began – one that was university-wide for all new GTAs, and one specific to the physical activity program. All eleven participating GTAs attended the departmental training, while all but one attended the university-wide training (he was later required to watch videos of the training presentations in lieu of attending). In the first instance I was what Merriam (2009) describes as the "complete observer" - I did not participate in the orientation or interact with the

GTAs – I simply observed. In the second instance I was what Adler and Adler (1998) described as “participant as observer”. I participated in the departmental orientation on a limited basis, introducing myself to the GTAs and explaining my role, but not providing any training at that time. At the constructivist-oriented GTA training session, I filled the dual role of facilitator and observer. During the course of the semester I observed each GTA teach three times, spaced fairly evenly throughout the 15 weeks. I did not schedule observations when physical activity was unlikely to take place (written tests, etc.). My field notes, and the narratives I composed based on them, focused on SLOs, learning cues, teacher-provided feedback, and alignment of these elements. Although they were not the focus of my dissertation, I also took notes about, and provided feedback and mentoring on, class room management, presentation of instruction, situating one’s self properly to monitor a class, student motivation, and anything else relevant to optimizing teaching performance that occurred to me. Since I was providing mentorship to this group of 11 GTAs, the director focused on observing the remaining GTAs, as well as his other duties as an instructor. I was the primary source of mentorship for these GTAs, and under these circumstances I felt compelled to offer information, feedback, support, and suggestions beyond the primary focus of the study (lesson alignment).

Interviews. Interviews are commonly a primary data source in qualitative research, providing an insider’s perspective (the emic) and allowing for participants to express their understanding of the unique events that occur in a particular context (Patton, 1981). While it is a common practice in research on constructivist-oriented teacher training to conduct an interview at the beginning of the experience gathering demographic information, details of teaching and coaching background, and general thoughts about teaching philosophy and concerns (Rovegno, 1992a), I chose to elicit that information through exercises during training (Samaras, 1998). I conducted semi-structured interviews (Patton, 2002) with each of the 11 GTAs near the

conclusion of the semester. The semi-structured interview intermingles pre-arranged specific questions to be asked of all participants with the flexibility to probe and follow up (Patton, 1981). The interview focused on the perceived impact of the training and class visits on each GTA's teaching experience and considered the ease/difficulty of creating and implementing SLOs, learning cues, and feedback, as well as aligning those three elements (see Appendix D). I also conducted a semi-structured interview with the director of physical activity instruction near the end of the semester regarding his thoughts on the program at large, his role, the impact of the training, and on the role of GTAs and their general readiness to teach (see Appendix E). I conducted individual semi-structured interviews with two undergraduate students of each of the eleven GTAs near the conclusion of the semester to gather their impressions of their course experiences and their perception of the presence and alignment of SLOs, learning cues, and teacher-provided feedback in their class (see Appendix F). Each interview was conducted individually and in person in a public space near the gymnasium, pool, or field where physical activity courses were taught. The interviews were audio recorded using an iPhone and were manually transcribed verbatim using MAXQDA software (version 12.2.1). I shared the purpose and research questions of this study with all participants before interviews took place.

Data Analysis. While data analysis in quantitative research is generally a distinct phase that follows the completion of data collection, the two phases often occur concurrently in qualitative research (Bogdan & Biklen, 2007). Data analysis *during* data collection can provide direction for further collection by identifying gaps and emerging themes. Since the researcher is the primary instrument of data analysis, it can be argued that from a constructivist perspective the analysis process has already begun with the first moment of an interview or observation. The information that qualitative researchers record will always be tempered by their knowledge, previous experiences, and personal positionality.

As in the pilot study, I utilized constant comparison (Glaser & Strauss, 1967), comparing units of data (Lincoln & Guba, 1985) to each other as they were gathered to reveal similarities, differences, patterns, and relationships. I chose to utilize MAXQDA data analysis software (Version 12.2.1) to create a complex database that contained all gathered data (documents, transcribed interviews, field notes, formal observation forms, lesson plans, training exercises, orientation information, and course syllabi). Existing documents were examined for pedagogical information that might impact GTA's ability to create and implement lessons. Documents created by the GTAs in the training session and plans for observed lessons were analyzed for evidence of SLOs, learning cues, curricular coherence, and alignment. As in the pilot study, I performed open coding (Glaser & Strauss, 1967) on these units of data.

Guba and Lincoln (1981) offered guidelines I adopted for developing categories. They suggested that the number of participants who mention a particular category, or the frequency with which it is discussed or observed, should influence the importance the researcher places on that category. Further, the participants should be the driving force behind a category's relevance, more so than the researcher. Guba and Lincoln posited that categories that are less supported but are unique should be retained, as they may foster alternative explanations. Similarly, so should categories that may lead to findings not previously recognized in the literature, as they present the possibility of adding to the knowledge base in unique ways. Merriam (2009) stated that categories should be responsive to the study's purpose and research questions, should be exhaustive (meaning that no relevant unit of data should be left orphaned without a category), should be mutually exclusive, and should be conceptually congruent (in other words, existing on the same conceptual level).

Once data collection was completed, data analysis became the primary focus. Categories were utilized to describe and then interpret the data, as I began to make inferences and generate

ideas in response to my research questions (Miles & Huberman, 1994). Informal models were created to explain the relationships between categories, creating a hierarchy between categories and combining, splitting, and rearranging them as needed. Coding was an iterative process that I revisited numerous times as I developed the themes that addressed my research questions. The first full iteration of data analysis resulted in nearly 40 categories. Some of these categories were combined when they appeared to overlap. Other categories were dropped because their contents did not directly address any of the study's research questions. Examples of dropped categories include "Fun", "The High Bar", "Scheduling Challenges", and "Repetition in Instruction". Some peripheral categories provided supportive information but did not contain enough relevant data to be individually pursued. These categories included "Language Barrier", "Using Students' Names", "Students Seeing Meaning", and "Student Focus on Teacher Traits". Primary categories were analyzed for themes. These included categories that were fairly self-evident a priori ("SLOs", "Learning Cues", "Feedback") and others that emerged ("Peer GTA Support", "GTA Readiness"). Themes were developed to answer research questions, and are presented in the fourth chapter.

Credibility, Consistency, and Transferability. Scientific research has long been concerned with validity, reliability, and generalizability. Does the study measure what it set out to measure (validity)? Would the results be the same if the study were undertaken again under identical conditions (reliability)? Can practitioners apply these findings in different settings (generalizability)? Historically, these questions have caused some to question the utility of qualitative research (Merriam, 2009). Lincoln and Guba (1985) suggested that credibility, consistency, and transferability are more appropriate terms to use with qualitative research. They argue that the reality that scientific research attempts to measure in a valid way is unknowable, in part because it is holistic, multi-dimensional, and ever changing, so true validity (is the study

accurately measuring the reality it is setting out to measure?) is forever unattainable. They suggest considering the credibility of a study – are the findings *credible* given the data?

Credibility and Triangulation. Whether one calls it validity or credibility, a key to producing accurate findings in qualitative research is triangulation (Denzin, 1978). The current study made use of triangulation in two ways. First, there were multiple methods of data collection (interviews, observations, and documents), and second, there were multiple sources of data (GTAs, the program director, undergraduate students, the researcher) to provide a variety of perspectives. Triangulation helps to ensure that findings will be accurate and inclusive, since multiple resources and points of view are utilized and considered (Richardson, 2000). I also utilized member checks, as participants were asked to explain their teaching choices, and to verify and clarify their interview responses (Maxwell, 2005). Member checks ensure that the meaning the participants intended is present in their interview transcripts. The presentation of preliminary analysis to GTAs allowed the “experts” (those most deeply involved in the teaching context) to share whether they thought I was making insightful connections or was on the wrong path. Patton (2002) suggested intentionally seeking data that might support alternative explanations to those that the researcher is pursuing to further assure credible findings, and I made every effort to seek such data, routinely collecting information that did not, on the surface, appear to directly address my research questions.

Consistency. Reliability considers the extent to which results can be replicated under identical conditions, and does not translate well to qualitative research in the social sciences, where conditions are always unique and forever changing (Merriam, 2009). Replication of qualitative educational research involving a myriad of relationships between teachers, students, course material, pedagogical methods, etc., would likely *never* lead to identical results. Lincoln and Guba (1985) suggested consistency as an alternative to reliability. Consistency considers

whether results are consistent with the data collected. While it may be tempting to suggest that consistency asks if other qualitative researchers would arrive at the same results given the same data, Wolcott (2005) dismissed this definition, feeling that it suggests a singular “correct” interpretation of data when many credible interpretations may exist. Consistency, like credibility, is supported by triangulation of data (Richardson, 2000). Dey (1993) also suggested the creation of an “audit trail” – an in-depth explanation of data analysis that allows other researchers to follow the steps taken to arrive at results. The MAXQDA software package provided me with an excellent audit trail. By saving the project file under different names on a regular basis, the evolution of categories and themes was successfully preserved.

Transferability. By its very nature, qualitative research utilizing a purposeful, small sample in a unique context will not lend itself to generalizability. Lincoln and Guba (1985) suggested that worthwhile qualitative findings *may* be transferable rather than generalizable. Since each setting/context is unique, even the best results may not be transferable to another practitioner’s situation. It is the responsibility of the researcher to provide as much relevant information as possible in the clearest manner so that others may determine the transferability of the findings to another context. Toward that end, I provided a rich, thick description of the GTA intervention and the context in which it occurred, allowing program directors in other universities to decide if my results might be reasonably duplicated in their setting. Patton (2002) described this part of the research process as extrapolation – the researchers, through their experience, provide a working hypothesis – one that may or may not work when applied in another setting. Replication of the experiment is essentially impossible, but adaption of it in a new setting might be a fruitful option.

Researcher Positionality and Prior Experiences. While positivist quantitative research attempts to neutralize researcher bias, qualitative research acknowledges that researcher

positionality is inescapable (Merriam, 2009). The experiences and conceptions that an individual brings to a learning situation are an integral element of constructivism and that tenet holds true for qualitative research as well. I come to this study with 20 years of experience as a physical educator and coach. In the last four years, while pursuing my doctorate, I have been a graduate teaching assistant. I have taught 200-level teaching methods courses for physical education teacher education students five times, and a 300-level teaching methods course for non-majors three times. The design of this training program was based, in part, on what my K-12 and university teaching experiences led me to believe is a key element in teaching physical activity successfully – the alignment of SLOs, learning cues, and teacher-generated feedback. I have also taught university physical activity courses five times, and for one year assisted the director of the physical activity department by observing and mentoring GTAs and writing formal teacher evaluations. The teacher education program I taught in, while not overtly constructivist, was rooted in that approach. Much of my coursework and my work as a research assistant has focused on constructivism and constructivist curriculum. I entered this study with the notion that this constructivist training program *would* successfully foster GTAs' ability to implement lessons aligning SLOs, learning cues, and teacher-provided feedback.

CHAPTER IV

FINDINGS

The purpose of this study was to implement and evaluate a constructivist-oriented program to train university GTAs to align student learning objectives (SLOs), learning cues, and teacher-provided feedback in their planning and teaching in physical activity courses. I will introduce this chapter by relating the experiences of two GTAs, Robert and Virginia, before devoting a section to answering each of the study's four research questions. In those sections I will consider: (a) the extent to which GTAs implemented an aligned and sequenced curriculum; (b) the ways in which the training/mentoring intervention enhanced GTAs' ability to align SLOs, learning cues, and feedback; (c) the ways in which the training/mentoring intervention impacted GTAs' perceptions of their initial university teaching experience; and (d) the extent to which the implementation of an aligned and sequenced curriculum impacted undergraduate students' experiences in physical activity courses. Throughout this chapter I will refer to two distinct phases of the GTA intervention. "Training" will refer to a single discrete event – the three-hour session that I conducted one week before the semester began. "Mentoring" will be used to describe all interventional aspects that followed – class observations, one-on-one discussions after observations, and informal interactions. First, a look at Robert's experience.

Robert

Robert was a first-year doctoral student in sport and exercise psychology who taught Beginning Basketball and Intermediate Basketball. Robert had played high school basketball, but had no previous teaching or coaching experience. When teaching, Robert demonstrated that he was a skilled basketball player with extensive content knowledge. He reported being "a little

anxious” about his first teaching experience, but “that really turned to a calm because I felt more prepared” after the training session. Brian, the director of physical activity instruction, described Robert as “a sponge for everything”, who was often “a couple steps ahead, thinking-wise” because “he cares deeply.” Robert took notes diligently during our one-on-one discussions that followed observations and displayed a strong desire to evolve as a teacher. Inexperienced teachers like Robert sometimes focus on simply “surviving” their first assignment, but he stated, “It wasn't a survival thing for me ... and I would think that (the training) helped with that.”

Robert’s syllabi were impressive, particularly for a teaching novice. He added clarity to his SLOs by specifying the skills and strategies that would be taught. He also provided very specific means for assessing skill performance, and a clear breakdown of that assessment’s role in the grading process. His course calendar provided lesson topics for the entire semester, which were sequenced in a logical and coherent manner. The lesson plan that Robert provided for his first observation, however, was far less impressive. His lesson plan was a simple list of activities and the time dedicated to each, with a single objective at the top. Learning cues and a means for assessing learning were both absent. However, the *execution* of Robert’s lesson proved effective. Implicit SLOs became apparent as he taught, and he provided learning cues in abundance. His well-sequenced activities built logically upon each other.

Robert seemed quite capable of *thinking* of SLOs and relevant learning cues that were effective with his students and brought clarity and structure to his lessons. However, he lacked the pedagogical training to arrange this information into a formal written lesson plan, and he may not have seen the value in attempting to do so. Robert’s style of lesson planning was fairly consistent across the three observations, as his third lesson plan was also primarily an itinerary of activities. While he did expand his SLOs, they still lacked the vocabulary and syntax one would associate with effective learning objectives, being vague and providing insufficient information.

Two of Robert's implied SLOs were almost slogans – “Read and react” and “Respond in your ability”. However, the embellishment that he provided brought these phrases to life for his students, who enjoyed being cognitively engaged (recognizing and reacting to what the defense offered) rather than responding mechanically.

Robert's third observed lesson was aligned well – his activities once again strongly supported his learning objectives. He provided learning cues in his lesson execution that were absent in his lesson planning, and he utilized those cues extensively when he provided feedback. The limitation (two dribbles) he placed on students in drills was carried over into five-on-five competitive play. This caused students to make quicker decisions when gaining possession of the ball, and to utilize more explosive movements (thus helping to achieve a number of his SLOs). Robert's use of this alignment tool was a direct result of a one-on-one discussion we had earlier in the semester. This approach resonated with Robert's student Brandon, who mentioned that “He puts different rules in for the scrimmages to make it what we worked on that day”.

While Robert consistently provided prescriptive and positive feedback during drills, he missed opportunities to provide individual feedback related to his SLOs during competitive play. Robert's closure was very much in keeping with what was suggested at the GTA training, as he elicited information from his students to check for understanding and to determine if his (implied) learning objectives had been met. Brian's “sponge” description of Robert proved to be accurate. With a strong desire to succeed, a wealth of content knowledge and a dearth of pedagogical knowledge, Robert leaned heavily on the training and mentoring provided. He embraced the opportunities that the training activities offered. In his overall assessment of the GTA training, Brian alluded to Robert.

I suspect that if (the GTAs) took (the training) to heart - it's like the old adage, you can lead a horse to water but you can't make him drink. I suspect somebody like Robert ... was getting and applying as much as he could, of what he learned that day.

Brian's assessment supports the notion that Robert may have been an ideal candidate for this training/mentoring program. He brought self-motivation and content knowledge to the situation, and his lack of teaching experience and training, slight anxiety about teaching, and "sponge"-like learning style may have combined to make him very open to the information and exercises he experienced that day. He also was open to, and capable of, utilizing the feedback provided in one-on-one mentoring sessions. This was in contrast to Virginia, a GTA who seemed to have difficulty using training/mentoring information effectively in her lesson planning and teaching.

Virginia

Virginia was a first-year master's student in exercise physiology who taught Beginning Soccer and Intermediate Soccer. She had no previous teaching experience, but had played intercollegiate soccer and coached soccer with children of various ages. When she provided demonstrations during her lessons, her advanced soccer skills were clearly evident. During the departmental orientation and pedagogical training, Virginia was very quiet and rarely volunteered to speak during learning activities and exercises. For the final group activity (creating and aligning SLOs, learning cues and hypothetical feedback), she and her partners chose a soccer skill (passing with the in-step), and completed the assignment satisfactorily, but Virginia largely deferred to her more verbose groupmates while they were working together.

Virginia's course syllabus for Intermediate Soccer contained four SLOs, three of which were vague (e.g., "Demonstrate a strong understanding of team play") and difficult to assess. The first lesson plan she provided was simply a brief list of activities, and in lieu of SLOs she headed the document with "Focus: First touch/receiving". A few activities contained no explanation

(“Individual warm-up/passing”) and others had only logistics related to a drill (e.g., cone placement) rather than points of instruction. Her lesson plan was devoid of learning cues. The basic structure of Virginia’s lesson plans was unchanged throughout the semester, although she embellished a bit more by the third observation. Still, her SLOs did not provide a great deal of information and lacked traditional pedagogical structure (“Objectives: Corner kicks, transitioning/team defending, PK’s”), and her list of activities was fleshed out with drill logistics rather than learning cues, instruction, or means for assessing her SLOs.

Virginia shared that she was “very anxious” about her first teaching assignment. She mentioned that the social aspect of the GTA training, rather than the training itself, lessened that anxiety to a degree, “because I was in an environment where a lot of people were first-time teachers”. In her first observed lesson Virginia failed to utilize learning cues in her instruction, and provided very little feedback, often falling completely silent for long periods of time. The two primary drills in her lesson broke down due to student confusion, suggesting that pre-drill walk-throughs were in order. Our one-on-one discussion following her first observation seemed uncomfortable for Virginia, and she appeared to be resistant to my mentoring.

