
Marshall James Milbrath

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SCIENCE OF THE ART OF COACHING: EXAMINING
THE DECISION-MAKING PROCESS OF
A COMPETITIVELY SUCCESSFUL
ENDURANCE RUNNING COACH

A Dissertation Submitted in Partial Fulfillment
Of the Requirements for the Degree of
Doctor of Philosophy

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College of Natural and Health Sciences
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Sport Pedagogy

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This Dissertation by: Marshall James Milbrath


has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Natural and Health Sciences in School of Sport and Exercise Science, Program of Sport Pedagogy

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ABSTRACT


Several knowledge typologies exist as part of the coaching process including scientific, sport-specific, and pedagogical knowledges. Prior literature has examined these typologies through investigation of decision-making schematics and through direct inquiry of sport coaches. However, while past investigations have included heterogeneous coaching populations, the understanding of mediating knowledges in sport-specific contexts is less clear. Additionally, the investigation of coaching knowledges and their contributions to coach decision-making has been limited solely to the explicit and implicit viewpoints of coaches through interview studies and has yet to be investigated through observation of the coaching process itself.

The present study investigated the decision-making process of a competitively successful endurance running coach through a single-case, instrumental, qualitative case study. Observations of the coach were conducted over a four-day field visit. Interviews with the participant coach, assistant coaches, and select athletes, as well as collected artifacts were used to provided additional trustworthiness and depth to the findings. Findings indicated that scientific, sport-specific, and pedagogical knowledges all contributed to the participant’s coaching process. Additionally, findings revealed that scientific, sport-specific, and pedagogical knowledges all contributed to the participant’s
coaching process through mediation of sport-focused and person-focused coaching actions. Evidence suggested that coaching knowledges shared an intertwined relationship with coaching actions and knowledge types with evidence indicating that multiple coaching knowledges influence coaching actions. Implications of the present study indicate that endurance running coaches should consider purposefully integrating scientific, sport-specific, and pedagogical knowledge into their coaching. Coaches are additionally advised to consider pedagogical knowledge that is applied to the sport irrespective of the members of their team, while also considering pedagogical knowledge that helps them serve individual needs of athletes.
DEDICATION

For the real Coach Gary Johnson

For modeling what it is to be an inspirational and gracious
Coach
Scientist
&
Educator

and for fanning a flame
of what has become a life’s calling

I will never be able to express my gratitude fully
ACKNOWLEDGEMENTS

To Scott Douglas and Mark Smith, for your patience and endurance through this process in my own pursuit of happiness, I express my thanks.

To my beautiful bride Gwyneth, in a life’s journey full of questions, it is only with you by my side that I can begin to find answers.

We hold these truths to be sacred and undeniable that all people are endowed by Almighty God with certain unalienable rights. And that among these are The Pursuit of Happiness.

-TJ

Jeremiah 29:11
TABLE OF CONTENTS

CHAPTER

I. INTRODUCTION ........................................................................................................... 1
   Background .................................................................................................................. 2
   Competitive Outcomes as a Marker of Successful Coaching ....................... 2
   Athlete Development ................................................................. 3
   Coaching Knowledge and Decision-Making ........................................... 5
   Knowledge and Decision-Making in Endurance Running Coaching .... 6
   Statement of the Problem ......................................................................................... 6
   Purpose of the Study ................................................................................................. 7
   Research Questions .................................................................................................... 7
   Chapter Summary ....................................................................................................... 7

II. LITERATURE REVIEW .............................................................................................. 9
   Success in Coaching .................................................................................................... 9
   Athlete Development ................................................................................................ 13
   The Developmental Model of Sport Participation ........................................ 14
   The Coaching Model ................................................................................................. 15
   Implications of Athlete Development for the Present Study ...................... 17
   Knowledge and Decision-Making ................................................................. 18
   Knowledge in Coaching and Teaching ............................................................ 18
   Teaching knowledge ............................................................................................... 19
   Content knowledge .................................................................................................. 19
   Curricular knowledge .............................................................................................. 20
   Pedagogical content knowledge ....................................................................... 21
   Coaching knowledge .............................................................................................. 23
   Coaching knowledge in track and field ............................................................ 27
   Implications for teaching and coaching knowledge for the present study ...... 31
   Decision-Making in Coaching .............................................................................. 33
   Coaches identify and develop outcome and process goals 
   taking a hierarchical approach ................................................................. 35
   Coaches use a hierarchy to make decisions in an integrated 
   fashion .................................................................................................................. 35
   Coaches use a broad range of knowledge sources to 
   underpin their decision making ................................................................. 36
   Implications of decision-making for the present study ......................... 36
   Chapter Summary ..................................................................................................... 36
### III. METHODOLOGY

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epistemology of Constructivism</td>
<td>39</td>
</tr>
<tr>
<td>Theoretical Perspective: Interpretivism</td>
<td>39</td>
</tr>
<tr>
<td>Theoretical Framework: Abraham and Colleagues’ Coaching Schematic</td>
<td>41</td>
</tr>
<tr>
<td>Methodology</td>
<td>42</td>
</tr>
<tr>
<td>Case Study</td>
<td>42</td>
</tr>
<tr>
<td>Case study types</td>
<td>42</td>
</tr>
<tr>
<td>Single-case, case study</td>
<td>42</td>
</tr>
<tr>
<td>Intrinsic case studies</td>
<td>43</td>
</tr>
<tr>
<td>Instrumental case studies</td>
<td>43</td>
</tr>
<tr>
<td>Special issues in case study</td>
<td>43</td>
</tr>
<tr>
<td>Defining the present case</td>
<td>44</td>
</tr>
<tr>
<td>Methods</td>
<td>45</td>
</tr>
<tr>
<td>Selecting the Setting and Participant</td>
<td>45</td>
</tr>
<tr>
<td>Data Collection Procedures and Tools</td>
<td>50</td>
</tr>
<tr>
<td>The onsite visit</td>
<td>50</td>
</tr>
<tr>
<td>Conducting interviews</td>
<td>51</td>
</tr>
<tr>
<td>Interviews with the participant</td>
<td>53</td>
</tr>
<tr>
<td>Interviews with the assistant coaches and athletes</td>
<td>54</td>
</tr>
<tr>
<td>Observing practice sessions</td>
<td>55</td>
</tr>
<tr>
<td>Collecting artifacts and documents</td>
<td>57</td>
</tr>
<tr>
<td>Using a researcher’s journal</td>
<td>58</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>59</td>
</tr>
<tr>
<td>Organizing the data</td>
<td>59</td>
</tr>
<tr>
<td>Immersion in the data</td>
<td>60</td>
</tr>
<tr>
<td>Immersion with the interviews</td>
<td>60</td>
</tr>
<tr>
<td>Immersion with the field notes</td>
<td>61</td>
</tr>
<tr>
<td>Immersion with video artifacts</td>
<td>62</td>
</tr>
<tr>
<td>Coding the data</td>
<td>63</td>
</tr>
<tr>
<td>Knowledge codes</td>
<td>64</td>
</tr>
<tr>
<td>Behavior codes</td>
<td>65</td>
</tr>
<tr>
<td>Goal codes</td>
<td>66</td>
</tr>
<tr>
<td>Analysis of decisions</td>
<td>66</td>
</tr>
<tr>
<td>Generation of themes and categories</td>
<td>68</td>
</tr>
<tr>
<td>Analysis of the coach’s decisions</td>
<td>69</td>
</tr>
<tr>
<td>Searching for alternate understandings</td>
<td>70</td>
</tr>
<tr>
<td>Important Methodological Issues</td>
<td>71</td>
</tr>
<tr>
<td>Building rapport</td>
<td>71</td>
</tr>
<tr>
<td>Trustworthiness</td>
<td>71</td>
</tr>
<tr>
<td>Credibility</td>
<td>71</td>
</tr>
<tr>
<td>Dependability</td>
<td>73</td>
</tr>
<tr>
<td>Transferability</td>
<td>73</td>
</tr>
<tr>
<td>Ethical considerations</td>
<td>74</td>
</tr>
<tr>
<td>Personal subjectivities</td>
<td>76</td>
</tr>
<tr>
<td>Experience as an athlete</td>
<td>76</td>
</tr>
<tr>
<td>Experience as a coach</td>
<td>78</td>
</tr>
<tr>
<td>Experience as a coach educator</td>
<td>79</td>
</tr>
</tbody>
</table>
Chapter Summary .............................................................................................................. 79