Virginia’s third observation took place during the eleventh week of the semester. After seeming to make some progress in her second observed lesson (although still struggling with learning cues and feedback provision), Virginia’s third observed lesson raised many concerns. She continued to list activities and skills in lieu of SLOs in her lesson plan, and learning cues and feedback were essentially absent from both her lesson plan and lesson execution. Apart from the absence of these curricular elements which had been central to the GTA training, Virginia also failed to heed some basic rules of physical education pedagogy that had been brought to her attention in previous mentoring sessions. She utilized an elimination-oriented activity (a penalty kick competition) and dispersed the students across the field for drills before providing them with

instruction (making explanations far more difficult to hear and understand). Two of her students offered insights regarding confusion over drills. Heather suggested that Virginia try “to find different ways to explain the drills or the games that we're going to play because sometimes we all get confused” and Randall observed that “sometimes when she explains stuff ... after we get going she'll maybe sometimes realize that we kind of don't know what we're doing.”

Randall went on to share his thoughts about the lack of learning cues and feedback in Virginia's teaching.

I don't really think that she uses them every single class period ... I feel like they would be effective to a beginner who didn't really have a lot of background. Because, you know, I think some of the girls in the class, they've never really played soccer before. I feel like she doesn't really correct us as much as she could ... she could do a lot more of that.

In Brian's assessment of the intervention, Virginia's name came up in juxtaposition to Robert's, as the “horse” who could be led to water but not be forced to drink.

(The GTAs are) either going to choose to receive this in the spirit you're intending to send it for their development or they're not. It's a shame if they won't ... You know, I'm pretty sure there's something Virginia could still learn (Brian laughs).

In an interview near the end of the semester, Virginia shared that using students' names more often was her singular takeaway from the training/mentoring intervention. Neither training nor mentoring appeared to resonate deeply with Virginia in terms of lesson preparation and execution. Robert and Virginia provided contrasting examples of GTAs' attitudes toward, and experiences with, the training/mentoring intervention. In the following sections I will respond to the four questions that guided this research.

GTA Implementation of an Aligned and Sequenced Curriculum

In this section I will respond to the first research question: “To what extent did GTAs implement an aligned and sequenced curriculum when teaching university physical activity courses?” In order to thoroughly answer this question, I will separately consider GTAs’ creation and implementation of SLOs, their experiences devising and sharing learning cues, and GTAs’ provision of performance feedback, before concluding with an examination of their implementation of a curriculum aligning these three elements. In these four sub-sections I will generally limit my comments regarding the influence of the training/mentoring intervention on this implementation, as that is the focus of the second major research question, answered further below.

GTAs’ Creation and Implementation of SLOs. GTAs created semester-long SLOs for their course syllabi as well as SLOs to accompany their daily lesson plans, and differences between the two were notable. GTAs had varying degrees of success in writing effective SLOs for their syllabi, as some were clear while many lacked specificity, observability, and assessability (the three characteristics emphasized at the GTA training). However, these SLOs routinely demonstrated the structure and syntax common to effective SLOs. In general, GTAs abandoned attempts at utilizing this structure and syntax when composing SLOs for their lesson plans, with most GTAs briefly listing activities or targeted skills in lieu of formal SLOs, and some not attempting to provide SLOs at all. Despite this fact, most undergraduate students interviewed generally attested to clear learning objectives being evident in GTA lesson execution, suggesting that many GTAs were able to structure their lessons around implied SLOs that were not captured well (or sometimes at all) in written form. I will now consider SLOs in syllabi and SLOs in lesson plans separately, and provide data to support the introductory statements I’ve made here.

SLOs in syllabi. Nine of the GTAs were required to create a syllabus, with four GTAs creating two because they taught multiple courses. Two GTAs, Fred and Akira, did not need to create a syllabus, as they were teaching laboratory subsections of a larger course that Brian instructed (Weight Training/Conditioning). A few GTAs were successful in creating effective SLOs for their course syllabi, as this example from Robert's Beginning Basketball syllabus attests.

After successful completion of this course, you will be able to exhibit ... progressive mastery of the fundamental motor skills and individual techniques of basketball, including dribbling, passing, and shooting, demonstrated through increased individual ability from the beginning to the end of the semester.

Robert's SLO was supported by a rubric which specified the characteristics of each fundamental skill listed, and the means by which those skills would be assessed. Lily (Beginning Badminton), with a background in pedagogy, provided fairly clear SLOs (e.g., "On completion of this course, the student will be able to perform the fundamental physical skills of badminton including the standard serve, the short serve, the flick serve, the clear, the drop and the smash"). Cynthia, a basketball instructor with no previous teaching experience, utilized a published basketball development instructor's manual for guidance with her course materials, resulting in fairly clear, if not exhaustive, SLOs (e.g., "Students will possess and demonstrate a working understanding of different offensive and defensive strategies, such as setting/using screens, reading the opposition, and applying/responding to pressure situations"). Glenn (Intermediate Volleyball) was an anomaly, as the SLOs in his lesson plans provided greater clarity and specificity than those in his syllabus, with "To demonstrate a clear understanding of advanced strategies [game situation] of volleyball" being one example of the latter. Glenn responded very positively to the GTA training, so I will discuss his SLO creation in greater detail when

answering the second major research question regarding the influence of the training/mentoring intervention.

The GTA training placed emphasis on effective SLOs being specific, observable, and assessable. While Robert's SLOs (and to a lesser degree, Lily's and Cynthia's) demonstrated these properties, many GTAs' SLOs failed to do so. One of Jimmy's Beginning Swim SLOs, for example, was particularly notable for its lack of specificity: "The student will recall, understand and demonstrate the various skills covered in the course." Many GTAs listed skills or knowledge but provided no details for how they might be defined. Sarah (Jogging) stated that her students would be able to "recognize and perform proper running technique" and "know the benefits of running", but shared no further information regarding the technique or benefits. Miranda (Fitness Swim) similarly stated that her students would be able to "refine various strokes" and "demonstrate an understanding of general principles of fitness" without specifying the strokes or the principles. Other GTAs struggled, as novice teachers often do (Rovegno, 1992a), with describing levels of proficiency to be observed. Some instructors used the level that appeared in their course title ("beginning" or "intermediate") in their SLOs (e.g., "Students will perform skills at an *intermediate* level"), without defining what performing to said level entails. Others used vague terms (e.g., "decently perform") that did not lend themselves to assessment.

Nearly all GTAs (Glenn being an exception) attempted to adopt the style and syntax common to SLO creation in kinesiology on their syllabi. This involved the use of stems (commonly "Students will be able to ...") followed by action verbs ("demonstrate", "develop", "apply", "recall") and targeted skills. Examples of this common practice are notable less for their expected inclusion in GTAs' syllabus SLOs, than for their unexpected *absence* in GTAs' lesson plan SLOs.

SLOs in lesson plans and lesson execution. Formal SLOs, phrased in traditional syntax and demonstrating specificity, observability, and assessability, were a relative rarity within GTA lesson plans. Lily, with a pedagogy background, produced fairly extensive lesson plans, but her SLOs were somewhat vague (e.g., “Students will be able to develop an understanding of basic badminton clearing concepts and strategies”) and would have benefited from elaboration. Fred and Akira often supplemented the lab assignments that Brian provided with lesson plans of their own creation. Fred crafted effective SLOs, despite the absence of the traditional stem (e.g., “Be able to explain anatomical terminology pertaining to human body position and movement”, accompanied by a list of relevant terminology, positions, and movement). Akira’s SLOs were presented as a “summary self-check” at the end of his lesson plans. Students were expected to ask themselves these questions to assess whether learning objectives had been met. Unfortunately, phrasing the majority of the self-check questions in “yes/no” form afforded students the opportunity to quickly say “Yes” three or four times and depart the class, thus not providing an effective assessment.

Similar to Robert’s experience described in his profile above, Jimmy (Beginning Swim) was far more capable of *thinking* of effective SLOs and executing them in his lessons than of presenting them in written form. Miranda’s (Fitness Swim) first lesson plan contained no SLOs at all, listing only drill names and number of repetitions. By her third lesson plan she had added SLOs (“Learning objectives: working hard on shorter rest intervals, Powering kick during swim - maintain a fast kick in the 25s”), although they lacked clarity and traditional structure. But as with Jimmy and Robert’s lessons, the SLOs that were inherent in Miranda’s lesson became clearly apparent to her students as she taught, as one student, Isabella, explained: “And she would state (the objective) and then we would do (the lesson) and then at the end she would kind of briefly go over what we did and then we’d be like ‘Oh yeah, we *did* do that’”. Paul (Beginning

Soccer and Intermediate Soccer) had a similar experience, as the SLOs in his lesson plans (e.g., “Review/perform the give-and-go”) tended to be terse and vague, but were fleshed out well during lesson execution.

Virginia (Beginning and Intermediate Soccer), as described in her profile, tended to list particular skills or activities in lieu of stating SLOs. Virginia’s limited verbal instruction made it more difficult for implied SLOs to emerge during her lesson execution. Still, students reported that they could perceive a logical connection between her instruction and the activities that she included, as Randall attested: “I feel like every single class has an objective. It's not just like we're just coming out here and doing random stuff, for just like activity”. Sarah (Jogging) did not appear to prepare any lesson plans, sending a narrative paragraph in the body of an e-mail to me before scheduled observations. It was difficult to determine what, if any, SLOs she intended. Her student, Jake, expressed his belief that there were objectives in each lesson, but his comment seemed to belie that notion: “It's not like a lecture in Anatomy or something where ‘Oh hey we learned this so now we're going to learn this so you should understand that.’ I just think it's kind of like a mixture.”

Summary of GTAs’ Creation and Implementation of SLOs. In summary, there were distinct differences in the SLOs GTAs created for their syllabi, and those they created for their lesson plans. GTAs had varying levels of success in creating effective SLOs in their syllabi, with many SLOs lacking specificity, observability, and assessability while a smaller number were written with clarity (sometimes exceptional clarity). While GTAs routinely utilized the structure and syntax generally associated with effective SLOs on their syllabi, most GTAs abandoned these characteristics when creating SLOs for their lesson plans. It appears that many GTAs were effective at *thinking* of SLOs and structuring their lessons around them without expressing them formally. This notion is supported by undergraduate student reports of consistently perceiving

objectives in lessons taught by most GTAs. I will now consider GTA implementation of the second major curricular element, learning cues.

GTAs' Experiences with Devising and Sharing Learning Cues. GTAs were generally more skillful in creating learning cues than SLOs, and most GTAs were comfortable using them and saw value in doing so. As with SLOs, there was a broad continuum across the GTAs in creating, capturing in writing, and utilizing learning cues. At one end of the continuum was Glenn, who was adept at all three of these aspects. As was the case with SLO creation, Glenn relied heavily on the GTA training in preparing his learning cues, so I will speak about his experience in greater detail when I discuss the intervention's impact on learning cue creation/implementation in a later section. Fred and Akira had learning cues already included in the materials they were provided (weekly lab sheets) but they were both skilled at going beyond those cues. Cynthia sifted through the learning cues in the published teaching materials she was using, but tended not to include any of them in her lesson plans, only in her lesson executions. Lily included appropriate cues in her lesson plans but had mixed results when applying them in her lesson executions. As with SLOs, many effective GTAs (Robert, Jimmy, Miranda, Paul) utilized learning cues in their lesson *execution* without including them (or including only a small sample of them) in their lesson *plan*. This pattern occurred even for some GTAs who described the involved process of thinking of cues when planning their lessons. At the far end of the continuum, Virginia and Sarah did not include any learning cues in their lesson plans, and rarely utilized them in their lesson execution. I will now move away from a continuum approach, and consider particular aspects of learning cue creation and implementation, in the process providing data to support the introductory statements made above.

Supplementing teaching materials with learning cues. Akira and Fred both demonstrated skill and content knowledge when creating and utilizing learning cues that

supplemented the provided teaching materials. Miguel, one of Akira's students, complimented his use of cues ("He broke down the cues really well"), while observing that Akira could go beyond the provided materials, and tailor his presentation to different students' needs.

Depending on the person the cues sometimes have to be different. For some people sitting back on a squat may not be the correct way for them to learn it. He might have to portray it in a different way. It may not be exactly the cue that's in the book but he's bringing across the same point.

Along these lines, Akira prompted his students to "use multiple cues because you never know which cue will work for that person" when they were providing peer instruction as part of their lab assignments. Akira's cues were brief and memorable ("grip tight", "control the speed", "full range of motion", "tuck your tail", "pinch fingers"). Fred also provided a wealth of learning cues beyond the text, many of them different from those used by Akira. These included unique ways of remembering anatomical movement (such as equating plantar flexion with "planting a seed" and dorsiflexion with "a dorsal fin"). Fred's student Claudia commented on the efficacy and brevity of his learning cues.

The short phrases make it easier for me because it's direct and to the point ... when he just says "Okay, get down", you *have* to get down. Just like there it is. There's no, "Okay, well, make sure like when you do it like you have to squat down first and then such and such and such".

Learning cues and international GTAs. Akira (Japan) and Lily (China) were the only international students among the 11 new GTAs who were the focus of this study. Of the two, Akira demonstrated a far greater command of English, allowing him to provide learning cues unimpeded by a language barrier. Lily demonstrated a greater comfort with writing English than speaking it, so while she included learning cues in her lesson plans, they did not always resonate with her students in execution. Her student Victor found her cues to be "kind of vague", as "she

just kind of hits the beginning of it”, such as saying “Elbow” to remind students to keep their elbows high when attempting a smash, without further explanation. However, another student, Donna, found Lily’s learning cues to be the most effective part of her instruction, (“She's pretty good on cues. That's what most of us pick up on.”), because she found longer instruction was difficult to understand. Lily, like the international GTAs in the pilot study, appeared more comfortable with physical demonstration than verbal cuing. Akira, with a much stronger spoken command of English, excelled at providing verbal cues.

Learning cues in lesson plans vs. lesson execution. Many GTAs who used learning cues extensively and effectively in their lesson execution included few or none of these cues when writing their lesson plans. Miranda (Fitness Swim) was one of the GTAs who provided learning cues without formal preparation, as the field notes from her first observation reveal: “Miranda’s lesson plan was a list of planned activities, lacking SLOs and learning cues. When she began to teach, however, she was a ‘learning cue machine’ (as I told her after class).” Isabella, one of her students, concurred, explaining “Yeah, I feel like she was always saying (learning cues)”, and another, Martina, added “She’s always like ‘Remember, keep your ear to your bicep when you breathe, and rotate’. And then when I'm swimming I think about that.” Paul (Beginning Soccer) provided an example of a GTA who valued learning cues and dedicated time to choosing appropriate ones, while still generally not including them in his lesson plans. He explained:

And then the learning cues I was really big on when I wanted to teach with the beginners, because most of them were playing the sport for the first time. But I knew it was going to be hard for them to understand. So it was funny because I hadn't played soccer for a really long time, but when I think back to some of the basic cues, I'm like "Well, how do I actually *do* that?" And that was hard at first but then I was able to think back and pick out the best cues that would help the students learn.

Quantity of learning cues. Cynthia (Beginning Basketball) discussed her desire to be precise with her cues, limiting herself to only the most impactful ones she found in published teaching materials so her students would not feel overloaded.

... just the idea of making it more specific and being very clear about it. And not trying to do too much. Because it's easy to say "Well, this is a cue, and this is a cue, and this is a cue". But I think the idea of just streamlining it - "Okay, what are *the* three cues? What do you want them to get out of the day?"

In three observations of Jimmy (Beginning Swim), my field notes routinely captured the quantity ("Jimmy uses a plethora of learning cues"), and quality ("Many of Jimmy's learning cues were especially memorable – 'Like laying your head on a pillow', 'Put your hands in your pockets") of the cues that he provided. He shared, "Obviously one of the things that I think is most important in swimming for sure is just providing them learning cues." Miranda (Fitness Swim), interestingly, took a different view.

I would say I use less learning cues in this situation teaching this course than I do when I coach swimming. Because that level of swimmer needs very specific detail that swimmers that are just doing it recreationally really don't need.

GTA's utilizing limited learning cues. I touched on the lack of learning cues in Virginia's planning and teaching when I profiled her in the first portion of this chapter. As her student Randall pointed out, this seemed to have a particularly negative effect on the learning of the relative beginners in the class. Sarah, who taught three sections of Jogging, also did not include any learning cues in her lesson plans, and very few were evident in her observed lesson executions. The limited number of learning cues that Sarah provided were generally presented as what *not* to do (e.g., "Don't swing your arms across your body"). Sarah supplemented her running instruction with exercises to improve core stability and balance, but learning cues were absent from these activities as well.

Summary of GTAs' Experiences with Devising and Sharing Learning Cues. GTAs were generally more adept at creating and utilizing learning cues than SLOs. Still, there was a broad continuum, from those skilled at incorporating learning cues into the appropriate places in their lesson plans to those GTAs who gave exceptional time and thought to devising appropriate and effective cues to utilize, but often failed to include them in written materials. Two GTAs provided no learning cues in their lesson plans and rarely utilized them in lesson execution, which appears to have negatively impacted learning. Later I will return to learning cues to discuss the influence that the intervention had on GTAs' creation of them. Next I will focus on the third curricular element central to the intervention, performance feedback.

GTAs' Provision of Performance Feedback. GTA provision of performance feedback presented the widest continuum of the curricular elements central to this study. Jimmy provided feedback that was exemplary – utilizing a student name, incorporating learning cues used in instruction, smoothly blending positive (reinforcing) and prescriptive feedback, and presenting it in a pleasant and upbeat manner that caused students to routinely seek it out. At the opposite end, Virginia rarely provided feedback at all during her lessons. Before considering the performance of other GTAs, I will briefly discuss the three levels of feedback which were seldom or never seen, allowing me to then focus on the most common level. The four levels of feedback identified by Hattie and Timperly (2007) are task feedback (describes how well students perform, or demonstrate understanding of, a task), process feedback (describes how well a student performs the main process needed to create a product, or understand/perform a task), self-regulation feedback (describes how well students self-monitor, self-direct, and regulate their actions towards a learning goal), and self feedback (which involves personal evaluations by teachers related to learners themselves and their traits and affect, rather than their performance).

Instances of process, self-regulation, and self feedback. While process and self-regulation feedback were rarely seen, a few GTAs were able to utilize them effectively. Akira and Fred (Weight Training/Conditioning) were both skilled in providing process feedback, often providing performance feedback in the form of questions that stimulated cognitive processing (such as the effects that moving one's hands on the bar will have on a given lift). Miranda (Fitness Swim) was effective in providing self-regulation feedback designed to help her students develop their abilities to meticulously pace themselves and to control their breathing. The delineations between task, process, and self-regulation feedback are not absolute, so to some degree process and self-regulation feedback were intermingled with task feedback in GTA lessons. Self feedback, which has been shown to be ineffective for learning (Deci, Koestner, & Ryan, 1999), was completely absent from observed lessons, as is preferred.

Trends in task feedback. In regards to task feedback, a number of trends emerged. Students welcomed and generally sought politely-presented feedback from their instructors, particularly feedback that reflected the teacher's understanding of their unique strengths, weaknesses, and tendencies. Students also liked having their name attached to the feedback, a seemingly simple device that surprisingly few of the GTAs initially utilized. Most (but not all) GTAs could provide effective prescriptive task feedback that was specific ("Raquel, remember to step forward when you pass"). Many GTAs struggled, at least initially, with providing positive (reinforcing) task feedback that was specific ("Way to keep your core tight, Will") rather than vague ("Nice job, Will"). Even for GTAs who were, or became, proficient in providing feedback during drills and practice activities, teacher feedback almost universally disappeared during competitive or pseudo-competitive team activities often used to culminate lessons in volleyball, basketball, soccer, and badminton. Lastly, there appeared to be a strong correlation between providing effective feedback and the maintenance of a healthy and productive culture of learning

within a class. I will now consider each of these task feedback trends in greater detail while providing supporting data.

Students seeking polite, personal feedback. Virtually all undergraduate students welcomed feedback and found it helpful, as long as it was presented in a manner that did not negatively single them out. Keye, a student in Cynthia’s Beginning Basketball class, offered a point of view held by many of the undergraduates – “If we’re not doing something correctly she’ll point it out. But not like *call* you out but, you know, she’ll like *help* you out.” Jimmy (Beginning Swim), who was particularly adept at providing feedback, fashioned it specifically for each student, taking the student’s strengths, weaknesses, and tendencies into consideration. His student Carlos expressed this notion well.

... he makes (feedback) personal ... he already kind of knows what we're going to do, where we're going to need some work, but, like I said, his feedback's *personal*. ... like for me, I have to work a lot on my form ... he points that out.

A fair number of students complimented their instructors’ provision of polite feedback (suggesting that they had some negative experiences with past teachers). A few even suggested that instructors might be reluctant to provide feedback for fear of embarrassing their students. Randall (from Virginia’s Intermediate Soccer class) suggested that his instructor might have been reluctant to provide feedback because “some people might take it the wrong way”. Katrina (from Glenn’s Intermediate Volleyball class) said, “You might not want to feel like you’re calling someone out”. These comments suggest the benefit of GTAs being transparent and explicit in explaining their teaching methods to their students – including the importance of feedback, what it is designed to achieve, and the spirit in which it is intended.

Using student names when providing feedback. Martina, a student in Miranda’s Fitness Swim class, pointed out one simple benefit of GTAs using student names when providing

feedback. She stated, “Obviously, I mean, it’s nice, because in swimming it’s kind of hard sometimes to know - are you talking to me? Are you talking to her?” She shared that she had grown very accustomed to being called by her name by Miranda, and found the question of whether or not this was important to her almost laughable, saying, “Yeah, obviously I like being called my name. Everyone likes being called their name (she laughs).” In the initial round of 11 observations it was relatively rare to witness GTAs using student names beyond taking attendance at the beginning of a class meeting. Apart from Miranda, Jimmy and Sarah were the only two instructors routinely doing so. Making use of student names throughout a lesson but particularly when providing feedback was a mentoring point I discussed with the remaining GTAs in one-on-one mentoring sessions. Paul took this advice to heart and attached student names to nearly all the feedback he provided in his final two observed lessons. Glenn, Cynthia, Akira, and Robert showed improvement, but were inconsistent in their use of names. Fred and Lily continued to rarely make use of student names. Virginia stated that she found using her students’ names “made a difference” and led to a more “laid-back environment”. It appears that using students’ names required conscious thought and practice for GTAs, at least initially, before it could become second nature. The same can be said for providing *specific* positive feedback.

Prescriptive and positive feedback. While most GTAs were very familiar with prescriptive feedback and many were adept at providing it, the provision of *specific* positive feedback (as compared to commonly-provided *vague* positive feedback, such as “Way to go”) was largely unfamiliar, and thus proved an initial challenge. The field notes for Miranda’s first observation reveal the issue with vague positive feedback that many GTAs experienced, particularly early on in the semester.

A pattern in Miranda’s feedback quickly became apparent, and was maintained throughout most of the lesson. Miranda’s prescriptive feedback was accompanied by student names and harkened back to her learning cues. Her prescriptive feedback was

abundant and on target. Students were able to make immediate use of it. Miranda's positive feedback, however, lacked specificity, being almost uniformly vague ("That was good", "Better", "Good job!", Thumbs up) and failed to reinforce any of her learning cues. I pointed this out to Miranda after class and she vowed to make a greater effort toward explaining *why* a particular performance was good.

At the training the tendency to provide non-specific feedback was presented as "the 'Good job!' trap" – complimenting a performance in a generic fashion that does not inform the student of which *specific* aspects of the performance are "good", while also failing to align learning cues with feedback. While specific *prescriptive* feedback flowed from many of the GTAs with almost unconscious ease, providing specific *positive* feedback required a conscious and deliberate effort for nearly all the GTAs (Jimmy being an exception, as he was adept in all facets of feedback provision from his first observed lesson). Fred (Weight Training/Conditioning) mentioned, "I would say 'Good, Good' - I want to explain *why* that's good." Victor, a student of Lily's (Beginning Badminton), described how even a relatively experienced teacher with a pedagogy degree could fall into this pattern.

She just does tell you if you're doing better or if you need improvement. Then she will tell you more of the specific - what you need improvement on, and what you can work on. But whenever you're doing good she just kind of hits you overall and just says, "You're doing well".

Sarah shared that she had difficulty providing specific positive feedback, because her feedback "just slips off the tongue" before she could formulate it in an effective manner. With some effort, a number of GTAs showed substantial growth in providing positive feedback that was specific and utilized learning cues. Glenn and Paul in particular showed great improvement across the semester, and were also able to blend specific positive feedback with prescriptive feedback seamlessly by their final observations.

Lack of feedback during competitive activities. As is traditionally the case, almost all observed lessons in basketball, soccer, volleyball, and badminton culminated in standard or modified team (or singles) play. GTAs were generally very open to experimenting with suggested modifications to competitive play that helped foster learning objectives and increase “touches” (such as replacing the volleyball serve with a gentle toss). My suggestion of providing as much feedback during competitive play as during drills, however, offered during many one-on-one discussions, was acknowledged but rarely heeded. Most GTAs were far quieter during this portion of their lessons. Some assumed the role of referee or score keeper, and the limited prescriptive feedback provided was usually directed to the entire class (e.g., “Remember to use the whole playing space”) while the positive feedback was often exceptionally vague and generic (e.g., “Nice shot”). Even when GTAs would modify competitive activities to foster learning objectives (such as Cynthia doubling the value for points derived from pick and rolls during full court play), they missed opportunities to provide feedback directly related to the modifications (whether the pick setter stood firm, whether the rub was close enough, whether the roller turned towards the ball or away from it). Despite repeated mentoring efforts, feedback provision decreased considerably during this portion of GTA lessons.

Feedback and learning culture. There appeared to be a correlation between the provision of feedback and the learning culture within a given class. Two of the eleven new GTAs in the study, Sarah (Jogging) and Virginia (Beginning Soccer and Intermediate Soccer), provided substantially less feedback than their colleagues and they experienced the most difficulty in keeping students motivated and on task. It appears that the lack of feedback (perhaps combined with a lack of learning cues) may have quietly instigated a recreational, rather than learning-focused, environment. Over time, many students demonstrated a reluctance to fully apply themselves in these classes, often resulting in half-hearted efforts during physical activity.

Sarah's difficulty with positive feedback was detailed above, but her provision of prescriptive feedback was also a concern, and seemed to contribute to the "low bar" culture that appeared to permeate her classes. In her first observed lesson, students had been assigned a reading about goal-setting strategies, and were required to submit a written paper and give an oral presentation regarding their running goals for the semester. Their goals were expected to meet the "SMART" requirement (specific, measurable, achievable, realistic, timely) laid out in the assigned reading. Nearly all student presentations were devoid of these five requirements, and many students were clearly creating vague goals ("Get back in shape", "Survive") off the top of their heads. Sarah's feedback following these presentations was universally positive and vague ("Good job"), subtly reinforcing the idea that the five requirements were not of any importance, and that there was no consequence for skipping assigned readings.

In two lessons late in the semester, there were examples of how a lack of feedback provision served as an indicator of an instructor "giving up" on students. Fred and Akira, similarly adept at providing feedback, both dealt with a small minority (three to five students) who gave minimal effort during conditioning drills in their classes. While Fred and Akira provided specific feedback to motivated students who were completing a variety of individual fitness and dexterity tests, they offered none to the poorly-motivated students. This suggested that they had, to some degree, "written off" these students. Akira discussed this with me, and considered it his "personal acceptance" of the fact that "some students are very motivated and want to learn and some are not." Apart from its role in instruction, feedback provision appeared crucial to a positive class learning culture.

Summary of GTAs' Provision of Performance Feedback. GTAs were in nearly universal agreement that specific performance feedback is an important and powerful teaching tool in physical activity courses. They generally found the process – using the student's name,

tailoring the feedback to the individual, revisiting the learning cues used in instruction, blending the positive with the prescriptive, being specific rather than vague, and continuing to offer feedback during competitive play – easy to understand, but challenging to implement. Paul’s experience sums it up well.

I think that is something I really tried to do and it was hard at first, because when you say it, you know, and you read about it you think "Oh yeah, that makes sense" but when you're actually out there ... it's hard to do that, but I think I did get better at doing that throughout the semester.

Almost all GTAs found that effective feedback provision required deliberate thought and consistent practice. In classes, or specific instances in classes, when feedback was absent, student motivation and learning appeared to be negatively impacted. To complete this section, I will consider the extent to which GTAs’ aligned SLOs, learning cues, and feedback in lesson planning and execution, while also considering their curricular sequencing across the semester.

Extent to Which GTAs Implemented an Aligned and Sequenced Curriculum. To briefly review, alignment is the manner in which curricular elements reinforce each other, and fit together logically (Biggs, 1999). Sequencing is the order in which curriculum is presented, either across one lesson (micro-sequencing) or across a semester (macro-sequencing). A well-sequenced curriculum is presented in a manner in which one piece logically builds upon another (Posner & Rudnitsky, 2001). While these two curricular aspects were often intermingled by GTAs, undergraduate students, and me during discussions and interviews, I will address them separately here.

Alignment’s role in the GTA training. The primary focus of the GTA training involved a “quick and easy” method (one that could fit within a three-hour training) for achieving curricular coherence in a physical activity lesson through close alignment of SLOs, learning cues, and feedback. The group exercise near the end of the training session focused on the creation of

this aligned combination. The model for alignment provided in the GTA training involved embedding learning cues within SLOs, and then utilizing those learning cues during instruction, feedback provision, and formative assessment to promote a consistent learning experience. It was also a consideration that planned practice activities should support achievement of SLOs, and that competitive activities (when appropriate to the given course) should be reconfigured to focus students on targeted skills, concepts, and strategies (as presented in SLOs) and not simply be presented as a reward.

Planning and implementation of aligned lessons. While there were significant individual differences, in general GTAs were far more proficient at *implementing* a lesson that demonstrated an alignment of curricular elements than formally *planning* one. Many GTAs failed to achieve basic proficiency in creating SLOs for their lesson plans. Many GTAs did not include formal SLOs in their lesson plans at all, and some also failed to include learning cues. Only one GTA (Glenn, Intermediate Volleyball) embedded his learning cues within his SLOs, and then distributed them within their appropriate places in his planned instruction. Most of the GTAs, even those who did not include learning cues in their lesson plans, utilized them when instructing, and tended to revisit those cues (an indication of alignment) when providing prescriptive feedback. Aligning learning cues with *positive* (reinforcing) feedback proved more challenging for many GTAs, at least initially, as their positive feedback tended to be vague and not grounded at all in their learning cues. Almost all GTAs were fairly skilled at choosing practice activities that promoted and aligned well with the skills, concepts, and strategies in their SLOs (even if those SLOs were implied rather than explicitly stated). However, GTAs in basketball, volleyball, soccer, and badminton had more difficulty (at least initially) in aligning their lesson-culminating competitive activities with their SLOs, and in providing feedback during them.

Aligning SLOs, learning cues, and feedback. Apart from Glenn, Jimmy (Beginning Swim), Miranda (Fitness Swim), Paul (Beginning and Intermediate Soccer), and Robert (Intermediate Basketball) demonstrated alignment in their lessons, at least in terms of lesson *execution*. The learning cues they provided recurred throughout instruction, closure, and prescriptive feedback, and with some mentoring and practice the learning cues were used in positive feedback as well. While those learning cues were not embedded in their SLOs on paper, and in some cases were not captured on paper at all, their (implied) SLOs were aligned well with the learning cues that they provided. Fred and Akira (Weight Training/Conditioning lab sections) faced the challenge of aligning their teaching with that of another instructor, intermingling Brian's materials with their own. They were generally successful in this regard, although Sofia, one of Fred's students, offered a different point of view.

I do wish though, that during the beginning of class ... we would talk more about the lecture part of it. He does talk about it, but it's not really in depth. I wish that he would talk a little bit more about it. And then incorporate it more into the workout for that day.

Cynthia (Beginning Basketball) was initially uncomfortable in her teaching, but as she began to establish her identity as an instructor, she became able to pay greater attention to alignment.

I think I definitely made a much more conscious effort to say "Okay, today, we're going to practice shooting form. These are the four cues." And then every time someone does that, reinforcing, "Oh, great balance, great eyes, great elbow, great follow-through". You know, making sure that the cues align with what I want them to learn today. And then at the end of the day ... it was "Okay, like what are the things we learned today?" and reinforcing those.

GTAs who demonstrated limited alignment. Sarah (Jogging) and Virginia (Beginning and Intermediate Soccer) rarely utilized SLOs or learning cues and provided limited, intermittent feedback or none at all, so it was not possible to see alignment of these elements in their lessons.

When Sarah was asked near the end of the semester if she had attempted to achieve alignment within her lessons, she appeared to be unfamiliar with the term: “I don't really know, maybe I've done that. I don't really, I haven't really thought about it that way I don't guess.” Virginia exhibited a better grasp of alignment, and could choose activities that supported her (implied) lesson objectives, but she struggled with learning cues, feedback, and written SLOs separately, making alignment of these elements impossible. She explained her planning process, and offered vague justifications for the absence of feedback in her teaching.

I feel like every time I make a lesson plan I go off my syllabus and kind of make my drills and such, obviously tailored to what I'm focusing towards. So that has been something that I think about when I make my lesson plans. Of the feedback, I do try, but I kind of struggle in that area. Just 'cause, one, there's so many (students), and two, this is new 'cause there's always kind of something going on or someone I need to keep an eye on. So I could definitely improve but that's something that I do think about and at least try to do while I'm teaching.

Micro-sequencing of curriculum. Most GTAs were able to sequence their lessons in a logical fashion that promoted curricular coherence for their students. Glenn shed light on the importance that sequencing played in GTA lesson planning and execution at the micro level.

In terms of a single lesson, what I try and do is put everything in some type of order so that it's coherent for the students, so that it makes sense, so that one thing is leading into the next ... And then we finish with trying to practice that skill in some type of game-like situation within a lesson. And I've tried to do each one that way.

Undergraduate students routinely used phrases like “break it down”, “build it up”, “bringing it together”, “piece by piece”, and “fits together” in describing the instruction they received. While English was not his first language, Paul's Intermediate Soccer student Muhammad summed up the sequencing in Paul's teaching well: “Everything was followed in order. There is nothing caused randomly.”

Macro-sequencing of curriculum. Most of the new GTAs created and presented semester-long curricula that were logically sequenced. Glenn explained how he saw this process.

From a semester standpoint, integrating things so that they coherently make sense in terms of "All right, so we're going to do passing first, then we're going to do setting ... That makes more sense to me ... because the footwork for one looks like the footwork for the other ... Doing serving before hitting because again you can incorporate similar principles ... and so we've kind of established this strong foundation of basic skills.

Glenn's student, Jahvid, echoed this point of view.

... you can take one thing and then everything kind of builds around it. I think that overall the progressions through this class have helped more so by breaking it down into smaller pieces ... So, the big picture's a great thing to see and yeah, we get to play and have a good time, but breaking it down into small pieces and then every day building that into game play really helps build confidence as well as skill level.