IV. FINDINGS ...................................................................................................................... 81

Theme #1: The Coach Used Scientific Knowledge to Make Decisions ........ 88

Knowledge of Physiology Influenced in Training Decisions .......... 88

Decisions on training implementation used knowledge of
energy systems. ........................................................................................................ 90
Decisions on training implementation used knowledge of
neuromuscular systems. ......................................................................................... 91
Decisions on training implementation used knowledge of
heart rate. ................................................................................................................. 92

Knowledge of Psychology Influenced Training and Competition
Decisions .................................................................................................................. 93

Theme #2: The Coach used Sport-Specific Knowledge to Make Decisions . .95

Knowledge of Periodization Influenced Training Decisions .......... 96

Decisions on training organization used
knowledge of training volume. ........................................................................... 97
Decisions on training organization used
knowledge of training intensity ........................................................................ 98

Knowledge of Endurance Running Requirements
Influenced Training Decisions ............................................................................. 99

Decisions on training implementation used knowledge of
specificity. ............................................................................................................... 99
Decisions on training implementation used knowledge of
appropriate effort. ................................................................................................. 102
Decisions on training implementation used knowledge of
the necessity of rest. ............................................................................................ 105

Knowledge of Past and Future Competitions Influenced Decisions .106

Theme #3: The Coach Used Pedagogical Knowledge to Make Decisions ... 109

Knowledge of Endurance Running and Coaching
Influenced Coaching Decisions ............................................................................ 111

Decisions on how to cultivate team environment were
influenced by the adoption of values and attitudes.............. 112

  The coach fostered an attitude of commitment
to excellence when cultivating
his team’s environment................................................................. 113

  The coach fostered feelings of belonging and
contribution when cultivating
his team’s environment............................................................. 115

Decisions on competition planning were influenced by
knowledge of goals. ......................................................................................... 121

Knowledge of Endurance Running and Individuals
Influenced Coaching Decisions ............................................................................ 125

Decisions on training and competition were influenced by
knowledge of athletes’ individual characteristics.............. 125
The coach learned about and used knowledge of the physical abilities of his athletes when organizing and implementing training. The coach learned about and used knowledge of the personality characteristics of his athletes during training and competition. Decisions on responsive training were influenced by knowledge of athletes’ individual circumstances. Responsive training was provided for athletes who needed a short-term plan. Responsive training was provided for athletes who needed a last-minute adjustment. Responsive training was sometimes not provided. Decisions on how to provide explanations and instructions to athletes were influenced by knowledge of individual communication styles.

Chapter Summary

V. CONCLUSIONS AND IMPLICATIONS

Sources of Knowledge that Contributed to the Coach’s Decision-Making
Comparing Present Findings with Prior Teaching Knowledge Frameworks
Comparing Present Findings with Prior Coaching Knowledge Frameworks
Comparing Present Findings with Studies on Coaching Knowledge
How the Coach Used Knowledge During Coaching
How the coach used scientific knowledge during coaching
How the coach used sport-specific knowledge during coaching
How the coach used pedagogical knowledge during coaching
Implications for Coaching
Implications for Researchers
Limitations of the Study
Summary

REFERENCES

APPENDIX

A. Initial Contact of Prospective Participant
B. Interview Protocol
C. Prepared Document on Competitive Success
D. Deidentified Video List
E. Initial Resultant Codes
LIST OF TABLES

TABLE

1. Correlations between CSQ-2 Responses from Gillham et al. (2013) .................. 11
2. Alignment of Teaching and Coaching Knowledges ........................................ 23
3. Useful Coaching Knowledges from Stoszkowski and Collins (2016) ............... 28
4. Pages Dedicated to Various Subjects in Track & Field Coaching Manuals
   Grouped by Knowledge Type ........................................................................ 30
5. Coaching Knowledges’ Alignment with Past Literature .................................. 33
6. Onsite Visit Schedule .................................................................................... 51
7. Actions Taken During the Iterative Coding Process ....................................... 65
8. Example of Assigning Multiple Predetermined Codes to a Memo .................. 67
9. Alignment of Teaching Knowledge with Present Findings ............................. 150
10. Alignment of Coaching Knowledge with Present Findings ............................ 152
LIST OF FIGURES

FIGURE

2. Coaching Knowledge Typology from Nash and Collins (2006)......................25
3. Conceptualization of Decision-Making in Coaching by
   Nash and Collins (2006) ..................................................................................25
4. The Coaching Schematic by Abraham et al. (2006)........................................26
5. Years of coaching for each coach at institution within the
   considered collegiate level and conference ..................................................48
6. Coaches’ markers of competitive success attained at institution within
   the considered collegiate level and conference ...........................................49
7. Coaches’ markers of competitive success attained at institution within
   the considered collegiate level and conference normalized for year and
   taking into consideration men and women’s teams ........................................49
8. Templates of Analysis Styles, from Crabtree and Miller (1992) ....................63
9. Hierarchical themes developed through to categories ..................................87
10. Hierarchical arrangement of the knowledges and actions ..........................148
11. Integrative diagram showing knowledge sources’ relationships with
    coaching actions .........................................................................................156
12. Integrative diagram showing knowledge typologies’ relationships with
    coaching actions .........................................................................................158
CHAPTER I
INTRODUCTION

Sport coaching is a complex process that involves the attuning to multiple domains of athletic experiences to ensure continual development of the sport participants. In the past, studies have taken on a positivistic paradigm that, by its very nature, is reductionist in the understanding of coaching (Cushion, 2007). In many cases, coaching has been seen as mechanistic, where predictable behaviors are expected to be observed in response to actions from a coach and/or athlete. American track and field coaching education efforts, have traditionally relied on the sharing of sport-specific knowledge (e.g., technical training for runners, sprinters, jumpers, and throwers) alongside sport science topics (e.g., sport psychology, physiology, biomechanics, etc.) in coaching education curricula (Freeman, 2015b; Gambetta, 1981). However, sport-specific and scientific knowledge address only part of what contributes to the coaching process. Abraham, Collins, and Martindale (2006) posited that across all sports, scientific, sport-specific, and additionally, pedagogical knowledges exist for organization and implementation during coaching that works towards an overarching goal of a sports program. International coaching education through the International Association of Athletics Federations (IAAF) have provided pedagogical practices in their curricula (Thompson, 1991, 2009). However, while what coaches should do is shared within coaching education, clear teaching on how coaches should do this had been largely left to be serendipitously learned by the coach. Coaching has been accepted to be context
dependent, recognizing that no two situations merit the same coaching (Côté, Young, North, & Duffy, 2007). In the world of endurance running, it has been said that there are as many types of training as there are coaches, much of which is based on tradition or adapted from successful coaches (Adelizi, 1992; Harter, 1993; Stevenson, 1987; Warhurst, 1985). The acknowledged diversity in coaching approaches, thus, prompts questions regarding how coaches coach, and how coaching knowledges contribute to these methods.