Cynthia's Beginning Basketball student Neil expressed that while her curriculum had come together, he didn't feel it was through overt planning on her part.

I don't really see it as a puzzle. I mean she kind of focuses on each skill in basketball, and then it all kind of comes together. But I wouldn't say there's a path that flows. It's just kind of there. She just kind of, you know - different skills are thrown at us each day, and then it all comes together. It's not really like a set path or - I wouldn't say it flows.

While appropriate macro-sequencing was routinely achieved by most GTAs, errors did occasionally take place, but they tended to serve as learning experiences rather than roadblocks, as Glenn explained.

It definitely shows itself when I've done something in the wrong way. For example, when we started 6-on-6 game play. We ... started playing and as we did I realized I never taught them how to transition, or base defense, base offense. And so then we had to go backwards. And so in that instance it pointed itself out as "Well you should have done this one in front of the other".

Summary of extent to which GTAs implemented an aligned and sequenced curriculum.

To summarize, in general GTAs were far more proficient at *implementing* a lesson with aligned curricular elements than formally *planning* one, and there was a very wide range among the 11 new GTAs regarding this achievement. Glenn was proficient at both planning and executing an aligned lesson, while Paul, Jimmy, Robert, and Miranda demonstrated alignment in their lessons without accompanying formal plans. These GTAs also demonstrated appropriate sequencing of their curriculum at the micro and macro levels. When individual curricular elements were absent from lessons (often the case with Sarah and Virginia), alignment was difficult to observe.

Intervention's Enhancement of GTAs' Ability to Align Curricular Elements

In this section I will respond to the second research question: "In what ways did a constructivist-oriented training session and semester-long mentoring intervention enhance GTAs' ability to align SLOs, learning cues, and teacher-provided feedback?" In answering this question, I will utilize a similar structure to that employed in my response to the first major research question. I will present my response in four subsections, examining the intervention's enhancement of GTAs' ability to create and implement SLOs, to devise and share learning cues, to provide feedback, and finally to align these elements in their planning and teaching.

Intervention's Enhancement of GTAs' Ability to Create and Implement SLOs.

Most GTAs struggled with creating written SLOs for their syllabi and (in particular) their lesson plans, yet many executed lessons in which their students consistently recognized clear objectives. The training session proved generally ineffective in preparing GTAs to create written SLOs that were specific, observable, and assessable. It also proved generally ineffective in helping GTAs to create SLOs with the structure and syntax typically found in pedagogy. The mentoring process (three planned observations and one-on-one discussions, plus informal discussions as they occurred) proved fairly ineffective as well in this regard, as there was limited evidence of growth

in GTAs' propensity for writing effective SLOs across the semester. One GTA (Glenn) proved to be a notable exception, as he reported the training being highly impactful, enhancing his creation of effective SLOs for his lesson plans. The training appeared to be somewhat effective in stimulating the thought process of many GTAs, leading to the creation of SLOs that were captured poorly (or not at all) on paper, but were evident in lesson execution and helped GTAs to choose appropriate activities and effective learning cues. I will now examine the training provided related to SLOs, discuss Glenn's unique success with SLOs, and consider the evolution of GTAs' SLOs across the semester as it related to the training/mentoring intervention. I will conclude by discussing the process by which many GTAs appeared to utilize SLOs in their lesson execution without capturing them well (if at all) in writing, and my failed attempts to alter this behavior through mentoring.

Training related to SLOs. SLO creation was not included in the university-wide GTA orientation or the departmental orientation. Over the course of the summer, Brian provided a variety of documents to the incoming GTAs via e-mail. It was his hope that these documents (which often included syllabi from previous iterations of the courses the given GTA would be teaching) would give the new instructors a head start on planning their teaching for the semester. This turned out to not always be the case, perhaps because some GTAs lacked the background to make effective use of the materials. Brian explained:

I got a little frustrated this summer ... You know I sent them a lot of material way back in like early June and said "Guys, you don't want to show up here Day 1 in August for orientation having done zero prep ... take this stuff, process it. Start to develop syllabi, lesson plans, unit modules". And I sent them some stuff that (the previous director) had put together, some really good stuff, and some of my thoughts on what they should do to prep. And some of them did that for sure, others came in completely flat-footed.

At the GTA training session, SLO creation, both for syllabi and lesson plans, was included in the slide presentation. The GTAs were provided with examples of SLOs that utilized common syntax (“Students will be able to ...”, commonly abbreviated as “SWBAT”, followed by action verbs and targeted skills) and were specific, observable, and assessable. GTAs were encouraged to embed the learning cues for the skills and concepts targeted in their lessons within the related SLOs. For example, “SWBAT perform a hand set using appropriate form (ball cradled, knees bent, power generated through legs, elbows out, target faced)”. The five embedded learning cues served to define “appropriate form” and make the SLO easily assessable, as an instructor could observe how well or frequently a student was performing those five aspects of the skill.

Near the conclusion of the training session, GTAs gathered in groups of three to complete a written exercise that involved creating three SLOs, three learning cues related to each SLO, and three sets of hypothetical feedback (for students with differing levels of success). The five completed exercises contained SLOs that suggested that the preceding training had been ineffective. None of the groups utilized the suggested structure (“SWBAT ...”), and most did not use complete sentences. One group’s SLOs for a weightlifting lesson were “Form, Breathing, Spotting/Safety”. Another group utilized learning cues in place of SLOs. Two groups used vague terminology (“various shots”, “proper body position”, “desired range”) without embedding learning cues to add specificity and assessability (as had been shown in the examples provided). Only the group creating materials for a soccer lesson attempted to embed learning cues in their SLOs (“Demonstrates proper in-step form, including hips, toe pointing, step and follow-through”). One GTA expressed on the anonymous satisfaction survey, “I wish we spent less time on the (think/pair/share) activity and more on the second group activity because I thought it was very helpful but rushed.” The activity was originally scheduled to include brief peer teaching

(with pantomimed physical activity, owing to the conference room location) from each group. With the training running behind schedule, the peer teaching was eliminated and the time to complete the exercise was shortened, perhaps affecting the quality of the completed exercises. It should be noted, however, that GTAs had relative success producing learning cues and feedback on the same exercise. To a large degree, the results of these exercises anticipated the semester-long difficulties most GTAs would have with SLOs. Glenn, however, proved a notable exception.

Glenn's success with SLO creation. Glenn was a member of the group that used learning cues in place of SLOs in their exercise. While he had a background in coaching collegiate club volleyball, Glenn had never taught and had no pedagogical training. He was one of the GTAs whom Brian had spoken of, coming in without having attempted any preparation for his course. Glenn had concerns about teaching for the first time, but felt strongly about his content knowledge (“I’m very confident in what I know and so there was kind of that level of confidence and that helped to suppress the anxiety”). Glenn created his syllabus and semester-long SLOs a short time after the training session, in part using a previous iteration of the course syllabus as a guide. He referred to “basic skills” and “advanced skills” that students were expected to grow fluent in, but added specificity to these SLOs by identifying the skills by name.

In his lesson plans, Glenn was the only GTA to embed learning cues in his SLOs, as had been suggested at the training. For example: “Students will be able to perform an attack using appropriate form (4 step approach, explosive jump, bow and arrow-high elbow, double-C’s, high contact-1-2pm)”. While his learning cues were steeped in volleyball jargon that was explained in depth within his lesson plan, the learning cues serve to define “appropriate form” and provide five observable means of assessment. The plans for all three of Glenn’s observed lessons contain

similarly-structured SLOs. Glenn described the anxiety that teaching created for him, in juxtaposition to the confidence he had in his content knowledge.

I was pretty nervous about it going into the year, before we had our orientation, and was like "Shoot, how do I put a lesson plan together? I guess I could just do it like I coach". But after your orientation I felt like it helped narrow my focus and build some confidence, provided some structure. So I knew, all right, this is how I need to set it up - a learning objective, some learning cues, and then come up with some type of lesson plan that's working those all in."

Glenn added that, "Obviously the training session was huge for me". Regarding SLOs, the training session was clearly less effective, though, for the majority of GTAs. I'll now consider the role that mentoring played in SLO creation, as I examine the evolution of SLOs across the semester.

Evolution of SLOs across the semester. While one-on-one mentoring sessions that followed observations impacted many aspects of GTA teaching, they seemed to have had little to no effect on GTAs producing effective written SLOs. A few GTAs, such as Virginia and Miranda, showed minor improvement by moving from no SLOs at all to a few short phrases that were difficult to assess. Akira's initial attempts to create SLOs were exceptionally vague ("Become able to demonstrate & assess new exercises", "Exercise in groups"). The SLOs in his third observed lesson plan added a small degree of specificity, naming some of the agility tests that participants were expected to be able to perform. Robert and Paul tended to list activities and or targeted skills in place of SLOs, and apart from being slightly more verbose at the end of the semester, there was little change. Glenn's SLOs were strong throughout his lesson planning, while Sarah failed to utilize SLOs at all in any of her planning.

Other GTAs demonstrated a regression in their written SLOs. Lily's SLOs grew broader as the semester continued (e.g., "Familiar with basic tactics and rules for playing doubles") and in her third lesson plan traditional structure and syntax were replaced by incomplete sentences. As

Cynthia moved away from using published materials as a guide, her SLOs were of varying quality. They wavered in viewpoint between the student (“Demonstrate fundamentally sound dribble”) and the teacher (“Introduce dribbling, including specific uses of the dribble and good sportsmanship”), and sometimes appeared confounded by the intermingling of concepts. By her third observed lesson, she abandoned written SLOs entirely (“We've gotten into game play, so I don't have a detailed lesson plan, but today will look like this ...”), even though the focus of the day’s lesson, as could be seen in execution, was clearly related to utilizing pick and rolls in a 5-on-5 setting. This provides an example of the phenomenon of GTAs structuring their lessons around implied, unwritten SLOs.

Implied SLOs in GTA lesson execution. Many of the GTAs were far more adept at formulating the core of an SLO in their mind than translating that thought to a formal, written SLO in a lesson plan. Jimmy described his planning process.

You have to realize what their weaknesses are and then prioritize them ... once I realize what they need to work on, I structure something based off of what has previously worked in classes and try and lump things that are generally grouped to help them improve on that one or maybe two skills per class.

Jimmy was very effective in his instruction, and in each of his three observed lessons the implied (but unstated) SLOs that drove his instruction and activities were plainly clear during lesson execution. When completing his overwhelmingly positive departmental evaluation, I included the suggestion that Jimmy create written SLOs in the format suggested at the GTA training. This suggestion went unheeded, as Jimmy’s third lesson plan contained only a terse “Focuses for today: Strengthening the stroke, flip turns” in lieu of SLOs.

Paul felt that the fluid nature of his Beginning Soccer class made the course calendar in his syllabus largely obsolete.

So, the student learning objectives, I tried to - when I first tried planning out my weeks for the course I tried to have some for each week, some student learning objectives that I wanted to implement for that week. But it changed, it changed based on like the level of kids I had and how they were progressing.

Far from “winging it”, though, Paul explained to me at length how he carried “this little notebook” with him at all times in which he would jot down ideas for lessons, activities, and learning cues. He would review his notes and formulate the pieces of a lesson in his head, and “then after that I would do the session breakdown of the times for all that” (in writing). Paul’s choices for instruction, learning cues, and activities were all fueled by SLOs that were implied but never seen to written fruition. Paul actively sought and was exceptionally responsive to feedback after his observed lessons, but he continued to avoid formal SLOs despite mentoring. In summary, the intervention was generally ineffective in enhancing most GTAs’ ability to create formal SLOs, particularly within written lesson plans.

Intervention’s Enhancement of GTAs’ Ability to Create and Implement Learning Cues. There was a broad spectrum in GTAs’ ability to create and implement learning cues. Previous GTAs experiences as students, players, coaches, and teachers appeared to lead to greater familiarity with, and skill at, creating and implementing learning cues than creating SLOs or providing feedback. For those with teaching experience, the training/mentoring intervention served as a refresher, or as an affirmation, regarding learning cues. For some with no teaching experience, though, the intervention gave a name and a process to an aspect of teaching/coaching that they had experienced as students/players, but had not given much previous thought to. For these individuals, the intervention enhanced their learning cue creation and implementation substantially. For two of the GTAs, the training/mentoring intervention was ineffective, as they rarely included learning cues in their lesson plans or executions. As with SLOs, many of the GTAs who were efficient at using learning cues in their lesson execution often failed to include

more than a small sampling of them (if any at all) in their lesson *plans*. Mentoring efforts to change this practice were largely ineffective. I will now consider the role of learning cues in the GTA training session, the various ways (affirmation, refresher, epiphany, little impact) the intervention was experienced regarding learning cues, and how mentoring failed to alter the tendency of most GTAs to include learning cues in their lesson execution but not their lesson planning.

The role of learning cues in the GTA training. Learning cues played a pivotal role in the GTA training session. They were presented as the link that can tie together SLOs, instruction, feedback, and formative/summative assessment, thereby playing *the* crucial role in formulating and executing aligned lessons. While there was a great deal more focus on the role learning cues play in alignment, there was also some instruction regarding the creation of learning cues, centering on making them brief and memorable. Interestingly, learning cues were not mentioned by name during a brain storming activity in which GTAs were asked “What do you feel are the key curricular elements of a successful physical activity lesson?”

As part of the exercise already described, groups of three GTAs were asked to provide three learning cues for each of three skills/concepts they chose. GTAs demonstrated greater success in creating learning cues than SLOs in this exercise, as two groups filled all nine slots with appropriate cues. These included cues that were brief (“Elbow over knee”, “Flat back”, “Knees out”) and memorable (“Make a balloon”, “Hand in the cookie jar”, “Style it, profile it”), along with a few that were more instruction than cue (e.g., “Breathe out during concentric movement”). Two other groups presented a mixture of overly-long (“ankle long with follow-through at hips”), memorable (“Pull the water”, “Ear to your arm”), and slightly-misremembered (“plant, put or push”, rather than “plant, putter, push”) cues. Only one group had notable difficulty, primarily providing instruction (“Stand with shooting hand and corresponding foot

slightly forward”) and environmental factors (“distance of opponent”, “availability of teammates”) in lieu of learning cues. The exercise results suggested that many GTAs had a workable understanding of learning cues entering the semester. Near the completion of the training I demonstrated an assessment/closure technique related to learning cues: “I’ve just arrived from Mars and know nothing at all about basketball. Please provide me with the learning cues (one unique cue per student, please) for properly executing a jump shot.” Robert successfully utilized this technique, nearly verbatim, in his third observed lesson, providing one example of a GTA response to the training/mentoring intervention. I will now consider other responses.

Varied GTAs experiences with training/mentoring and learning cues. There was a very wide range of responses to the training and mentoring related to learning cues. Lily, the most experienced teacher in the group shared, “I have to say the training at the beginning of this semester was quite helpful. It refreshed my mind to focus on what I'm going to do in my teaching. For example, learning cues.” Jimmy had two years of experience as a GTA, but only a single day of previous pedagogical training. He was mildly surprised to see his existing methods align so closely with the training he was receiving.

As you would present something I would be interested in finding out, you know, "Okay, what is this going to entail? How is it going to help me?" And then as you said what it was, I was like "I'm already doing this".

Jimmy’s confidence and comfort were further enhanced when we had our mentoring session after his first observed lesson.

... like, you know, the different learning cues. When you illustrated how many I had I realized "Oh, I am doing the right thing here, this is helping them learn". And I think it was good to have an external view on that. And just kind of a little bit more objective measure of, you know, somebody validating, "Hey, your students are learning, they're very receptive, and this is good stuff".

As his comment attests, Jimmy provided numerous learning cues for nearly every skill in his observed lessons, and they were appropriate to the associated skills and exceptionally memorable (e.g., “Act like someone is about to punch you in the stomach”). To Jimmy, the training, and particularly the mentoring sessions, were a confirmation that his two years of teaching experience had helped make him skilled at providing learning cues. For many GTAs with no experience, a stronger impact was felt. Paul provides one example.

But the whole like - the student learning objectives and the providing the cues - like the little activities we did, where we, you know, "How do you do a basketball shot?" and "Pick a skill and pick out the cues you want to do". I think that stuff was definitely helpful, and definitely gave me a little bit more confidence for that first day of class.

Miranda had been using learning cues in swim coaching without giving thought to what they were called and how they could interact with SLOs, and the training brought that into focus for her.

I did like learning about creating course objectives and the learning cues. That wasn't something I really had any familiarity with and I think it helped me with this level of swimmer or with this level of student because it made more sense in a teaching course.

Similarly, Cynthia described how she had benefited from the use of learning cues as a student/player without ever giving thought to the process until the training session.

I don't think I really paid (previous) attention to "Okay, I'm learning this new thing. What are the cues that someone gave me? What is the information that I received from a teacher or a coach to learn something?" ... I definitely pulled from (the training).

Glenn also expressed how the training session enhanced his creation of effective learning cues.

I would say the learning cues have been big for me because, if anything, if when I coached it's something that I maybe do subconsciously. I'll throw something in there,

like "Oh, this is how you should be doing it", but in terms of teaching the skill I really like that aspect of what you taught us because it allowed me to focus and say "All right, how *do* you learn this skill? What's an easy way to teach this that someone is going to pick up on?" And that's how I feel, those have really helped.

Finally, there was very little evidence that training and mentoring related to learning cues resonated with Sarah or Virginia. Learning cues were generally absent from their lesson plans and lesson executions. Near the end of the semester Sarah mentioned being “mindful” of cues, but had a hazy recollection of the training session.

Definitely I've tried to be mindful of the learning objectives and cues, for sure ... So that's one component, and I honestly can't remember everything that we learned from that session. Specifically, maybe it's stayed with me, but I don't associate it with that session.

GTA responses to the training/mentoring regarding learning cues was generally positive, sometimes exceptionally positive, but the process clearly did not resonate with all GTAs.

Learning cues in lesson plans vs. lesson execution. While learning cues were abundant in most GTAs' lesson executions, they were often absent from GTA lesson *plans*. The model presented at the training exhibited the practice of embedding learning cues within SLOs, and then repeating those same learning cues in their naturally-occurring places within instruction. Glenn was the only GTA to follow the model, and he did so in all three of his observed lessons, as these excerpts from this third lesson plan vividly demonstrate.

SLO: SWBAT demonstrate an understanding of how to perform appropriate individual defense, including the correct form (low posture, step towards the ball, get your hips around towards target) as well as making the correct reads (reading the hitter's approach and arm).

From the instruction portion of the lesson:

Demonstrate correct defensive starting form

- a. Low body posture (chest > knees > feet)
- b. Feet turned in (slightly past shoulder width)
- c. Arms outside of knees

Demonstrate correct defensive adjustments (moving left and right)

- a. Step towards the hit

- b. Feet should be forward towards the target; not away from our body
- c. Turn your hips towards target (your hips will follow your feet; the ball will follow both)

...

Demonstrate how to make the proper reads

- a. First read: the hitter's approach – helps to hint the direction the hitter will attack
- b. Second read: the hitter's arm – further hints at direction of the hit

Lily's lesson plans routinely contained learning cues, although they were not embedded in her SLOs. Jimmy's first lesson plan contained a number of learning cues, or allusions to learning cues ("Getting a good catch", "Keeping hips up", "Straight legs"), but only a small sampling of what he would share in the execution of his lesson. By his third lesson plan, learning cues were essentially absent. Apart from these three GTAs, instances of learning cues in lesson plans were rare. This aspect of the training did not resonate with most GTAs, and mentoring was equally ineffective in getting GTAs to capture their learning cues on paper. I will now consider how the intervention enhanced the third major curricular element, GTAs' ability to provide feedback.

Intervention's Enhancement of GTAs' Ability to Provide Feedback. The training/mentoring intervention positively enhanced most GTAs' ability to provide prescriptive feedback and for many had a profound effect on their ability to provide *specific* positive feedback. Exercises completed at the training demonstrated that GTAs grasped the basic concepts of prescriptive and positive feedback. A number of GTAs were fairly fluent in prescriptive feedback immediately, aligning it with learning cues, as modeled at the training. *Positive* feedback proved much more challenging for GTAs, as many provided positive feedback unrelated to learning cues ("Way to go!"). However, mentoring substantially enhanced the provision of specific positive feedback for a number of GTAs. As with SLOs and learning cues, the training/mentoring intervention was ineffective for two of the GTAs, who provided little

effective feedback in their lessons throughout the semester. Mentoring was ineffective in motivating GTAs to provide feedback consistently during competitive play – little improvement was seen in this area across the semester. I will now consider the training related to feedback provision, how training/mentoring impacted prescriptive and positive feedback provision, and how mentoring failed to impact the diminished feedback provided during competitive play.

The role of feedback in the GTA training session. In the training’s brainstorming exercise, GTAs recognized “Consistent feedback from teacher or other students” as a key curricular element in effective physical activity instruction. Feedback provision was prominently featured in the slide presentation I provided. GTAs were introduced to the four levels of feedback as well as the characteristics of effective feedback (specific, related to previous instruction such as learning cues, non-evaluative, directed toward an individual student) (Hattie & Timperly, 2007). Three “takeaways” were provided at the bottom of three slides – “Always align your learning cues and your feedback”, “Always explain what was good about (a performance)”, and “USE YOUR STUDENTS’ NAMES”. The first was quickly achieved by most GTAs, the second (providing specific positive feedback) proved an initial challenge, and the third required a conscious effort for most GTAs.

Each group completed three pieces of hypothetical feedback related to the SLOs and learning cues they created for a concept or set of skills of their choosing. Adherence to the provided model varied, but all five groups demonstrated understanding of the differences between positive and prescriptive feedback. All the feedback provided was specific and related to the learning cues contained in the exercise (e.g., “I like the way you’re following through but you need to remember to lock that elbow in”). Only one group addressed all three students by name, indicating that one of three “takeaways” had failed to resonate meaningfully with most GTAs. That same group provided the only attempt at higher-level feedback designed to foster cognitive

processing (“Johnny, why do you think the ball didn’t reach the basket? And how could you have used your teammates in this situation?”) The exercises generally indicated that GTAs could demonstrate a theoretical understanding of the role of feedback, and how to provide it effectively. When they began teaching, however, GTAs had varying success putting theory into practice.

Intervention’s enhancement of GTAs’ ability to provide prescriptive feedback. The majority of the GTAs provided prescriptive feedback that was on point and aligned with learning cues used in instruction. They generally followed the model provided at the training session, although most (Jimmy and Miranda being exceptions) rarely attached student names to feedback in their first observed lessons. Sarah, conversely, used student names but tended to provide little effective feedback in her observed lessons. As Fred’s student Sven described, “He does a really good job of making sure to pinpoint what's wrong, what's going on, and how I can improve it”. Miranda’s prescriptive feedback and learning cues were tightly aligned – at times, she would simply repeat cues used in instruction (preceded by the student’s name) to serve as feedback (e.g., “Grab the water and throw it down towards your feet”). Many GTAs supplemented their verbal prescriptive feedback with demonstrations that built on previous instruction (as suggested in the training), as Paul’s Intermediate Soccer student Muhammad pointed out: “He’ll come beside you if you cannot make it. (You) pass it to him and then he’s gonna go with you step by step until you're getting it.”

Mentoring sessions positively reinforced GTAs who were providing effective prescriptive feedback. In his first observed lesson, Paul aligned his learning cues and prescriptive feedback well, but rarely made use of student names and struggled with positive feedback. In our mentoring discussion, Paul expressed a strong desire to improve as a teacher, as his departmental evaluation, completed after his second observed lesson, demonstrates.

Paul is a very reflective teacher who sought my counsel and advice to tweak his current methods rather than rest on his laurels. His efforts to master feedback between my first and second visits were exceptionally fruitful. Paul's provision of feedback that aligns the student's name, previous learning cues, a positive (reinforcing) statement and a prescriptive statement is "textbook" – he excels at it, and his students unquestionably benefit from it.

Jimmy offered some insight into the focus most GTAs initially had regarding prescriptive feedback over positive feedback.

I think there are a lot of times in swimming that you get so focused on improvements, because even the best swimmers have sometimes not optimal form. So you can tell them, "This is something you can do" but it's easy to forget to tell them, "Hey, everything else is looking great. You're doing awesome."

Providing positive feedback to reinforce proper skill performance, with greater specificity than Jimmy displayed in the example above, was a challenge for nearly every GTA, excepting, ironically, Jimmy himself. Jimmy was the only GTA who provided effective *specific* positive feedback from his very first lesson.

Intervention's enhancement of GTAs' ability to provide positive feedback. While GTAs demonstrated understanding of positive feedback in a theoretical sense at the training session, it was something many seemed to have rarely been exposed to as students or athletes. Robert shared his experience and how the training changed his perception of positive feedback.

I think what I'm used to from coaches is - I can just hear it in my head "Good, good". But what does that really mean? So then saying what is good about what happened ... that was very helpful because I hadn't even thought of that at all. I don't think anyone's pointed that out to me before. Just to say exactly what was good about the play or good about what happened, so that was a new way of thinking for me.

With the basic idea already understood, GTAs were able to grow adept at providing specific positive feedback through mentoring and practice. The training/mentoring process was exceptionally influential in this regard, as Glenn (Intermediate Volleyball) explains:

I think the second time you observed me you talked about feedback. How my feedback that day was pretty lazy in terms of "Good up", "Good pass". Which was good because I need that because sometimes I think I get lazy with it where I just think "All right, that was good, that was good" instead of providing the specific feedback and so I've tried to be better since then, of, "You're doing this right, you're doing this wrong".

Fred was another GTA who made dramatic improvement in his provision of specific positive feedback after a mentoring session, as he explained: "Without you coming on that first visit I don't know if I would have clicked as soon as I did about the feedback, and the positive feedback".

Intervention's influence on feedback provision during competitive play. Continuing to provide individualized, specific feedback (both prescriptive and positive) during competitive play was not discussed at the GTA training. However, it was a mentoring point raised numerous times in one-on-one discussions with instructors of team sports and badminton. Robert, who was exceptionally responsive to much of the mentoring provided, did not demonstrate improvement in this area, as my third observation field notes attest.

Robert missed many opportunities for individual feedback once competitive play began. I suggested that in future instances he provide feedback on whether students were catching the ball in a triple threat position, or whether they were able to create space via v-cuts, or slashing dribbles leading to pull-ups or drives.

Robert modified 5-on-5 play in his lesson to promote his implied SLOs in response to previous mentoring, but did not capitalize on the chance to provide feedback regarding the targeted skills. Paul, who had grown exceptionally proficient ("textbook") at providing feedback during drills and practice activities, provided minimal feedback during the 15-minute scrimmage that culminated his third observed lesson, and that feedback was not related to that day's SLOs or previous instruction/drills. Glenn's student Jahvid offered that "Sometimes I feel like it's hard to kind of give feedback to everybody when we play in the games". Despite mentoring attempts to

reverse this trend, his statement held for all GTAs teaching team sports and badminton. In summary, the training/mentoring intervention positively enhanced most GTAs ability to provide prescriptive feedback and for many had a profound effect on their provision of *specific* positive feedback. I will now consider how the intervention enhanced GTAs' ability to align the three focal curricular elements.

Intervention's Enhancement of GTAs' Ability to Align Curricular Elements. The training/mentoring intervention enhanced the ability of most GTAs to align SLOs, learning cues, and feedback in the *execution* of their lessons. It was much less impactful in enhancing GTAs' alignment of these curricular elements in their written lesson plans, in which the frequent absence of formal SLOs and learning cues often made alignment impossible. In general, GTAs demonstrated understanding of alignment and were motivated to utilize training and mentoring in order to present their students with effective and coherent teaching. I will now consider the role of alignment at the training, and then present evidence of the manner in which the training/mentoring intervention enhanced GTAs' alignment of curricular elements in their lesson execution.

Alignment in the GTA training. Alignment of SLOs, learning cues, and feedback (and to a lesser extent, activities and formative assessment) was the focal part of the GTA training. The group exercises demonstrated that GTAs had a basic understanding of alignment (as learning cues and feedback were generally well-aligned), but struggled with the creation of written SLOs, and the alignment of those SLOs with learning cues (thus failing to achieve two objectives laid out in the lesson plan for the training). Most GTAs had greater success in putting alignment into practice in their lesson execution once the semester began, and mentoring served to reinforce this practice.

Evidence of the intervention's enhancement of GTAs' ability to align. Numerous examples of the intervention enhancing GTAs' ability to align curricular elements in their lessons have already been presented in this chapter. These include Robert's utilization of activities that supported his SLOs, and his use of rule modifications that carried over from drills to competitive play to foster achievement of specific learning objectives. Robert shared that the training/mentoring intervention played an important role in shaping his approach to teaching, "Because if it had been done in another way... I think it would be more, I jump to the word chaotic (he laughs) ... at least it wouldn't be as cohesive". Glenn followed the model provided at the training closely, resulting in aligned lessons that manifested in notable student learning. Entering his first teaching assignment unsure of how to proceed, Glenn found that "Having the structure" that the training provided "definitely helped". He described the presentation of an aligned curriculum as "just trying to make sure everything is coming together", then spoke at greater length of the training's specific impact.

It gave me some structure to base each of my lesson plans off of in terms of, you know, we need to work at this objective, these are the different cues that we're going to use. Here's how we're going to set up a lesson plan, using feedback, specific feedback to a student and tell him "Okay, you've got this down, but this part you need to work on." And so looking back on it I think it's helped tremendously with me organizing my thoughts, organizing how I want the semester to go, organizing each individual lesson and then actually doing it.

Jimmy felt that the training provided a confirmation that his teaching methods arrived at through "trial and experiment" were appropriate and effective, and that our mentoring sessions provided him with another perspective on his teaching. His student, Leon, described the alignment in Jimmy's lessons and how it fostered student learning.

I feel like his background knowledge really comes into effect in class. He's not able to just tell us what he wants us to do, he's able to show us, he's able to kind of see where we

might struggle and then he's able to fix it. So I feel like he can mesh all those together in a way that - I feel like I can learn a lot.

The intervention strongly enhanced GTAs' alignment of learning cues and feedback. As described above, many GTAs were completely unfamiliar with the concept of providing positive feedback that was specific (i.e., directly related to learning cues provided in instruction). Training ("Takeaway: Always align your learning cues and feedback"), mentoring, and deliberate practice led to numerous GTAs (Glenn, Robert, Paul, Miranda, Fred, Cynthia, Akira) evolving from vague positive feedback to specific positive feedback aligned with learning cues in a fairly short time (often from their first observed lesson to their second). This was a skill that Jimmy already possessed (as was evident in his first observed lesson), and one in which Sarah and Virginia did not exhibit growth. To summarize, the training/mentoring intervention enhanced the ability of most GTAs to align SLOs, learning cues, and feedback in the *execution* of their lessons, but was substantially less effective in influencing alignment in GTAs' written preparation.

Intervention's Impact on GTAs' Perceptions of Their Initial Teaching Experience

In this section I will respond to the third research question: "In what ways did a constructivist-oriented training session and semester-long mentoring intervention impact GTAs' perceptions of their initial university teaching experience?" As mentioned earlier, "Training" refers to a single discrete event – the three-hour session that I conducted one week before the semester began. "Mentoring" is used to describe all interventional aspects that followed – class observations, one-on-one discussions after observations, and informal interactions. I will consider the experiences of nine of the new GTAs, as Jimmy and Akira had already both completed two years as GTAs at other universities. The majority of the nine GTAs described the positive impact the training/mentoring intervention had on their perception of their first university teaching experience. Most (but not all) of the new teachers shared that the training session

reduced their anxiety regarding their upcoming teaching assignment, and nearly all agreed or strongly agreed that the training had been useful, had increased their pedagogical knowledge, and had increased their self-confidence regarding their teaching. In part, this reduced anxiety was related to GTAs feeling that they now had a structure for creating and executing lessons. Some GTAs also described anxiety being reduced by peer interactions at the training. All the GTAs described mentoring as beneficial, particularly because most were eager to receive feedback on their teaching performance. Many GTAs felt that their lack of experience left them relatively poor judges of the efficacy of their own teaching, and some found the objective perspective of an experienced outsider to be exceptionally valuable. I will now expand on these introductory statements and provide data to support them.

Training's Impact on GTA Anxiety. All nine of the GTAs new to university teaching expressed feeling varying degrees of anxiety (from “pretty nervous” to “very, very anxious”) before the training, and seven of those nine stated that the training ameliorated that anxiety to some degree (one GTA’s feeling of anxiety remained the same, one felt a “little bit more anxious” afterwards). Of the 15 GTAs who completed the anonymous training satisfaction survey (9 of whom are the focus of this research question), 14 out of 15 agreed with or strongly agreed with the statement, “I have greater self-confidence in my ability to teach a physical activity course after completing the training”. All 15 GTAs agreed or strongly agreed that the training was useful overall, and had served to increase their pedagogical knowledge. Many GTAs expressed the feeling that the training had provided them with pedagogical tools and structure that increased their chances of being effective instructors, thus lowering their anxiety regarding teaching. Glenn explained how this process worked for him.

So I felt like the training we had at the beginning of the year and your instruction (at the training) helped me build some confidence when it came to teaching. So the anxiety was

a little bit more suppressed. Of course, I was a little bit nervous doing something for the first time, but ... having the structure definitely helped I think.

Paul's observations reveal a similar experience.

I think (the training) did have an impact. I think it definitely lessened the impact, meaning that it lessened my anxiety. So like before that session I was pretty - I wasn't overly anxious. But there were some things I was concerned about, because I was like, "How do you teach a physical activity course?", you know?

Fred discussed the anxiety he experienced his first day of teaching, and how the training helped reduce his anxiety, at least regarding preparation.

I'm a very anxious person (he laughs). So it was really stressful. I was really nervous but it ended up going pretty well, so ... I would like to say the training helped but really in the heat of the moment, I didn't really have much time to think. But the training helped me prepare beforehand so I already knew going in the things I needed to work on and the things I needed to focus on. So, in that sense it did.

Miranda described her initial level of anxiety as "very high". She explained, "I was not super anxious about the content of the course because I feel very comfortable teaching swimming ... but it was really the age of the students that I was most anxious about", as she was accustomed to coaching children. Since her anxiety was focused on "how I would interact with the students", rather than teaching methods, the training did not reduce her level of anxiety. But she added, "I will qualify that and say if I didn't have a background in swimming, or in the sport that I was teaching, I would be *very* anxious not having a training beforehand."

Sarah (Jogging) similarly expressed that she was "pretty comfortable" with her course content but her anxiety stemmed from having suffered an injury that would impede her ability to run with her students and to demonstrate technique. Near the end of the semester she stated, "That was where my anxiety came from, not from my knowledge or perceived ability."

However, immediately after the training, she had expressed that the session "actually makes me a

little bit more anxious, but I like that the standards are there, and that you put in a lot of effort to teach us. Putting this to use is kind of difficult.” This statement proved prescient on her part, as Sarah struggled both with maintaining standards and with applying the training in her lessons throughout the semester. For some of those GTAs experiencing similarly anxious thoughts, the interactive aspects of the training provided some consolation.