Background

Competitive Outcomes as a Marker of Successful Coaching

Successful coaching has historically been categorized through competition outcomes either through won-loss records or number of championships won (Gillham, Burton, & Gillham, 2013). At the time of this study, competitively successful coaches were of interest as the International Counsel for Coaching Excellence (ICCE) had turned attention to the coaching characteristics of ‘serial winners,’ or “coaches who have, repeatedly and over a sustained period of time, coached teams and athletes to gold medals at the highest level of competition such as the Olympic Games or World Championships,” (Mallett & Lara-Bercial, in press). However, competition, and subsequently the opportunity to be competitively successful, was not limited to international competition. In the United States, competition exists between clubs, high school teams, and college teams. Within American, four-year collegiate systems, four levels of national competition exist between the three divisions of the National Collegiate Athletics Association (NCAA) and the National Association of Intercollegiate Athletics (NAIA) with regional and conference subsets of these systems. American intercollegiate
athletics are organized so that schools of equitable resources and competitive levels compete against each other (Groza, 2010). Not only does this system differentiate four levels of intercollegiate competition, but it also differentiates the conferences within these divisions (e.g., ‘Power Five’ vs. ‘Group-of-Five’ conferences in NCAA Division I) (Lavigne, 2016). Championship competitions are organized within these layers of competition providing coaches with additional opportunities to be competitively successful. National championships or national championship appearances are certainly markers of success. However, to look past coaches who regularly coach athletes and teams to success in conference competitions overlooks success based in competition against equitably matched competitors. Therefore, conference competition histories should be considered when identifying coaches who are competitively successful. Using conference championships and appearances at national championships as a measure of success was additionally supported by Carter and Bloom (2009) who used these criteria as markers of successful coaches.

**Athlete Development**

Competitive success is not the only important part of coaching. Gillham and colleagues (2013) created the Coaching Success Questionnaire-2 (CSQ-2) “to provide a global measure of coaching success not dependent upon won-loss records.” This was undertaken in part because a measure of coaching success that “promotes athlete development tied to accomplishable goals,” (Gillham et al., 2013) had not been available. This implies that athlete development is a valuable component of coaching. Additionally, in the validation of the CSQ-2, athletes’ perceptions that coaches who were competitively successful (e.g., successful at winning game or championships) were highly correlated with perceptions that those coaches were successful in their ability to develop athletes (r
Therefore, it was reasonable to expect that coaches who were competitively successful would also successful in developing athletes who were under their care.

Positive athlete development has been characterized by providing experiences that result in improvement as an athlete while taking into consideration the developmental stage of the athlete (Côté, Bruner, Erickson, Strachan, & Fraser-Thomas, 2010). The Developmental Model of Sport Participation (DMSP) differentiates between Sampling, Recreational, Specializing, and Investment stages of sport participation (Côté et al., 2010). The Sampling, Recreational, and Specializing stages provide experiences for young athletes in which general participation in sport is emphasized before giving way to deliberate training in a focused sport. Starting around age 16, the Investment stage is characterized by late adolescents/young adults who commit to a sport and dedicate much of their sport participation to deliberate training that is specific to the needs of a chosen sport. Participation in intercollegiate athletics occurs during this Investment stage. During this stage, athletes may increase their attention to extrinsic merits of competition. Côté and colleagues (2010) stated that athletes in this stage are “often motivated by factors such as winning, selection to an international team, or establishing a sport career,” (p. 75). As such, coaches of athletes in this stage should structure training purposefully in order to improve current performance and avoid plateaus in skill development (Côté et al., 2010). Therefore, an important aspect of endurance running coaching is the elicitation of athlete improvement. However, a question that remained, focused on what content information, or knowledges, coaches rely on to do this, as well as how these knowledges are applied during the coaching process. The following section addresses some of these knowledge bases, and how they have been used during coaching.
Coaching Knowledge and Decision-Making

The coaching process is a multi-faceted teaching process that requires professionals to be cognizant of an array of knowledge bases in sociocultural, scientific, and pedagogical contexts (Freeman, 2015a). Shulman (1986, 1987) identified that effective teaching is composed of content knowledge (CK) of a discipline along with pedagogical content knowledge (PCK) used for teaching skills to students. Nash and Collins (2006) highlighted the context-specific relevance of this indicating that coaches require declarative ‘ological knowledge rooted in science, sport specific knowledge, and pedagogical knowledge. Nash and Collins (2006) further inferred that these knowledges are interconnected with procedural knowledges that in turn affect the actions of a coach. Taken together, this study defined coaching knowledge as the scientific, sport specific, and pedagogical knowledge bases used by a coach for the training of her or his team.

While part of the coaching process is widely considered a decision-making process, research on this decision-making process was lacking. Abraham and colleagues (2006) took the coaching knowledges posited by Nash and Collins (2006) and validated a schematic describing the connectedness of these knowledges through coach perceptions. However, no research had been undertaken to determine how knowledges moderate decision-making. Since the schematic by Abraham et al. (2006) was published, researcher efforts had looked at the cognitive complexity (Vergeer & Lyle, 2009) and styles of decision-making (Giske, Benestad, Haraldstad, & Hoeigaard, 2013) between expert and novice coaches. However, a dearth of information remained regarding the how coaches made decisions based on their knowledge bases including in track and field settings.
Knowledge and Decision-Making in Endurance Running Coaching

Coaching education curricula historically addresses content knowledge. From the first iteration of track and field coaching education in the United States (Gambetta, 1981) to its most current revision (Freeman, 2015b), a focus on sport-specific knowledge for each of the events of track and field along with ‘ological knowledge is emphasized. The IAAF included these aspects, but, also included pedagogical and administrational considerations for the coach as well, even at its earliest rendition (Thompson, 1991, 2009). In endurance running, major focuses are placed on the speeds and distances run within each practice, and organizations of different practice types. However, coaching literature acknowledges that training is likely to be different between athletes, teams, and seasons within the same team (e.g., Adelizi, 1992; Harter, 1993; Stevenson, 1987; Warhurst, 1985). What remained to be understood was how a coach used the different knowledges to differentiate training so that each athlete was accommodated appropriately.

Statement of the Problem

Content knowledge has been widely examined in its relationship with pedagogical effectiveness, including physical education, no studies had addressed this topic in the context of endurance running coaching. With coach education efforts in track and field focusing on the content knowledge of training, a remaining question was if coaches primarily rely on content knowledge, or if pedagogical knowledges were a greater determinant of decision-making. Investigating this aspect of coaching in endurance running settings allowed for a better understanding of how a coach who exhibited markers of competitive success made decisions while coaching endurance runners.
Purpose of the Study

Many endurance running training approaches in cross-country, indoor track, and outdoor track have provided general progressions that have been considered best practices (e.g., Rose, 1984; Smith, 1992; Wilson, 1992). However, no detailed explanation of how coaches determine the nuances of these progressions has been provided in coaching education, in the coaching education resources themselves, in technical journals of track and field, or in pedagogical research.

Therefore, the purpose of this study was to better understand how a coach, who had a history of competitive success, utilized coaching knowledge and made decisions while training endurance running athletes.

Research Questions

This study was guided by the following research questions:

Q1 What sources of knowledge contribute to the decision-making process of an endurance running coach with a history of competitive success?

Q2 How does an endurance running coach with a history of competitive success use scientific (e.g., psychology, physiology, biomechanics, etc.) knowledge during coaching?

Q3 How does an endurance running coach with a history of competitive success use knowledge specific to endurance running training during coaching?

Q4 How does an endurance running coach with a history of competitive success use pedagogical knowledge during coaching?