Impact of Peer Interactions and Peer Support. The structure of the training was based on the tenets of constructivism, including the belief that learning is socially constructed (Glaser, 1987). Apart from the slide presentation, which was primarily a direct provision of information in lecture form, the remainder of this training involved interactions between the GTAs in pairs, groups of three, and as one large group. Brian, the director of physical activity instruction, shared his feelings about the structure of the training.

I like the fact that most of it was very - I mean you had to explain things didactically - but then you were letting them work in small groups. And they're getting to know each other, and I appreciate that, because a lot of them didn't know each other. But they were also doing practically-oriented drill sessions that I thought were meaningful.

Most of the new GTAs had not met each other before that day, and were unaware of the level of teaching experience among their colleagues (a potential source of anxiety). In activities, the GTAs got to describe their experiences and inspirations for teaching, as well as share their “biggest doubt or concern regarding starting to teach next week”. Virginia, although she was “definitely freaking out a little bit” about her first week of teaching, reported that she drew comfort from the notion that she was not alone in her situation: “I kind of realized that I was not the only one that was stressing out about it”. Virginia added that additional group discussions at recurring intervals in the semester might have been a good idea “just to see if (other GTAs) kind of experienced the same things I did”.

Fred's feelings about the interactive structure of the training touched on ideas expressed by Virginia and Brian. The training allowed him to feel that he was not alone in being nervous, but also provided a means for sharing teaching methods and pedagogical information.

The training was good because it was a chance to talk to the other new TAs. And you can sit in a lecture and hear this said and it might stick with you well, but I benefitted from talking to other people and seeing how they felt about it. "Okay, everyone's nervous. And okay, this seems like the right way. Oh, you've experienced it like that, okay, it's cool, I'll try to incorporate that." So I think the training session with everyone together was very beneficial.

Miranda described the benefit she received from the social learning situations at the training as well.

I got a lot of materials from Brian prior to starting that kind of showed what the class was organized like and what they did in the past. And I think if anything that did the opposite of help me (she laughs) ... I almost think I went in a really bad direction ... But it was a lot of what we did (at the training), talking to the other students that teach here - they were "No, we don't do that, no I've done it this way" - that helped me a lot more.

The training positively impacted GTAs' perceptions of their first teaching experience, both in terms of the pedagogical structure and tools that GTAs felt they were now equipped with, and in terms of a collegial atmosphere of shared concerns and exchanges of knowledge and experiences. The mentoring process that followed over the next 15 weeks also proved impactful.

Mentoring's Impact on GTA's Initial Teaching Experience. All the GTAs described mentoring as beneficial, particularly because most were eager to receive feedback on their teaching performance. This feedback both helped GTAs tweak areas of their teaching and served as a much-needed reinforcement for what they were doing well. Mentoring also helped some GTAs overcome feeling "a little isolated", and provided them with a highly-desired outside perspective on their teaching that went beyond their own reflection. Cynthia (Beginning Basketball) described herself as "definitely very, very anxious and nervous" before the training.

The boost of self-confidence that the training provided for her appeared to be transitory, as “for the first month or so going to class was terrifying because it was like ‘I don't know if I feel prepared for this’. The training had provided pedagogical information that she found useful, but she still felt uncomfortable and out of her element: “And I had good cues and I had a structure and stuff, but I think just figuring out what it meant to teach in my own authentic style was something that I didn't know.” Her anxiety manifested itself in thoughts like “I don't know what's happening” and “I don't know how to control situations”. Cynthia felt that “because I don't have a pedagogical background I don't have that level of self-awareness to realize what went well or what are things that I should be doing or what are things that I shouldn't.”

During her second observed lesson, Cynthia was growing more comfortable teaching, but was struggling to motivate three less-skilled students who did not engage well with instruction and were not applying themselves during physical activity. Our discussion after class proved impactful to Cynthia's approach to instruction, and to her trust in my mentoring.

(I liked) having another resource to say "Hey, I see this in your class, these are some things you can work on and this is how you can make it better for the next time". That was super helpful because after that I realized - I ended up doing some progress reports after our second interview because there were definitely a lot of people who just didn't have the right attitude and that was kind of leading to the lack of environment that I wanted. And so by you recognizing that, I had progress reports, and then I had some awesome conversations with students as a result and it led to a much more open and cohesive environment ... And so that - you recognizing that and understanding that it was definitely a hard challenge validated me being like "Oh, it's not all my fault, there are things that just happen". And then the strategies to be able to deal with it meant that it went from a moment of a lot of anxiety and frustration to a great teaching moment and learning moment for me to definitely move my classes forward.

Glenn's comments suggest that he also felt that his lack of experience limited the efficacy of his self-reflection, and he explained that he found great difficulty in drawing useful feedback regarding his teaching from his students alone.

And so I think your feedback has helped me identify areas that may not be working, areas that I need to improve upon. Because it's not feedback I'm going to get from my students. They're just gonna show up and they're gonna go through the class and no matter how much I say "Is this working? Does this make sense? What do you guys need? What do you not need?" They're always just going to look at me with that blank stare and just say "No, it's good". For me it's definitely helped because it is my first semester teaching, and of course I can have some personal reflection on how I think I'm doing but an outside perspective makes it that much better.

Robert also felt that an “outside perspective” was valuable for “just having the consistent feedback throughout, that was helpful to see how I was doing”. Miranda described how she found the mentoring sessions to be of greater personal import than the training.

(Our discussions) have been helpful ... it was better, easier for me to see what I was doing wrong or where I had room for improvement when it was someone coming in and watching me and using specific examples versus having a long training beforehand where I really didn't have any way to conceptualize what was being discussed, or what was the idea. Because I didn't have any background before that training. So now, the training might help me now that I have more of an idea in my brain what the semester would look like, but it helped me more having those one-on-one sessions because I got the specific feedback to what I was doing.

Lily shared that she found our mentoring sessions “very helpful”, and stated that she had made adjustments in her presentation of instruction in response to suggestions I provided, in hopes of bridging the communication gap she experienced with her students. In an interview near the end of the semester, Sarah felt that our discussions “definitely have given me a different perspective on things”, and she made reference to my suggestion made after her first observed lesson that she enforce a “higher set of teacher expectations”. The “low bar” culture in her class that I commented on resulted in a situation she eventually sought Brian’s intervention to resolve. He described it as “Basically her class almost committed mutiny on her, one of her three sections. They don't want to listen to her, they don't want to respect her”. Sarah acknowledged that “I don't want to say that I was super lenient at the beginning of the semester but I kind of was a little more

lenient than I probably should have been.” Sarah appeared to perceive value in the mentoring I provided, even if it may have been in distant hindsight.

Summary of Intervention’s Impact on GTAs’ Perceptions of Their Teaching

Experience. The majority of GTAs reported that the training/mentoring intervention had a positive influence on their perception of their first university teaching experience. The training reduced the anxiety of most new teachers, and increased their pedagogical knowledge and their self-confidence regarding their teaching. Some described anxiety being reduced by peer interactions at the training, which served not only as a means of exchanging information but also as a communal expression of a degree of nervousness about teaching. All the GTAs described mentoring as beneficial, and many were eager to receive feedback from an outside perspective, as they did not trust their own reflective abilities. Many GTAs expressed that they felt able to utilize information shared in mentoring sessions to improve their teaching presentation.

An Aligned and Sequenced Curriculum Impacting Student Experiences

In this section I will respond to the fourth research question: “To what extent did the implementation of an aligned and sequenced curriculum impact undergraduate students’ experiences in physical activity courses?” Most undergraduate students interviewed expressed that they felt their instructor had been successful in presenting a well-sequenced curriculum that fostered their learning. They often spoke of “steps”, “pieces”, and “building”, and of seeing the results of instruction “come together”. Undergraduate students primarily considered sequencing at a macro level, commenting on skill progressions across the semester. A few discussed sequencing in individual lessons, but my attempts to elicit direct information about the alignment of SLOs, learning cues, and feedback routinely failed, as I appeared unable to define these terms with sufficient clarity to allow students to craft an informed response. Still, the students were, as

might be expected, the best source of data for describing *their* experiences. After focusing on their comments, I will also share my impression of their experiences from my role as observer.

Student Perspective on an Aligned and Sequenced Curriculum. Several students articulated their perspective on the sequence or flow of tasks and skills in their courses. Jimmy's student Carlos, for example, described his experience in Beginning Swimming ("a really well-structured class"), and how Jimmy progressed the students through the individual aspects of one stroke (the freestyle), and then used the knowledge of that stroke as a basis for learning other strokes. It is clear that as a student Carlos appreciated Jimmy's transparency when sharing the reasoning behind his teaching choices. Carlos focused on the curricular coherence students experienced across a series of interrelated lessons.

He broke it down from the very beginning ... he moved on progressively each week towards where we could work on our kicks, work on our strokes, work on our breathing, and combining it all together ... make it natural and make it easier for us to transition into other forms of swimming. Because if we learn that freestyle correctly and we just ingrain it in ourselves, which this is what he said, you know, we move on to other things a lot easier.

Cynthia's student Keye described how her ability to present learning progressions appropriate for a beginning level course impacted his learning experience.

She does a really great job breaking everything down. Not taking baby steps but taking the *proper* steps, I would say. Not too advanced. She does a really good job of breaking everything down which makes it a lot easier to learn.

While not explicitly mentioning alignment of curricular elements, Miranda's student Isabella touched on how her instructor's ability to provide instruction, demonstration, feedback, and scaffolding was very effective in facilitating her learning.

I feel like I've learned a lot from it. I thought I knew how to - like technique and stuff with swimming, but this has totally changed it. I even was a swim teacher for little kids in the summers and now I'm like "Oh, shit! This is definitely more than I knew".

Conversely, Virginia struggled with alignment in her individual lessons, in large part because of a lack of SLOs, learning cues, and feedback. Her student Heather appeared to have sensed this, but she still experienced a degree of curricular coherence.

A lot of times (the lessons) don't make sense for a couple of classes because we work on small parts each class. But ... last week we played a big game ... this whole small field. And it kind of put everything together because we got to work on scoring, passing - we had worked on our formation skills already. So everything kind of started to come together while we were playing. And so everybody started setting up in their formations. Kind of looked like a real team.

Robert's student Brandon came close to describing the alignment of curricular elements by an instructor, discussing how Robert used an SLO, instruction, feedback, and closure in his lesson execution (without explicitly naming any of the elements).

He'll tell us (the objective) at the beginning of class. He'll give a demonstration himself and then if you don't do it quite right, he'll give you a little tip whenever you're walking back to the next line. And then he revisits it at the end of class.

Brandon added that Robert's instruction was "definitely good" and that he felt strongly that he had learned in the course. In summary, most undergraduate students felt that they experienced effective micro and macro sequencing, which positively impacted their experiences in physical activity courses. Undergraduate students rarely spoke of the alignment of SLOs, learning cues, and feedback at all – routinely preferring to focus alignment-related questions on sequencing instead. Students pointed to "progression", "steps", "breaking everything down", "advancement", and "putting everything together" as characteristics of effective GTA teaching that positively impacted their experiences.

Observer Perspective on Students' Experience with an Aligned and Sequenced

Curriculum. There appeared to be a distinct correlation between the alignment in a GTA's lesson and/or their micro/macro sequencing and the experiences of their undergraduate students. Greater implementation of an aligned and sequenced curriculum appeared to have positively impacted students' processing of instruction, skill development, and learning. Tight alignment of SLOs (explicit or implied), learning cues, activities, feedback, and formative assessment appeared to have provided students with a strong sense of curricular coherence, and tended to foster a stronger learning culture, as comments from multiple observation forms and field notes attest.

Jimmy's ability to provide instruction, demonstration, learning cues, learning activities, and feedback that are tightly and logically aligned is exceptional. It is a pleasure to watch him teach and to see the smiles on his students' faces as they experience success.

Jimmy's lesson execution (although not his lesson planning) mirrored the model presented at the GTA training, as his formal observation document (above) describes. Substantial skill improvement was evident in Jimmy's Beginning Swimming students not only from class to class, but within a given class period. His students demonstrated consistent engagement with the instruction and feedback that he provided.

Glenn's Intermediate Volleyball students also demonstrated substantial gains in skill and knowledge across three observed lessons. Glenn followed the model provided at the GTA training in both his lesson planning and his lesson execution. An excerpt from his formal observation document describes the effects of his teaching.

Glenn provides solid, useful instruction replete with demonstrations and learning cues. He chose learning activities that support his learning objectives, and provided feedback to individuals and the group. His students are clearly learning and improving their skills in every class meeting.

Miranda's Fitness Swim instruction was very well aligned, allowing her students to easily make use of each constituent element. Students experienced a "high bar" learning culture that was also supportive, encouraging and responsive ("She listens to our feedback", mentioned her student Martina). An excerpt from her formal observation document supports these claims.

Miranda demonstrates a great many strengths in her teaching. She is knowledgeable, well prepared, and clearly committed to the success of her students. She excels at providing demonstrations and learning cues that her students make immediate use of, and she provides a great deal of specific feedback, both positive and prescriptive. She has created a safe learning environment, in which being on task and trying one's best is taken as a given.

In contrast, Virginia's inability to include SLOs, learning cues, and feedback in her lessons appeared to have contributed to a class culture that deteriorated over the course of the semester, as the field notes from her third observation suggest.

Virginia continues to offer very little feedback, an admitted weakness. In this lesson, learning cues were nearly absent as well. While her students aren't out and out rebellious, their level of participation is generally disappointing, and the brashness of their use of cell phones on the pitch is disturbing.

My third observation of Lily's Beginning Badminton class also suggested a correlation between presentation of an aligned and well-sequenced lesson and the maintenance of a positive, engaged learning experience for students. My field notes describe the interaction between the two.

Today marked a disappointing follow-up to my last visit. The students seemed to have given up trying to bridge the language barrier, and a culture of malaise has overtaken the class for the most part. Lily's instruction today seemed to lack direction, and things that could have been taught in a fairly straight-forward fashion (the doubles boundaries, hitting the shuttle "where they're not") were presented in lengthy, convoluted and confusing fashion. Learning cues and specific feedback were almost completely absent in today's lesson ... The level of student engagement was greatly varied – some self-motivated students were applying themselves while others didn't even seem to be keeping score.

In summary, observed lessons suggested that the implementation of an aligned and well-sequenced curriculum positively impacted the experiences of undergraduate students, manifested in clear processing of instruction, skill development, and learning. An aligned and well-sequenced curriculum also contributed to students experiencing curricular coherence. The absence of an aligned curriculum, and/or SLOs, learning cues, and feedback, appeared to negatively impact student experiences, resulting in class cultures that were less conducive to learning.

CHAPTER V

DISCUSSION

The purpose of this study was to implement and evaluate a constructivist-oriented program to train university GTAs to align SLOs, learning cues, and teacher-provided feedback in their planning and teaching in physical activity courses. To briefly review the major findings of this study, the training/mentoring intervention enhanced the ability of most GTAs to align SLOs, learning cues, and feedback in the *execution* (although much less so in the *written planning*) of their lessons. Most (but not all) of the new teachers shared that the training session reduced their anxiety regarding their upcoming teaching assignment, and nearly all agreed or strongly agreed that the training had been useful, had increased their pedagogical knowledge, and had increased their self-confidence regarding their teaching. All the GTAs described the semester-long mentoring as beneficial, particularly because most were eager to receive feedback on their teaching performance. In turn, most undergraduate students interviewed expressed that they felt their instructor had been successful in presenting a well-sequenced curriculum that fostered their learning. In the sections that follow I will first consider the broad effects of the training/mentoring intervention in comparison to common practice in GTA preparation and physical education professional development. I will then consider the appropriateness of constructivism as a theoretical framework for a GTA training/mentoring program, and then discuss the GTAs' developmental experiences in comparison to those common to novice teachers. Finally, I will give consideration to a major failed objective of the intervention – GTAs' inability to create effective written SLOs for their lessons.

Efficacy of Training/Mentoring Intervention in Comparison to Common Practice

The findings of the current study support Russell and Chepyator-Thomson's (2004) assertion that GTA training for physical activity instructors greatly improves instructional effectiveness and teacher confidence when programs provide appropriate, consistent, formal, and systematic instructional support, mentorship, and evaluation. Most GTAs in this study demonstrated marked improvement in their instructional effectiveness and self-confidence following the training/mentoring intervention. Limiting the initial training to a single three-hour session may have increased the transferability of these findings, as the training aligned with the time limitations many college and university programs currently utilize (Roehrig, Luft, Kurdziel, & Turner, 2003).

Rikard and Nye (1997) found that limited training/mentoring time consistently causes teaching assistants to feel undertrained and undersupported. In contrast, most GTAs in this study expressed that they experienced impactful training and supportive mentoring. It appeared that the assertion of Davis and Minnis (1993) - that GTAs may have insufficient time to *be* mentored - did not resonate with the vast majority of the GTAs in this study, who were eager to be mentored and to receive feedback on their teaching from the perspective of an experienced physical education instructor. These three one-on-one sessions immediately after observations seldom exceeded thirty minutes, representing an investment of less than two hours (and less than five hours total when coupled with the initial training) of GTAs' time that seems to have had a profound effect on many of their teaching experiences.

Two distinct differences between standard GTA mentoring practices and the procedure in this study are worth noting as contributing factors to its efficacy. One is the frequency of mentor – mentee contact. Russell (2009) reported that 30% of GTAs had one formal meeting with their supervisor each semester, while 50% had met with their supervisor only once in the previous

academic year, in contrast to three observations/consultations in one semester in the current study. The second is the provision of feedback regarding teaching performance. As reported, student course evaluations are the sole means of instructional effectiveness evaluation for 85% of GTAs (Russell, 2009). In contrast, GTAs in the current study experienced three mentoring sessions and received one formal, written evaluation of their teaching.

The training/mentoring intervention was effective as a means of professional development. The current study supports the findings of Armour and Yelling (2004), who identified aspects of continuing professional development that physical education teachers found integral to effective training. Teachers want to have hands-on, practical experiences (such as the group lesson plan design exercise in this study) rather than passively receive information. GTAs in this study and physical educators in Armour and Yelling's (2004) study both identified presentations dominated by theory as the least effective. The presentation of theory via direct instruction (a 20-minute slide show) appeared to be the least impactful portion of the GTA training in the current study. Armour and Yelling (2004) also indicated that teachers desire "real world" information that can be applied, rather than theoretical models which may lack clear application. Similarly, teachers want to be provided with practices that are ready to be implemented and are likely to be workable in their environment. Once again the current study supported these findings, as GTAs valued a simple and pragmatic means for tying together SLOs, learning cues, feedback, activities, and formative assessment that they could put to immediate use.

Armour and Yelling (2004) found that teachers desire a presentation that is "delivered by an experienced and knowledgeable course leader with recent, relevant experience and an understanding of the current demands of teaching" (p. 11). While this study was not specifically designed to meet these criteria, my extensive teaching and coaching background (approximately

20 years) and my recent, relative experience of having taught and mentored previous GTAs in the very same physical activity program lent authority to my presentation and mentoring. Teachers wish to have development experiences that are challenging and thought-provoking. GTAs in this study expressed the value of examining their motivations as teachers and of participating in exercises that served to cognitively engage their notions of how physical activity lessons should be designed and implemented. Lastly, teachers want professional development to allow them to reflect and to collaborate with other teachers, sharing experiences and ideas. Numerous GTAs described the collaboration and exchange of ideas and concerns they experienced at the training session. Many of these aspects of effective professional development described above align closely with notions promoted by constructivism, which may help to explain why a constructivist-oriented training/mentoring intervention succeeded.

Appropriateness of Constructivism as a Theoretical Framework

Constructivism proved to be an exceptionally appropriate and efficacious choice of a theoretical framework for the training/mentoring intervention. One contributing factor was the focus on connecting personally meaningful knowledge/experience to immediately observable and useful outcomes (Beane, 1995). GTAs in this study repeatedly expressed how the training and mentoring directly addressed their concerns about teaching by providing information that was of immediate value. The intervention fostered GTAs' ability to identify the relationship between and among topics (in this case, in part, between SLOs, learning cues, feedback, learning activities, and formative assessment), and allowed GTAs to see the interrelation of these instructional elements and their role in successful teaching. Fostering these abilities is a major focus of constructivism (Beane, 1995). As Beck and Kosnik (2006) suggested, the constructivist nature of the intervention allowed GTAs to control their own development as teachers. The feeling of ownership motivated GTAs to focus on their own immediate needs and experiences.

Similarly, the constructivist notion that hands-on experience is integral to learning was borne out. Some GTAs felt that the pedagogical information in the training session lacked a point of reference that only experience could provide, supporting Dewey's (1938) notion that experience is irreplaceable, and Rovegno's (1992b) finding that practical experience is of far greater value than theoretical classroom learning for novice teachers.

One strength of the constructivist intervention was helping the learner/mentee address prior knowledge/conceptions/skills, some of which were misconceptions, with the new knowledge/conception/skills they were expected to learn. The constructivist nature of the training session provided GTAs an opportunity to examine and discuss their conceptions (and misconceptions) about effective and ineffective teaching, and to be consciously aware of the common practice of novices teaching as they themselves had been taught (Lortie, 1975). The GTAs universally rejected the notion that they would teach as they had been taught, and most were just as likely to point to negative experiences as positive ones as their inspiration for teaching (or not teaching) in a particular style or manner. Similarly, the lesson planning process led many GTAs to reexamine how *they* had learned the basics of their sport, in order to better understand how to teach content (that they had long taken as second nature) to relative beginners.

Social Aspects of Learning. The social construction of knowledge (Vygotsky, 1986) is a crucial aspect of constructivism (Kozulin et al., 2003). The central idea is that learning takes place with constructive social interaction between the learner and the teacher and among the learners. In contrast to the direct delivery of information to passive learners often adopted in professional development workshops, the constructivist design of the three-hour training session focused on paired, small group, and large group interactions that fostered a positive social learning environment in which GTAs exchanged ideas, knowledge, experiences, and concerns. GTAs spoke with each other about course design and approaches to teaching, and also found it

reassuring that many others with similarly limited teaching backgrounds were sharing their experience. A few GTAs mentioned that group meetings and discussions during the semester about shared teaching experiences would likely have also been beneficial. With one or two exceptions, the GTAs placed significant value on the mentoring that I provided. While it sometimes helped to ameliorate feelings of isolation and occasional panic, it primarily served as an opportunity to receive insightful and immediately-applicable feedback regarding teaching performance. The training/mentoring served as scaffolding, fostering GTAs' ability to learn pedagogical skills in the zone of proximal development that Vygotsky (1986) described. Working with an experienced and knowledgeable mentor, many GTAs were able to enhance the effectiveness of their teaching in a manner which they likely could not have accomplished on their own. I will now turn to a comparison of GTAs' initial teaching experiences with the phases of novice teacher development found in the literature.

Phases of Novice Teacher Development

In general, the GTAs in this study did not experience phases of novice teacher development as outlined in the literature. Nyquist and Wulff (1996) found that novice teachers tend to be initially focused on themselves (their dress and deportment) and then their "survival". Only after they feel comfortable with these two aspects are they likely to give consideration to their teaching skills and student learning. Rovegno (1998) found that novice physical education teachers' initial concerns were primarily related to finishing the lesson plan and "surviving". Similarly, Fuller (1969) suggested three phases for novice teachers: Pre-teaching (concerns are amorphous and vague because would-be instructors have such limited understanding of the teaching process), Early-teaching (teachers' concerns center on themselves and their ability to manage a class and their adequacy as teachers), and Later-Concerns (teachers focus on the knowledge gain of their pupils and grow more adept at self-evaluation).

The notion of “survival” was dismissed by virtually all GTAs, and with the exception of one GTA’s experience (Sarah, who had a “mutiny” in her Jogging class), losing control of a class was not a warranted concern. Since the majority of the physical education literature focuses on teaching in a K-12 setting, this may simply be a function of undergraduates in general (or undergraduates at the university in this study in particular) being more willing, on average, to follow instruction and not disrupt learning, than children are. There was some evidence of Fuller’s pre-teaching phase, as GTAs who lacked previous teaching experience literally asked themselves, “How *do* you teach a physical activity course?” For them, the initial training session provided not only answers, but also a framework to begin asking more specific questions about lesson preparation and the relationships between curricular elements. However, most GTAs then moved almost immediately to concerns about student learning (a characteristic of Fuller’s third phase) while passing over most of the concerns common to the second phase (adequacy as teachers and the ability to control a class).

One major disparity between the experience of the GTAs and those most commonly found in the literature was a near-total absence of concern regarding adequacy of content knowledge. None of the GTAs expressed any concern about their content knowledge, and this may be attributed to the narrow but deep content knowledge that college physical activity instruction requires (in comparison to the broad but relatively shallow content knowledge that K-12 physical education teachers are expected to possess). Whether it was attributable to good luck, exceptional management, or a combination of the two, the director of physical activity instruction placed GTAs in teaching assignments that matched their content knowledge well. With content knowledge firmly in place, GTAs were able to focus on gaining and utilizing basic pedagogical knowledge. However, creating effective written SLOs proved to be one pedagogical skill few GTAs could master.

The Missing Piece – SLO Creation

In his seminal work on curriculum construction, Tyler (1949) provided a framework for creating effective SLOs, and stated that “objectives ... are the most critical criteria for guiding all the other activities of the curriculum-maker” (p. 62). While emphasizing the importance of teachers developing the ability to manufacture and clearly express SLOs, he also made a brief mention of those teachers who utilize a less-than-scientific method for this process.

No doubt some excellent educational work is being done by artistic teachers who do not have a clear conception of goals but do have an intuitive sense of what is good teaching, what materials are significant, what topics are worth dealing with and how to present material and develop topics effectively with students. (p. 3)

Taken within their fuller context, Tyler’s comments suggest that such teachers are a relative anomaly, and that mastering the craft of SLO creation is a far more reliable means of fostering effective teaching than relying on intuitive sense. Still, this quote is highly relevant to this study’s findings, which appear on the surface to be somewhat paradoxical. The training/mentoring intervention was generally ineffective in developing GTAs’ ability to create effective written SLOs in their lesson plans, and yet the vast majority of undergraduate students interviewed felt that clear learning objectives were routinely present in GTA lessons.

Tyler (1949) put forth that effective objectives can be broken into two parts – a kind of behavior, and an area of content that the behavior is to be applied to. The deficiency in GTA SLO creation was overwhelmingly in the behavior part – they could generally identify the skills they wanted their students to attain, but appeared to lack the pedagogical vocabulary (and the requisite exhaustive practice) to express the student behavior they were seeking regarding those skills. Tyler described this common shortcoming nearly 70 years before, reporting that a “form in which objectives are often stated is in listing concepts, generalizations, or other elements of content” (p. 44). GTAs often made lists of activities or content in lieu of proper SLOs.

Possessing solid content knowledge in their subject areas may have aided GTAs in identifying important content areas - ones inherent in a given course of study as well as those relevant to the particular needs of a given group of students based on their previous knowledge and skills, and current progress. Since GTAs primarily failed to express the behavior aspect of SLOs (in some cases GTAs did not document SLOs at all), yet managed to generally choose appropriate learning activities and to present instruction that most undergraduates found to be coherent and well-sequenced, Tyler's notion of "intuitive sense" appears to offer the best explanation to this seeming paradox.

The procedure for effective SLO creation, it appears, is far too complex to be mastered, at even a basic level, when presented as one of numerous elements in a single three-hour training session to individuals with little or no background in pedagogy. It is an evolving process that requires a great deal of practice coupled with ongoing mentoring from someone experienced at it. Rovegno (1992a) found that novice physical educators tend to focus in their planning on activities to *do* rather than goals to *achieve*, and this occurs after they've had years (rather than hours) of pedagogical training. It may be more pragmatic in GTA training to focus on the gist or import of SLOs (and how they impact choosing learning activities, creating learning cues, and providing feedback and formative assessment) than to try to teach the proper structure and syntax of SLOs in the short time available. Despite the objection that Tyler himself might have been likely to raise, fostering GTAs' "intuitive sense" may be the most pragmatic option given the existing restraints for training and mentoring. It appears that implicit SLOs may be as effective for driving other lesson components (learning cues, activities, feedback, formative assessment) as written ones structured as PETE professors would prefer. The GTAs previous positive experiences in physical education and/or athletics may have greatly enhanced their "intuitive

sense” for SLOs, while these same experiences rarely or never exposed them to SLOs in written form, perhaps partially explaining their lack of ability in that area.

Summary

This study adds to the pedagogical knowledge base by describing how constructivism can provide an effective framework for a GTA training/mentoring program that fosters an improved teaching experience for college physical activity GTAs and an improved learning experience for their undergraduate students. Using time limitations (three hours of training and three observations/consultations) only slightly more taxing than current conditions in most higher education programs, this study may provide a guide to a professional development procedure that has the potential to be transferred and applied in most college physical activity instructional settings. Novice instructors, generally lacking in pedagogical knowledge and imminently facing their first teaching assignment, will tend to eagerly embrace practical (rather than theoretical) means for improving their teaching effectiveness and the learning experiences of their students. Instruction in the alignment of SLOs, learning cues, learning activities, and performance feedback proved to be an effective choice for content in the training/mentoring intervention, although GTAs were generally not able to craft effective *written* SLOs. A handful of hours spent on meaningful GTA training may reap a reward of hundreds of hours of improved instruction and better educational experiences for undergraduate students taught by GTAs.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In this chapter I will consider the findings of this study within the context of current GTA training practices in kinesiology, discuss why a constructivist-oriented training/mentoring program had a positive impact on the experiences of GTAs and their students, and offer recommendations for applications and future research. First I will briefly review the current state of GTA teaching and training in kinesiology. Physical activity courses in higher education are increasingly taught by GTAs who generally teach in isolation, receive little or no pedagogical training, and often feel unprepared to teach (Hopwood & Stocks, 2008). Once teaching, these GTAs receive little support and are infrequently observed by a supervisor - often once a semester, once a year, or sometimes not at all (Russell, 2009). Often the only feedback they receive about their teaching performance comes from student evaluations, which are not available until the semester is completed (Roehrig et al., 2003). These practices stand in juxtaposition to the extensive training, mentoring, and ongoing evaluation that PETE students receive in constructivist-oriented programs at these same institutions (Beck and Kosnik, 2006). One group is provided with *years* of pedagogical training while the other is provided with a handful of *hours*, if any at all. Yet the expectations and content related to teaching physical education in a K-12 setting and being a college physical activity instructor have more similarities than differences. Resolving this astounding disparity in training/mentoring is beyond the scope of this study. But optimizing the use of the existing limited contact hours between trainers/mentors and GTAs is not, and this study describes one means for doing so.

In this section I will offer conclusions by first summarizing the major findings that address the study's four research questions. "To what extent did GTAs implement an aligned and sequenced curriculum when teaching university physical activity courses?" Most GTAs demonstrated the ability to implement an aligned and sequenced curriculum in their lesson *execution*. Many GTAs created lessons around SLOs that were implied or intuitively sensed, and aligned their learning cues, learning activities, and feedback with these SLOs. GTAs' written lesson plans rarely demonstrated alignment, and often contained poorly-written SLOs (or no SLOs at all) and few learning cues. "In what ways did a constructivist-oriented training session and semester-long mentoring intervention enhance GTAs' ability to align SLOs, learning cues, and teacher-provided feedback?" The training/mentoring intervention enhanced (often profoundly) the ability of most GTAs to align SLOs, learning cues, and feedback in the *execution* of their lessons. Conversely, the intervention was generally ineffective in fostering the ability to align SLOs and learning cues in *written* lesson plans. Mentoring helped most GTAs grow adept at providing feedback, particularly specific, positive feedback (which was initially absent in most GTAs' teaching). "In what ways did a constructivist-oriented training session and semester-long mentoring intervention impact GTAs' perceptions of their initial university teaching experience?" Most (but not all) of the new teachers shared that the training session reduced their anxiety regarding their upcoming teaching assignment, and nearly all agreed or strongly agreed that the training had been useful, had increased their pedagogical knowledge, and had increased their self-confidence regarding their teaching. All the GTAs described the semester-long mentoring as beneficial, particularly because most were eager to receive feedback on their teaching performance. "To what extent did the implementation of an aligned and sequenced curriculum impact undergraduate students' experiences in physical activity courses?" Most undergraduate students interviewed expressed that they felt their instructor had been successful in presenting a

well-sequenced curriculum that fostered their learning. Many of these undergraduate students described experiencing clear learning objectives in each lesson, succinct and efficacious learning cues, and feedback that was relevant and immediately applicable.

Rather than offer further summary of findings and discussion found in the previous two chapters, I wish to move to the question of *why* this training/mentoring intervention had a positive impact on most GTAs and their students – a discussion potentially insightful for supervisors or administrators in physical activity instruction. After deciding to limit the GTA training session in this study to three hours to mirror the prevailing conditions at many colleges and universities (Roehrig et al., 2003), I was faced with two questions. First, how might one pare down and distill the pedagogical knowledge PETE students experience in hundreds of hours of course meetings into three hours of GTA training? Second, how could this information be best presented and experienced by GTAs? Constructivism provided the necessary guidance for answering both questions.

Constructivism and GTA Training

Constructivism promotes learning that is personally meaningful because the learner's active involvement is fostered by real-life learning situations that are perceived as relevant to their own lives (Wiggins, 2015). This tenet provided an effective guide for the content of the GTA training in this study. Pedagogical knowledge and tools that could have *immediate* applicability for the GTAs, who would begin teaching in slightly more than one week, became the focus of the training session. Training GTAs to align SLOs, learning cues, activities, feedback, and formative assessment proved to be an effective choice. First, it provided novice and relatively-novice teachers with a much-needed framework for constructing and executing their lessons. It directly addressed a concern that most GTAs were experiencing (“How *do* you teach a physical activity course?”) and it provided knowledge and skills that GTAs were eager to

receive. Second, the alignment of these curricular elements fostered curricular coherence, which the GTAs' undergraduate students experienced as well-sequenced curriculum with clear learning objectives. Third, and perhaps most importantly from a pragmatic perspective, being trained to align these curricular elements made using them easier and simpler, rather than adding complexity for potentially overloaded novice teachers. The training transparently promoted a “quick and easy” method for designing a lesson via alignment – create SLOs with learning cues embedded in them, use those same learning cues during instruction, have the SLOs drive the choice of learning activities, revisit the learning cues to provide feedback, and revisit the SLOs during closure as formative assessment. The creation of explicit links between the curricular elements (a cornerstone of constructivist education) allowed the GTAs to see and understand their interrelationships. Just as importantly, it made teaching easier for the GTAs while improving the learning experience of their students – a win-win scenario. While GTAs rarely developed the ability to create effective *written* SLOs, they were generally able to utilize their training to align curricular elements in the *execution* of their lessons. The training was, for the most part, effective and impactful.