Chapter Summary

In this chapter, I provide background for this study highlighting the relevance of the interest in competitive success in endurance running coaching, its connection to athlete development, the importance of coaching knowledge and decision-making in coaching, and the relationships of these topics to coaching endurance runners.
Significance of the present investigation was established along with the purpose, research questions, and anticipated limitations of the study. The following chapter provides in depth information on the background of this study further highlighting the gap that existed in the literature surrounding decision-making in endurance running coaching.
CHAPTER II
LITERATURE REVIEW

The present study investigated how an endurance running coach, who had a history of competitive success, utilized coaching knowledge while coaching endurance running athletes. The investigation required an in-depth understanding of topics pertaining to success in coaching, athlete development, and decision-making in coaching.

Success in Coaching

Characterizing coaching success has stemmed from literature on coaching effectiveness. Horn (2008) defines effective coaching behaviors as behaviors that result “in either successful performance outcomes or positive psychological responses on the part of the athletes,” (p. 240). Horn’s (2008) model of coaching effectiveness includes 10 areas. These areas are divided into two main groups, dimensions that are outside of the coach-athlete interaction and dimensions that are directly related to the coach-athlete interaction. Key concepts of Horn’s model are that coaches’ behaviors affect “(a) self-perceptions, beliefs and attitudes; (b) type and level of motivation; and (c) behavior and performance,” (as cited in Gillham et al., 2013).

Historically, evaluation of coaching success had focused on this third effect (i.e., behavior and performance) through outcomes such as won-loss records (Horn, 2008) or number of championships at various levels of competition have also been used (Carter & Bloom, 2009; Gillham et al., 2013). This presented three major problems. First, only one of three general criteria have been considered when evaluating successful coaching not
allowing for the ability of the coach to positively affect self-beliefs or attitudes. This is problematic as feelings of self-concept are positively related to performance (Bandura, 1986, 1997). Second, ignoring the ability of a coach to foster environments that are conducive to developing positive intrinsic motivation for a task ignores another positive affector of performance (Deci & Ryan, 1985; Ryan & Deci, 2000). Lastly, considering only won-loss and championship records ignores that gains in performance can also come from personal improvement, not only through competitive superiority. Thus, a metric by which to measure the successfulness of a coach accounting for all three of these dimensions had been used in past investigations.

Attention had been turned to other measures of successful coaching in order to more holistically include effects from coaches’ behaviors. Gillham and colleagues (2013) developed the Coaching Success Questionnaire-2 (CSQ-2) using athletes’ perceptions of coaches’ successfulness. Athlete perception of coaching behavior rather than observed coaching behavior was used as the validating criteria upon Horn’s (2008) recommendation as effectiveness of coaching behavior is mediated by athlete perceptions. The result was a measure of successful coaching that included the ability of the coach to foster and promote:

- self-confidence (i.e., athlete self-confidence),
- athlete wellness (i.e., positive views on athlete fitness),
- sportsmanship (i.e., good sportsmanship),
- attitudes about winning (i.e., win-at-all-costs attitudes),
- skills and strategies (i.e., effective competitive strategies),
- teamwork (i.e., atmosphere of cooperation),
- physical development (i.e., improve athletes’ individual physical capabilities),
- enjoyment (i.e., athletes’ desires to continue to play the sport),
- winning (i.e., positive impact in competitions), and
- emotion management (i.e., athlete emotion and attention control) (Gillham et al., 2013).
The final evaluation of this questionnaire showed that the ‘winning’ subscale of this questionnaire correlated with every other subscale \((r = 0.64-0.88)\) with the exception of ‘attitudes about winning’ \((r = 0.24)\) and that it also highly correlated with the overall measure of coaching success \((r = 0.88)\) (Table 1). The result was a means of evaluating successfulness of coaching that takes into account the athlete-coach factors of Horn’s (2008) model of coaching effectiveness.

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<td>5. Emotion Management</td>
<td>0.80</td>
<td>0.69</td>
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<tr>
<td>6. Sportsmanship</td>
<td>0.79</td>
<td>0.56</td>
<td>0.63</td>
<td>0.74</td>
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<td></td>
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<tr>
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<td>0.73</td>
<td>0.85</td>
<td>0.65</td>
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<td>0.64</td>
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<td>10. Attitudes about Winning</td>
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<tr>
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<td>0.89</td>
<td>0.82</td>
<td>0.90</td>
<td>0.81</td>
<td>0.89</td>
<td>0.88</td>
<td>0.24</td>
<td>0.20</td>
</tr>
</tbody>
</table>

The present study included a coach who had a history of competitive success. This criterion was chosen through three justifications. First, a history of competitive success (i.e., ‘winning’) was included within the validated CSQ-2 for evaluating successful coaches. This criterion (i.e., ‘winning’) is highly correlated \((r = 0.88)\) with overall coaching success. Second, coaching success is embedded within Horn’s (2008) coaching effectiveness framework indicating a potential contribution to part of the understanding of effective coaching. Lastly, using “history of competitive success” as an inclusion criterion allowed for a valid criterion that can be ascertained in the absence of response information from athletes. Out of the 10 subscales included in the CSQ-2, the
only one that could be evaluated from outside of the team environment was ‘winning’ while all others would require purposeful sampling from within the team environment. However, limitations included the acknowledgement that the CSQ-2 evaluates athletes’ perceptions of winning (Gillham et al., 2013) through the following questions:

- Did your coach create a winning program?
- Did your coach help you find a way to win?
- Did your coach make decisions to help you win?
- Did your coach design strategies to help your team win? (p. 125)

Using athlete perceptions of competitive success was different from traditional objective measures of competitive success such as won-loss records or number of championships won at various levels of competition (Carter & Bloom, 2009; Gillham et al., 2013; Horn, 2008). Thus, using a history of competitive success as an inclusion criterion assumed that my assertion of a coach’s competitive success would match the perception of her or his athletes.

A final topic on using measures of success as an inclusion criterion for the present study centers on its necessity. The notion of constructing knowledge from a coach who had a history of competitive success was rooted in an expert-novice paradigm (Campbell, Brown, DiBello, & Hoffman, 1992) in which standardized relevant tasks reflect superior performance (Ericsson & Smith, 1991). The expert-novice approach has been used in coaching science to understand desirable coaching traits in studies focusing on successful (e.g., Gilbert, Côté, & Mallett, 2006), effective (e.g., Côté & Gilbert, 2009) and expert coaches (e.g., Côté, 1995; Côté & Sedgwick, 2003), as well as in general studies on expertise (e.g., Glaser & Chi, 1988; Starkes & Allard, 1993). Thus, the use of a competency-based inclusion criteria, such as “history of competitive success,” was both justified and appropriate for the present study.
This section addressed the relationship between a “history of competitive success” and successful coaching. Additionally, this section addressed how including a coach with a history of competitive success was advantageous for the present study. The following section addresses the necessity of the second requirement of the participant, that decisions made during the coaching process are made with the continual development of athletes in mind.

**Athlete Development**

Sport is a popular leisure activity in which young people participate (e.g., Eccles & Barber, 1999; Hansen & Larson, 2007). American collegiate student-athletes, in particular, participate in sport for various reasons, among which, is the desire to meet full athletic potential (Caron, Bloom, & Bennie, 2015; Jenny, 2013; Stec, 2011). The desire to meet full athletic potential can be considered a major influencer as it has been shown to influence college choice of a prospective student-athlete (e.g., Glasby, 2014; Howat, 1999) and has been shown to be a major motivator for competitive college-age runners (Frey & Ruble, 1990). Therefore, attention to developmental matters as it pertained to the athletic experience was merited.

Researchers in sport have emphasized the importance of appropriate development during sport participation (Côté et al., 2010). Fraser-Thomas, Côté, and Deakin (2005) argued that positive development is dependent on appropriately conducting sport programs that consider the developmental stage and personal attributes of the athlete. Attention to developmental stage mirrors American track and field coach education efforts that emphasize the importance of an ‘athlete-centered’ approach through individualized attention (McGuire, 2015). Performance outcomes (e.g., improving best time, winning a race) are often the focus of development, though other related attitudes
should be considered. Both the Developmental Model of Sport Participation (DMSP) (Côté et al., 2010), and the Coaching Model (CM) (Côté, 2006; Côté & Gilbert, 2007) of coaching and development have emerged as theory-driven methods of providing for physical and socio-emotional needs. These models are addressed in the following section along with the relevance they had to the present study.

The Developmental Model of Sport Participation

The Developmental Model of Sport Participation (Côté et al., 2010) focuses on the physical development of the athlete. It highlights the importance of developmentally appropriate training in four stages: sampling years, recreational years, specializing years, and investment years. Each of these stages takes into account the developmental needs of athletes. These stages employ varying levels of deliberate play and deliberate practice. Deliberate play (Côté, 1999) consists of sporting activities that provide immediate gratification and maximized enjoyment. Deliberate practice (Ericsson, Krampe, & Tesch-Ramer, 1993) consists of structured activities typical of organized sport, where the goal is to improve performance. Deliberate play is associated with younger and more recreational stages of development with deliberate practice increasingly taking the place of deliberate play as a child increases in age and competitive/performance focus (Côté et al., 2010).

Participation in collegiate athletics, or elite sport, takes place in the Investment stage of development. During this stage athletes typically commit to one sport, are often motivated by competitive and performance goals, engage primarily in deliberate practice, and require structured training in large quantities. However, while necessary attention should be given to the physical training of the athletes, attention should also be given to
the cognitions and attitudes of athletes as well. The following section examines these cognitions and attitudes as well as how coaches may develop these cognitions and attitudes in their athletes.

**The Coaching Model**

The Coaching Model (Côté, 2006; Côté & Gilbert, 2007) focuses on the socioemotional aspect of the athletic process and integrates the development of the 4Cs (Competence, Confidence, Connection, Character/Caring) (Lerner, Fisher, & Weinberg, 2000) as desirable coaching outcomes. The following sections provide a brief review of these components.

Competence is the perception of abilities within a specific domain (Weiss & Ebbeck, 1996). Fostering high levels of competence in sport contexts is associated with (a) greater intrinsic motivation, (b) higher achievement, (c) more positive attitudes and behaviors, (d) higher levels of happiness, and (e) lower levels of anxiety (Weiss & Ebbeck, 1996). In elite sports, fostering high levels of competence involves successful integration of motor, perceptual and psychological skills (Côté et al., 2010). However, Walton (1992) also found that effective coaches also contributed to athletes’ human experience by committing to the integrity, values and personal growth of the athletes.

Confidence is the degree of certainty individuals have about their ability to be successful (Feltz & Chase, 1998) in isolated skills (Maddox, 1995) or across multiple skills (Horn, 2004). Confidence can also be interpreted as a more global representation of an individual’s attitudes and self-beliefs (Jelicic, Bobek, Phelps, Lerner, & Lerner, 2007). Close attention to developing confidence in sport is critical as it has been acknowledged to be fragile, yet critical to the thoughts, attitudes, and behaviors of athletes (for a review see Vealey & Chase, 2002). A concurrence exists that the coach-athlete relationship is a
major determinant in the development of athlete confidence (Côté & Salmela, 1996; Hays, Maynard, Thomas, & Bawden, 2007). Thus, coaches do well to give positive attention to athletes regarding not only sport, but other aspects of athletes’ lives in order to develop them as athletes (Sedgwick, Côté, & Dowd, 1997).

Connection refers to the sharing of close relationships athletes have with others in the sport context. This stems from the acknowledged need for relatedness posited by Deci and Ryan's (1985) self-determination theory and has been shown to contribute to athlete well-being (for reviews see Jowett & Poczwardowski, 2007; Smith, 2007). Because of the level of investment that athletes have in the athletic experience in elite sport, coaches have an important role in fostering these feelings of relatedness and belonging (Côté, 1995, 2002; Côté & Salmela, 1996; Kalinowski & Bloom, 1985). Jowett and Poczwardowski (2007) posited that coach-athlete relationships are most beneficial when the coach and the athlete are close, committed to their relationship, complementary, and mutually invested in the athletic environment. Not only does this dynamic support the athletic endeavors of the athletes, but also helps the athlete maintain a healthy perspective on sport and life.

Character/caring and its relationship to sport participation has conflicting views in literature as some authors state that sport undermines character (Weiss & Smith, 2002)) while others celebrate it as a character-building activity (Côté et al., 2010). Largely, character/caring has been pursued as a moral endeavor with initiatives such as Personal-Social Responsibility (Hellison, 1995) aiming to promote these values in sport. Coaches should, therefore, use sport to teach social values that can be transferred to real life situations (Côté et al., 2010).
Implications of Athlete Development for the Present Study

The present study was interested in how the methods of a coach who had a history of competitive success were used when training endurance running athletes, using a demonstrated record of competitive success as an inclusion criteria. Athlete development is most certainly of interest when coaching and as such could be implicated in the decision-making process. This section addressed issues of both physical and socio-emotional development. One anticipation this study made was that coaches who have histories of competitive success would also use coaching practices that have the development of athletes in mind. Using the CSQ-2 (Table 1), there was evidence to suggest that athletes’ perceptions of a coach’s competitive success (i.e., ‘winning’) is positively related to athletes’ perceptions that physical development (i.e., physical development, skills and strategies, wellness) and socio-emotional development (i.e., self-confidence, emotion management, sportsmanship, teamwork) are also being nurtured. This relationship allowed for the reasonable anticipation that responses from the coach would include a focus on these holistic markers of athletic development. According to Côté et al. (2010), such coaching practices may include the coach’s tendency to:

- Construct a training program grounded in deliberate practice
- Structure training purposefully to improve performance and to avoid pauses in development
- Surround athletes with the physical and social resources needed to overcome effort and motivational constraints
- Recognize that the coach/athlete relationship will change becoming more collaborative
- Encourage full commitment to sport on a year-round basis, and required rigorous training
- Encourage involvement in activities that remind them of the intrinsic enjoyment from sport
• Encourage athletes to participate in an off-season sport for relaxation or cross-training
• Acknowledge and respect that athletes sacrifice other life opportunities for their one sport, and promote the benefits rather than the costs of such an investment

This section addressed multiple components of athlete development, including not only the physical development of the athlete, but the socio-emotional development of the athlete as well. Additionally, this section highlighted the plausible relationship between athletes’ perceptions of developmental aspects of sport and a demonstrated history of competitive success which allowed for the anticipation that the participant coach would describe and demonstrate coaching practices that directly addressed athlete development. Furthermore, this review of the literature identified potential coaching practices that would be directly described, observed, or mirrored by the participant coach’ during the onsite visit. The following sections examine attributes of interest of the coach in the context of a competitively successful and developmentally minded endurance running coach.