Hands-on Experience

While the training was focused on paired, small group, and full group interactive learning activities that fostered social learning (Vygotsky, 1986), there was a limited portion (about 20 minutes) of direct transmission of information, some of it theoretical (e.g., the four levels of feedback). This appeared to be the least effective portion of the session, and, in retrospect, time that could have been better spent on the final exercise (creating aligned SLOs, learning cues, and feedback in a group). The final exercise resonated the most with GTAs, and may have been more impactful coupled with limited peer teaching in a gymnasium setting. The findings in this study suggest that maximizing hands-on experiences and minimizing or eliminating theoretical

information makes for the most effective training. Most GTAs demonstrated alignment and sequencing in their lesson execution a short time after applying these concepts during the training session. Conversely, none of the GTAs ever explicitly discussed the four levels of feedback presented during the slide presentation. The hands-on experience with immediate “real world” applicability resonated, while the theoretical information did not.

Mentoring

Constructivist PETE programs create a learning community that provides social and emotional support to novice teachers (Beck & Kosnik, 2006). Typically, physical activity GTAs experience the opposite – they teach in isolation and receive little or no feedback regarding their teaching from an individual trained in pedagogy (Russell, 2009). In this study, all of the GTAs reported that their mentoring experience (three observations/consultations) positively impacted their teaching. Many (particularly those with some previous teaching experience) reported that the mentoring was of greater personal use than the training session. GTAs reported feeling less isolated, less anxious, and better equipped to teach after mentoring sessions. In short, mentoring was effective in fostering GTAs’ pedagogical skills and positively impacting their impression of their teaching experience, and in turn, improving the learning experiences of their undergraduate students. This study suggests that hours devoted by experienced individuals to mentoring GTAs may reap an exponential return in undergraduate student learning in courses GTAs teach.

Transferability and Future Research

While the unique attributes of the setting make it impossible to generalize the study’s findings, they may be transferable (Lincoln and Guba, 1985). Patton (2002) described this part of the research process as extrapolation – researchers, through their experience, provide a working hypothesis – one that may or may not work when applied in another setting. The transfer of this training/mentoring intervention to relatively similar settings in the physical activity instruction

departments of other colleges/universities is my primary suggestion for future research.

Similarly, this intervention could be used as the framework for a semester or year-long continuing professional development experience for established physical educators in K-12 settings. As described earlier, the intervention may prove more effective with complete focus on hands-on and immediately-applicable material, and the complete or near-complete exclusion of theoretical or abstract information. GTAs and established teachers want practical, concrete information that they can make immediate use of and that is likely to work in their particular setting, and this intervention may offer that information.

Further research regarding GTA training might include comparisons of the experiences of GTAs with undergraduate or master's degrees in pedagogy to those with no teaching backgrounds. Such research could more closely examine the disparity in these two groups in creating effective written SLOs, and how that disparity impacts teacher effectiveness and student learning. Also of interest would be similar training/mentoring programs freed from the time limitations (a three-hour training session, and one semester of observation/mentoring) used in this study. A longer training session, including peer teaching with actual physical performance, might prove to be more impactful, as might mentoring for a full school year. Lastly, future research identifying the relationship between GTA motivation and teaching effectiveness might shed some light on why some GTAs were impacted by the intervention more than others.

This research has hopefully added to the pedagogical knowledge base by describing a training/mentoring program and its effect on relatively novice physical activity instructors. The findings here demonstrate that constructivism provides a robust theoretical framework to guide an intervention, and that GTAs with little or no pedagogical background *can* execute (if not plan in writing) aligned and properly sequenced lessons and semester-long curricula that provide positive learning experiences for undergraduate students. In the spirit of constructivism, my hope is that

this information isn't simply added to the body of *theory*, but is put to immediate and practical use as a framework for creating training/mentoring programs for other GTAs.

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APPENDIX A

UNIVERSITY-PROVIDED TEACHER OBSERVATION FORM

Activity Instruction Program Observation Form

Instructor: _____

Date: _____

Course: _____

Lecture / Discussion

Comments

Interesting / Creative / Unusual?	1	2	3
Examples / Illustrations /Personal experience?	1	2	3
Demonstration given?	1	2	3
Indications of students being engaged with the material?	1	2	3

Class Management

High degree of time on task?	1	2	3
Students engaged with the activity in a meaningful way?	1	2	3
Quick transitions from segment to segment?	1	2	3

Teacher Role During Instruction

Energy / Enthusiasm?	1	2	3
Actively monitoring the group?	1	2	3
Effort made to interact with every individual?	1	2	3
Interactions teacher or student initiated?	1	2	3
Evidence of teacher diagnosing performance?	1	2	3
Evidence of feedback given?	1	2	3

Future Target Objective:

APPENDIX B

GTA TRAINING LESSON PLAN

Learning Objectives

At the conclusion of the 3-hour training, GTAs will be able to:

- identify and describe the personal motivations, influential teachers/coaches, and critical incidents that have contributed to their subjective warrant for teaching physical activity courses.
- identify curricular elements (demonstration, individual practice, SLOs, etc.) and provide justifications for those they find integral to a successful physical activity lesson.
- explain curricular coherence and the alignment of curricular elements within a lesson.
- create three SLOs that are observable and assessable.
- create three effective learning cues that align with SLOs.
- express three instances of effective teacher-provided feedback that is aligned with student learning objectives and learning cues.

Introductions (10 minutes)

The GTAs and I will complete introductions covering name, city/country of origin, area of study and degree pursued, courses to be taught in the coming semester, and previous teaching/coaching experiences.

Think/Pair/Share (30 minutes)

In “Think-Pair-Share” activities, learners are provided with a question to think about, then relate their responses to a partner, then share information with the entire group (Lyman, 1981). GTAs will each receive a card with a sequence of four numbers. In each of four rounds,

GTAs will pair with the individual whose number matches theirs (each will have four unique partners). After thinking about the question privately, each pair will exchange their responses. Volunteers will then share their response, their partner's response, a synthesis of the two, or a fresh observation with the group.

1 – Do you have long-term aspirations to teach? If so, explain why you wish to be a kinesiology teacher. If not, explain what you'd like to derive from your GTA teaching experience.

2 – Describe the teacher/coach whom you feel has had the most influence on how you plan to teach. Explain why you feel that way.

3 – Describe a critical incident that you experienced as a student/athlete that helped to shape how you plan to teach (or not to teach). Consider the statement “New teachers tend to teach as they themselves were taught” and comment on it.

4 – Describe your biggest doubt or concern regarding starting to teach next week.

Brainstorming (10 minutes)

I will lead a brainstorming session, eliciting contributions from GTAs with the question “What do you feel are the key curricular elements of a successful physical activity lesson?”

GTAs will be asked to explain and justify their choices. I will contribute SLOs, learning cues, and feedback if they are not among the GTA responses.

Break (10 minutes)

Slide Presentation (20 minutes)

I will offer a slide presentation presenting information about constructivism, subjective warrant, curricular coherence, SLOs, learning cues, feedback, and alignment of these three curricular elements. The presentation will also touch on choosing activities that support SLOs and create a logical learning sequence.

Group Exercise (80 minutes)

GTAs will be organized into groups of three. Each group will:

- choose a concept or set of skills related to physical activity.
- create 3 SLOs related to the concept/skills that are observable and assessable.
- create 3 or more learning cues related to each of 3 concepts/skills.
- create 3 hypothetical feedback statements that one might supply to a successful student, a student with emerging but inconsistent skills, and a student who is struggling.
- present their information to the other groups and mock-teach physical skills (physical activity will be exceptionally brief or pantomimed).
- reflect on their “lesson” and assess strengths, weaknesses, and degree of alignment.

Closure (20 minutes)

Achievement of training learning objectives will occur through verbal questioning.

1 – “Who would like to explain how our previous experiences are likely to influence how we teach?”

2 – “Who would like to explain what curricular elements are? What are some of the ones that we discussed, and which do you feel are integral to a successful physical activity lesson?”

3 – “Who would like to explain what SLOs are? What two attributes do effective SLOs need to have? Why might we include learning cues in our SLOs?”

4 – “I’ve just arrived from Mars and know nothing at all about basketball. Please provide me with the learning cues (one unique cue per GTA, please) for properly executing a jump shot.”

5 – “Please watch my jump shot and provide me with feedback. Who would like to explain why feedback is an integral part of an effective physical activity lesson? Why is ‘Good job!’ fairly ineffective feedback? How might ‘Good job!’ be turned into effective feedback?”

6 – “Who would like to explain what curricular coherence means? Why is it important? What does alignment mean to you as a teacher? How will you plan for alignment in your lessons?”

7 – “Have your doubts, concerns, and feelings about teaching changed since this training began? Who would like to share their current state of mind about your upcoming teaching experience?”

APPENDIX C

TRAINING SATISFACTION SURVEY

Thank you for participating in this training program. Please take a few minutes to complete this form anonymously and place it face down in the center of the table when you have completed it.

Please circle the response that best matches your feelings about each statement.

1 – Overall, I found this training session to be useful.

Strongly Disagree Disagree Neither Disagree/Agree Agree Strongly Agree

2 – I have greater self-confidence in my ability to teach a physical activity course after completing the training.

Strongly Disagree Disagree Neither Disagree/Agree Agree Strongly Agree

3 – I feel that my pedagogical knowledge (familiarity with teaching methods and skills, and the ability to apply them) has increased because of this training.

Strongly Disagree Disagree Neither Disagree/Agree Agree Strongly Agree

4 – I feel I will likely “teach as I was taught” rather than adopt alternate methods/strategies.

Strongly Disagree Disagree Neither Disagree/Agree Agree Strongly Agree

5 – I feel that aligning curricular elements is crucial to learning for my students.

Strongly Disagree Disagree Neither Disagree/Agree Agree Strongly Agree

Please share any comments, thoughts, or criticisms you have regarding the training session:

APPENDIX D

SEMI-STRUCTURED GTA INTERVIEW GUIDE

“Thank you for agreeing to participate in this interview. While you already signed a form back in August that includes consent for this interview, I’d like to remind you that your participation is voluntary, and you can choose to not answer particular questions or choose to end the interview entirely at any time, without any consequences related to your position as a GTA. I will not share your answers with the director of physical activity instruction, and while I will make my best effort to maintain your anonymity as delineated in the consent form, I cannot guarantee it. I will be audio recording this interview.”

“To start, can you please remind me of your teaching experiences before this semester?”

“At the training session in August we talked about GTAs ‘teaching as they had been taught’. Please comment on your teaching this semester in this regard, and share what you feel were the sources and inspirations for your teaching choices.”

“Thinking back to your first day of teaching this semester. How would you describe your level of anxiety at that time?”

“Please share your thoughts about the GTA training session. Did the training impact your level of anxiety? What are your lasting impressions of the training session?”

Follow-up: “You mentioned (name whichever of three curricular elements they mentioned – student learning objectives, learning cues, performance feedback). Do you recall others that we focused on (provide them if the interviewee does not)? Please describe if and how you tried to focus on these three elements in your teaching.”

Potential Follow-up: “At the training we mentioned how ‘survival’ is a primary goal of many new teachers, especially early in the semester. Describe what *your* focus was.”

“Please walk me through the process of your planning of a lesson.”

Potential Follow-up: “Please describe the role that you feel the GTA training may have played, if any, in your planning and execution of lessons.”

Follow-up: “If you recall, we also talked at length about alignment during the training. Do you recall how we defined alignment? (provide definition if necessary) So please share with me your experience in putting these three elements - student learning objectives, learning cues, and performance feedback - together.”

Potential Follow-up: “What did you learn from the training that helped you with this?”

Potential Follow-up: “How do you think your ability to align curricular elements affected your students’ experience in your class?”

“Talk to me about my visits to your class, and our discussions afterward.”

“With nearly a semester’s worth of hindsight, please describe whatever impact the training session and follow-up visits had on your teaching.”

“Thank you. Is there anything else you’d like to share that you feel might be relevant to my research?”

APPENDIX E

SEMI-STRUCTURED INTERVIEW GUIDE FOR DIRECTOR OF PHYSICAL ACTIVITY INSTRUCTION

“Thank you for agreeing to participate in this interview. While you already signed a form back in August that includes consent for this interview, I’d like to remind you that your participation is voluntary, and you can choose to not answer particular questions or choose to end the interview entirely at any time. I will make my best effort to maintain your anonymity as delineated in the consent form, but I cannot guarantee it. While I will not use your name or the name of the university in my manuscript, any quotes of yours that I use will be attributed to the director of physical activity instruction. I will be audio recording this interview.”

“Can you describe to me what being a director of physical activity instruction entails?”

“What attracted you to this particular position?”

“Please share your thoughts on the GTA mentoring process as it currently stands. What percentage of your workload does the director’s position theoretically account for?”

Potential Follow-up: “Do you feel that mentoring makes a difference, and if so, how?”

“I’d like for you to share your thoughts on the typical GTA’s readiness to teach – not necessarily just the current group, but overall - and the training provided for GTAs, both university and department wide.”

“Taking reasonable real-world constraints into consideration, please share what you think an ideal GTA training/mentoring process might look like at (this university).”

“How realistic is it for some type of mentoring for GTAs to occur in the future? What obstacles might impede it?”

“You were present for the entirety of the training session I provided. Please share your impressions of it, and any impact you feel the training may have had on the GTA teaching you witnessed this semester.”

“Is there anything else you’d like to share that you feel might be relevant to teaching and mentoring in physical activity instruction here at (this university)?”

APPENDIX F

SEMI-STRUCTURED UNDERGRADUATE STUDENT INTERVIEW GUIDE

“You have been asked to participate in an interview for a research study. The purpose of this study is to design, implement, and evaluate a program to train university graduate teaching assistants to align curricular elements in their planning and teaching in physical activity courses. Your participation is voluntary and you may withdraw at any time without any penalty or consequences related to your grade or standing in this course. You may choose to not answer any given question or questions, and you can stop the interview at any time. I will audio record the interview. You will not be identified by name when this research is published. However, because your voice will be potentially identifiable by anyone who hears the recording, your confidentiality for things you say on the recording cannot be guaranteed although I will try to limit access to the recording by keeping the audio file secure and password protected, and keeping paper transcripts of the interview in a locked file cabinet. I will not share your answers with your instructor. I will provide you with a copy of the consent form that you have signed. When this study is completed, the audio recording and all records of your interview will be destroyed.”

“Please tell me why you chose to take this particular course.”

“Please share your overall impression of your experience in this course.”

“Let’s talk about the instruction that was provided. Please share with me something you liked about your teacher’s approach to instruction, and anything you feel could maybe have been done better.”

Follow-up: “I’d like for you to think of one particular skill that you learned or significantly improved at during the semester. Please relate to me how your teacher went about teaching that skill, and what was most effective with you.”

Follow-ups as needed:

“Did you feel that there was a clear learning goal built into each lesson? Why or why not?”

“What role, if any, did learning cues – short phrases like ‘Keep your elbow high’, ‘Tuck your chin’, or ‘Bring your biceps to your ears’ play in your experience in this course?”

“How did you feel about the feedback your teacher provided while you were performing skills? What role did it play in your experience?”

Potential Follow-up: “One of the things my research is looking at is how a teacher puts all the pieces of a lesson together. What was your impression of your teacher’s ability to do this? How do you feel it affected your experience as a student?”

Is there anything else you’d like to share about your experience in this course that you think might be relevant to my research?”

APPENDIX G

UNIVERSITY-PROVIDED TEACHING OBSERVATION FORM

Instructor: _____

Evaluation Date: _____

Course: _____

Faculty Evaluator: _____

Please complete instructor ratings and a summary of teaching strengths and areas for improvement. More detail and additional evaluative comments may be provided in the Narrative Summary.

Instructor Ratings. Please rate the following and add evaluative comments supporting each rating.

Content (appropriate content, organization, clarity):

- Instructor demonstrates knowledge of content
- Instructor focuses on appropriate, important content
- Content is organized and clear

____ Excellent ____ Satisfactory + ____ Satisfactory ____ Unsatisfactory

Comments:

Presentation (class organization, effective communication/delivery, pace, use of A-V/resources):

- Instructor speaks clearly, at appropriate pace
- Instructor uses multimedia effectively
- Instructor uses class time effectively

____ Excellent ____ Satisfactory + ____ Satisfactory ____ Unsatisfactory

Comments:

Interaction (instructor-student interaction, student engagement, class climate):

- Instructor has good rapport with students
- Instructor encourages student participation

____ Excellent ____ Satisfactory + ____ Satisfactory ____ Unsatisfactory

Comments:

Summary of teaching strengths and areas/recommendations for improvement:

Teaching Strengths:

Recommendations for improvement:

Teaching Evaluation Narrative Summary:

APPENDIX H

UNIVERSITY-PROVIDED TEACHING OBSERVATION CHECKLIST

Activity Instructional Program Observation Form

Instructor: _____

Date: _____

Course: _____

Lesson: _____

Teaching Performance	1	2	3	4	Comments
Stated day's objective at the beginning of class					
Related lesson to previously learned material					
Gave examples/illustrations/personal experience					
Demonstrated knowledge of content					
Focused on appropriate, important content					
Content was organized and clear					
Used effective teaching cues					
Gave effective/correct demonstrations					
Used appropriate voice projection/tone/pace					
Integrated technology effectively					
Used innovative/appropriate learning activities					
Regulated activities and level of difficulty					
Brought effective closure to the lesson					
Class Management					
Began and ended class on time					
High degree of student time-on-task					
Students engaged in a meaningful way					
Minimized transition time between segments					
Used instructional formations effectively					
Had appropriate equipment on site					
Teacher Role During Instruction					
Well-prepared and organized					
Maintained a safe, non-threatening environment					
Exhibited enthusiasm/encouragement					
Demonstrated good rapport with					

students					
Treated students with dignity and respect					
Actively observed/monitored the class					
Made effort to interact with every student					
Gave specific performance-oriented feedback					
Positively reinforced correct performance					
Gave group feedback					
Modified instruction where appropriate					

Note: 1 = excellent, 2 = good, 3 = satisfactory, 4 = unsatisfactory

Summary of Strengths

Summary of Areas for Improvement