Knowledge and Decision-Making

Knowledge in Coaching and Teaching

Typologies of coaching knowledge stem back to knowledge sources in teaching identified by Shulman (1986, 1987). In order to better understand these knowledge sources and their central focuses, a better understanding of content knowledge and pedagogical content knowledge, as coined by Shulman (1986, 1987), was necessary.
**Teaching knowledge.** Shulman (1986, 1987) stated that teaching knowledge consists of content knowledge (CK) (i.e., knowledge of what is to be taught), pedagogical content knowledge (PCK) (i.e., the knowledge of how to teach content), and curricular knowledge (i.e., the cumulative understanding of all areas used to teach and influence a setting). Pedagogical content knowledge has been of great interest in teaching as it describes the bridging of content and teaching practice for the effective instruction of learners (Ball, Thames, & Phelps, 2008). Shulman (1986, 1987) first posited that PCK acts parallel to other content knowledges (i.e., curricular knowledge, general pedagogical knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, and knowledge of educational ends and purposes), but later adjusted this stance to state that content knowledges act through PCK (Gudmundsdottir & Shulman, 1987). Abell (2008) called attention to discrete categories of knowledge within both CK and PCK which were then addressed in more detail by Ball and colleagues (2008). The following sections examine CK, PCK and curricular knowledge in more depth and connect them to coaching knowledges that were of interest in the present study.

**Content knowledge.** Content knowledge can be applied through three discrete categories of knowledge. First, common content knowledge (CCK) is knowledge and skill used in settings other than teaching. The word “common” does not mean to imply that everyone has this knowledge, but rather that this knowledge is used in a wide variety of settings and is not necessarily unique to the setting and context. Second, specialized content knowledge (SCK) is knowledge and skill unique to teaching. In other words, these types of knowledge are rarely needed outside of a teaching situation. The final knowledge subcategory of CK, introduced by Ball (1993), is horizon content knowledge (HCK). This is an awareness of how knowledge has been related over the span of a larger
picture. This allowed for an awareness of how previous experiences may have prepared a learner for the present, while keeping in mind how present experiences might prepare a learner for the future.

Currently, CK is seen as the greatest influencer of PCK (Iserbyt, Ward, & Martens, 2016). Abell (2008) stated that PCK involves, at its core, dynamic content matters through an integrated application of discrete categories for problem solving and transformation of knowledge. Ball and colleagues (2008) stated that, “there may be nothing more foundational to teacher competency,” (p. 404) than knowing the content of what they teach. Krauss, Brunner, Kunter, et al., (2008) found that the connectedness between CK and PCK was influenced by the degree of expertise in the content matter of what is being taught. This was echoed by Ward and Ayvazo (2016) who more recently stated that “when CK is weak, PCK is weak, and when CK is strong, PCK is typically strong,” (p. 200). Taken together, CK has been considered critical to the development of effective teaching practice in past literature.

Curricular knowledge. Curricular knowledge, according to Shulman (1986), is:

…represented by the full range of programs designed for the teaching of particular subjects and topics at a given level, the variety of instructional materials available in relation to those programs, and the set of characteristics that serve as both the indications and contraindications for the use of particular curriculum or program materials in particular circumstances (p. 10)

Shulman went on to further distinguish between lateral curricular knowledge and horizontal curricular knowledge. Lateral curricular knowledge refers to sources of learning that occur apart from an in particular setting. An example within classroom education would be acknowledging learning that occurs in a mathematics class may augment the understanding in a math-based discipline such as physics or chemistry. Vertical curricular knowledge refers to an understanding of how present and future
learning experiences within the context are shaped by the past and present respectively. Another example within a classroom setting would be the understanding of how past science classes will affect the learning of a present class, or how the present class will affect future science classes.

**Pedagogical content knowledge.** Pedagogical content knowledge has two categories within it identified by Ball and colleagues (2008). First, knowledge of content and student (KCS) is knowledge that combines knowledge of learners and content in an effort to provide instruction that is appropriate on an individual level. This may involve an awareness of potential conceptions and misconceptions learners may have about a content area of interest. Second, knowledge of content and teaching (KCT) combines knowledge of instruction and content. In KCT, there is a heightened attuning to pedagogical issues that affect student learning within the content and setting.

Taken together, a theoretically rooted understanding of how teaching knowledge influences teaching and learning existed. However, while PCK and its related knowledges had been a prominent topic for the explanation of effective teaching, some ambiguities in the field existed. Ball and colleagues (2008) created a turning point in the understanding of PCK by better defining the discrete categories that exist within CK and PCK. Ward and Ayvazo (2016) noted that Ball and colleagues had divided PCK into three categories (i.e., KCT, KCS and Knowledge of Content and Curriculum (KCC)). However, this is not entirely accurate as Ball and colleagues (2008) disclosed:

> We have provisionally placed Shulman’s third category, curricular knowledge, within pedagogical content knowledge…[however], We are not yet sure whether this may be a part of our category of knowledge of content and teaching or whether it may run across the several categories or be a category in its own right (p. 402-403).
Table 2 portrays this ambiguous relationship by showing it as a pedagogical conceptualization with potential relationships to KCT and KCS. Ball and colleagues (2008) stated that the rationale for this change to Shulman’s (1986, 1987) model, stems from the observation that Shulman’s research team had made similar changes to Shulman’s (1986, 1987) model (Grossman, 1990). However, an overall observation was that many of the conceptualizations of how the discrete categories of PCK and CK relate to each other and to PCK and CK themselves had been hypothesized and were still lacking empirical support. Exempted from this lack of support were the empirical inferences that 1.) PCK is specific to content and context, 2.) PCK shares a direct relationship with CK, and 3.) PCK shares a direct relationship with the degree to which a teacher knows her or his learners (Ward & Ayvazo, 2016). Taken together, the relationships between the discrete categories of CK and PCK were largely hypothesized and lack ubiquitous empirical support. Despite this limitation, the wide acceptance for this explanation provided some specificity for how CK and PCK might be embodied in teaching practice. Implications of this for the present study are addressed in a later section.
Ball et al. (2008) place Shulman's (1987) area of 'curricular knowledge' as a category of 'pedagogical knowledge' based on later publications from Shulman's research team (Grossman, 1990) while acknowledging an uncertainty about its relationship with other discrete categories.

### Coaches Knowledge

Coaches have been often viewed as teachers (Nash & Collins, 2006). Teaching requires the knowledge and application of both content and pedagogical skills that are specific to the setting and context of the learning environment (Ward & Ayvazo, 2016). Nash and Collins (2006) identified three types of knowledge present in coaching – pedagogical, sport specific, and ‘ological knowledges. These three types of knowledge are rooted in knowledge bases found in physical education and classroom settings. Nash and Collins (2006) coined these terms, adapting language from Kreber and Cranton (1997, 2000) who synthesized the relationship of pedagogical, instructional and curricular knowledges (Shulman, 1986, 1987) in their relationships with overall teaching knowledge of physical education and classroom teachers (Figure 1).

Nash and Collins (2006) further cited Ennis, Mueller, and Zhu stating that, “PE teachers are assumed to have declarative knowledge regarding exercise, sport, and human movement, as well as procedural knowledge on teaching and learning methods,” (p. 468)
inferring that coaches should be expected to have similar knowledge bases as teachers. For coaches this relates to tactics, training, and pedagogical processes of their setting and context. Nash and Collins (2006) thus adapted the model of Kreber and Cranton (1997, 2000) to include pedagogical, sport specific, and ‘ological knowledges present in coaching (Figure 2). Nash and Collins (2006) further went on to posit a model that identifies the roles of each of these three knowledge bases within a network that describes where coaches get knowledge, what coaches do (i.e., sport specific), and how coaches do it (i.e., pedagogical) (Figure 3). A resulting schematic including these three coaching knowledges was later validated as an integral part of the coaching process (Figure 4) (Abraham et al., 2006). Additionally, these knowledges have emerged in studies that investigated coach perspectives on useful knowledge sources (Stoszkowski & Collins, 2016).

Figure 1. Teaching Knowledge Typology from Kreber and Cranton (1997, 2000)
Figure 2. Coaching Knowledge Typology from Nash and Collins (2006)

Figure 3. Conceptualization of Decision-Making in Coaching by Nash and Collins (2006)
Figure 4. The Coaching Schematic by Abraham et al. (2006)
Coaching knowledge in track and field. An academic understanding of knowledges used for coaching and how knowledges contribute to the coaching process had been limited. The understanding had been limited even further for the sport of track and field, including, endurance running. Using the coaching knowledges of Nash and Collins (2006), Stoszkowski and Collins (2016) investigated which knowledge bases coaches perceived to be most useful and found that 46% of coaches identified pedagogical knowledge as he most relevant, while 39% identified content knowledge (21% ‘ological, 18% sport specific) as most relevant (Table 3). Stoszkowski and Collins (2016) converged on these knowledge types from raw response themes as these knowledges had “been highlighted as being necessary for coaching excellence,” (p. 798).¹ This finding illustrated a preference for pedagogical knowledge in coaching; however, it should be mentioned that only 11 of the 320 (3.4%) coaches participating in this study coached track and field indicating that this may not necessarily represent the perceived valued knowledge of track and field coaches.

¹ Stoszkowski and Collins (2016) also identified 15% of the knowledge coaches identified as most useful as “developmental knowledge,” though a rationale was not provided for why ‘developmental’ knowledge was identified as a theme as it is not part of the coaching knowledge typology of Nash and Collins (2006), nor was a previously identified “developmental knowledge” referenced in the literature review of the study.
Table 3

*Useful Coaching Knowledges from Stoszkowski and Collins (2016)*

<table>
<thead>
<tr>
<th>Raw Data Themes</th>
<th>Responses</th>
<th>%</th>
<th>Higher Order Themes</th>
<th>Responses</th>
<th>%</th>
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<td>Skill acquisition</td>
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<td>(10.12)</td>
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<td>Pedagogy</td>
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<td>(45.83)</td>
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<td>Performance analysis</td>
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<td>Physiology</td>
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<td>Biomechanics</td>
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<td>(21.13)</td>
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<tr>
<td>“Sports science”</td>
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<td>(0.60)</td>
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<td>Tactical knowledge</td>
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<td>Sport specific knowledge</td>
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<td>(17.56)</td>
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<td>Technical knowledge</td>
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<td>Participant needs</td>
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<td>Development</td>
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<td>Self awareness</td>
<td>15</td>
<td>(4.46)</td>
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</table>

Coaches’ perceptions of what they need to know more about to be a better coach (n=320)

The emphasis on pedagogical knowledge was contrary to the implied value of pedagogical knowledge in American track and field coaching education. The first text developed as a training manual for American track and field coaches was published in 1981 by The Athletics Congress (TAC) of the United States (Gambetta, 1981); this manual would continue to be revised over the next 34 years (Freeman, 2015b).

Furthermore, a decade after the first American coaching manual was published, the International Amateur Athletics Federation (now the International Association of Athletics Federations) (IAAF), in conjunction with USA Track and Field, produced its first coaching education manual with the goal of providing knowledge for “sound
coaching practice” (Thompson, 1991, Acknowledgements); this was also later revised 18 years later (Thompson, 2009). Examining the content of these primary sources provides implicit evidence for what has been valued as coaching knowledge, specifically in the formal training of track and field coaches. Table 4 shows the relative attention many of the coaching knowledges received in these manuals. This indicated that throughout track and field coaching education, content knowledge has been the primary focus of formal education efforts with the inclusion of pedagogical knowledge serving, at best, a supporting role. This prompted the question if coaches value and use knowledge that was in line with the knowledges emphasized in coaching education efforts.
Table 4

Pages Dedicated to Various Subjects in Track & Field Coaching Manuals Grouped by Knowledge Type

<table>
<thead>
<tr>
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<tr>
<td>Injuries and First Aid</td>
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<td>-</td>
<td>19.1%</td>
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<td>-</td>
<td>12.5%</td>
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<tr>
<td>Nutrition</td>
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<td>Philosophy, Ethics Risk Management</td>
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<td>13.7%</td>
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</table>

These sources are used for the USA Track and Field Level 1 Certification Program of a three-tiered system.
Implications for teaching and coaching knowledge for the present study. The conceptualization of Ball and colleagues (2008) was highlighted earlier despite the lack of direct connection from it to accepted coaching knowledges (e.g., Nash & Collins, 2006; Abraham et al., 2006) in order to highlight two issues surrounding coaching knowledges and their roots. First, the conceptualization of Ball et al. (2008) allowed for an intricate understanding of the discrete categories of Shulman’s (1986, 1987) framework, to which coaching knowledge was directly connected. Ball and colleagues examined the discrete categories within Shulman’s (1986, 1987) typology of teaching knowledges. Nash and Collins (2006) adapted the model of Kreber and Cranton (1997, 2000) which is rooted in Shulman’s typology. Therefore, it was reasonable to suggest that the discrete categories as proposed by Ball and colleagues (2008) would be transferable to the typology posited by Nash and Collins (2006). Furthermore, subjective examination of themes from Stoszkowski and Collins (2016) showed plausible alignments with the discrete categories identified by Ball and colleagues (Table 2). In the present study, consideration of the discrete categories identified by Ball and colleagues allowed me to search out coaching knowledges rooted in these discrete categories. By asking direct questions as they pertained to these discrete categories, I was able to pursue a more specific information pertaining to the three coaching knowledges posited by Nash and Collins (2006).

The second reason the typology by Ball et al. (2008) was highlighted pertained to the potential implications of this study. Ball and colleagues modified Shulman’s (1986, 1987) framework based on the work for Grossman (1990). However, Kreber and Cranton (1997, 2000) conceptualized their model of teaching knowledge rooted in Shulman’s original model though after the modification by Grossman (1990). Nash and Collins
(2006) adapted the model of Kreber and Cranton (1997, 2000) to reflect teaching knowledges specific to the context of coaching (i.e., ‘ological knowledge, sport specific knowledge, pedagogical knowledge). The resulting conceptualization of Nash and Collins (2006) has been the focus of coaching knowledge including a validation of the knowledges (Abraham et al., 2006) as well as a descriptive analysis of which knowledges are prevalent in coaching practices (Stoszkowski & Collins, 2016). As such, I identified that the typology identified by Nash and Collins (2006) did not take into consideration the reconceptualization by Grossman (1990).

The incongruence between the multiple conceptualizations of Shulman’s (1986, 1987) model highlighted limitations to the understanding and implications of ‘ological knowledge. As Nash and Collins’s (2006) model stands, the ‘ological knowledges identified by Stoszkowski and Collins (2016) (i.e., psychology, physiology, biomechanics, child development, sports science) were considered ‘curricular knowledges’ as representations of many programs spanning multiple topics and subjects and serving as indications and contraindications for current coaching practice (Shulman, 1986, 1987) (Table 5). However, rooting the coaching knowledges in the discrete categories of Ball et al. (2008), I argued that these topics fundamentally fall under CCK as they can be understood outside of a teaching settings (Table 2). Additionally, there was an admitted lack of understanding of the nature of ‘curricular knowledges’ as either an independent category or as component of PCK (Ball et al., 2008; Ward & Ayvazo, 2016). The evolving understanding of the relationships of ‘curricular knowledge’ to KCT and KCS highlighted fundamental disconnects between the natures of ‘ological knowledge and the discrete category to which it belongs. This highlighted the potential to augment
the ontological implications of "ological knowledge in its relationship to coaching knowledge.

Table 5

Coaching Knowledges' Alignment with Past Literature

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<td>Curricular Knowledge</td>
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<td>Pedagogy</td>
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<td>Technical knowledge</td>
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</table>

The present study was interested in understanding the coaching process and how knowledge bases influence coaching practice. Both of the above typologies identified knowledges that were applied in teaching in coaching and have been viewed as similar, taking into account both content knowledge and pedagogical content knowledge.

Decision-Making in Coaching

The necessity of highlighting the importance and origin of knowledge bases was rooted in the observation that effective teaching is accompanied by high level of subject matter knowledge in the subject of expertise (Cushion et al., 2010). However, identifying knowledge bases present in coaching did not address how these knowledges work together to positively affect the coaching environment (Nash & Collins, 2006). Despite a wide consensus that coaching is fundamentally a decision-making process, there had been a dearth of examination of this decision-making process (Vergeer & Lyle, 2009). Vergeer
and Lyle (2009) concluded that experienced coaches use a more complex process, taking into account more forms of information in comparison with more novice coaches. Giske and colleagues (2013) investigated the decision-making styles of coaches across a wide range of experience levels finding that coaches with a great deal of experience have preferred decision-making styles that are intuitive (e.g., reliance on hunches, feelings, and impressions from experience) or rational (e.g., logical and structured approach to decision-making) in nature. These types of decisions however still did not include, and failed to resolve, questions surrounding how these decisions are made.

St. Pierre and Smith (2014) noted that many coaches are able to “recognize patterns across contexts rather than seeing separate components of a situation,” (p. 38). They stated that this occurs through an intuitive process where subconscious processes based on perception, knowledge and experience come out in deliberate action. Nash and Collins (2006) had previously acknowledged that instinctive decision-making can be an indicator of highly developed procedural knowledge as they draw upon a well-developed knowledge base used for problem-solving. Nash and Collins (2006) proposed that instinctive knowledge could potentially be transferred through the development of declarative and procedural knowledges. Nash and Collins (2006) conceptualized coaching knowledges and posited likely relationships and purposes that they hold (Figure 3). Their model indicated that the coaching process involves an interconnected network of declarative ad procedural ‘ological, sport specific, and pedagogical knowledge bases that can help explain what and how they coach along with an understanding of where knowledge originates. Nash and Collins (2006) further observed that knowledge is arranged in a hierarchical fashion, with declarative knowledge influencing procedural knowledge and ultimately coaching practice. Nash and Collins (2006) additionally stated
that these knowledges are intertwined (e.g. declarative ‘ological knowledge can influence procedural sport specific knowledge).

To illustrate this process further, Abraham and colleagues (2006) created and validated a coaching schematic to illustrate the coaching process rooted in the knowledges posited by (Nash & Collins, 2006) (Figure 4). The coaching schematic represents “an intra- and multi/inter-disciplinary decision-making process within a theoretical and practical framework,” (p. 550) that is transferable to a multitude of coaching contexts. The schematic presents three main characteristics of the coaching process.

Coaches identify and develop outcome and process goals taking a hierarchical approach. This to say that coaches direct training based on overall goals for what they would like to accomplish. Coaches then take these overall goals and break them down into short, medium, and long term goals in technical, tactical/strategic, physical, mental, lifestyle and metacognitive areas. These goals impact how coaches planned to use their resources within competition and training.

Coaches use a hierarchy to make decisions in an integrated fashion. This is to say that coaches use a wide range of information to identify problems and then develop a solution to them. These decisions make use of a cache of concepts, conceptualizations, and procedures that can be used to effectively direct organization and operation of actions that work towards the goals of program. During the validation of the schematic, coaches acknowledged that decisions can have multiple consequences in relation to goal attainment. This indicated that the coaching process is not a simple cause-and-effect process, but a complex web of interacting decisions.
Coaches use a broad range of knowledge sources to underpin their decision making. In the schematic’s validation, coaches identified that sport-specific and pedagogical knowledge were the two knowledge bases they most relied on for decision-making with ‘ological knowledge, or knowledge of sport sciences, also contributing. This finding reflected prior research in teaching that states that effective teachers need to have knowledge of content and teaching practice in order to effectively teach (Berliner, 1991).

Implications of decision-making for the present study. Taken together as a whole, the schematic represented an interconnected process where a vast range of knowledge bases influence the conceptions, concepts, and procedures utilized during the organization and operation of training and competition that pursues an overarching goal. Abraham and colleagues (2006) found support for the model as coaches not only agreed with it at an implicit level, but also, in some cases, felt that the schematic helped them better understand their own coaching. However, this validation does not connect knowledge base to demonstrated or perceived coaching practice. At the time of this study, these had been no further studies that examine the coaching process while connecting the relationship of coaching knowledges to coaching practices, let alone in track and field. The markers of validity of Abraham and colleagues’ (2006) schematic give support for its use in the present study as a theoretical framework for the systematic investigation of the participating coaches’ decision-making processes and what knowledges influence them.

Chapter Summary

This chapter addressed the topics of successful coaching, athlete development, coaching knowledge, and decision-making in coaching as it relates to the present study. This chapter provided a rationale for using “history of competitive success” as a
qualifying criterion for participants, as well as a justification for the assumed relationship between this criterion and the expectation that coaching is done with athletes’ developmental needs in mind. Lastly, background on coaching knowledge and decision-making highlighted the gap in the literature this study aims to fill. The following chapter proposes the methodology that was used in this investigation.
CHAPTER III
METHODOLOGY

The purpose of this study was to better understand how a coach, who had a history of competitive success, utilizes coaching knowledge and makes decisions during the coaching process when coaching endurance running athletes. The primary focus of this chapter is a description of the methods and practices in investigating the present research purpose. Crotty (1998) suggested that qualitative research aims to answer four questions:

- What epistemology informs the theoretical perspective?
- What theoretical perspective lies behind the methodology in question?
- What methodology governs the choice of and use of methods?
- What methods will be used in the study?

As such, this chapter includes the epistemological framework of constructivism, the theoretical perspective of Interpretivism, the theoretical framework for the study is rooted in the coaching schematic of Abraham and colleagues (2006), and case study methodology. This chapter also includes the methods by which the participant and setting was selected, the research tools of interview, observation, document collection, and use of a researcher’s journal is described. Additionally, use of constant comparison methods of data analysis is described, and lastly, important methodological issues of trustworthiness, rapport building, and ethics including my own subjectivities that influenced the analysis of the data is discussed.
Epistemology of Constructivism

Coaching is a social field. Understanding the coaching process relies upon understanding the social interaction between coaches and athlete. The understanding of coaching’s social reality is dependent on the mind of a researcher as they give meaning to interpretations witnessed in the external world (Sparkes & Smith, 2014). Because investigation of the present research purpose involves the researcher’s interpretations of the data, a constructivist epistemology is appropriate for an understanding of this study. Constructivists aim to construct meaning as they engage with the world they are interpreting (Crotty, 1998). Rather than adopting an expectation that truth exists and awaits its own discovery (Stake, 1995), concepts and theories are constructed out of stories that are constructed by the participant who is trying to explain and make sense out of their experiences and/or lives both to the researcher and to themselves (Corbin & Strauss, 2008).

The aim of a constructivist approach is, therefore, to understand how the participant has constructed his knowledge toward the decision-making process in coaching. The responsibility of the researcher was to acknowledge and report the reality of the participant by relying on the participant’s voice and interpretations of the participant’s actions (Sparkes & Smith, 2014). The construction of knowledge is extended to the reader by providing deep description and raw information allowing for the reader’s own generalizations to be formed (Stake, 1995).

Theoretical Perspective: Interpretivism

Interpretivism is characterized by the construction of meaning. However, Crotty (1998) distinguishes it from constructivism by describing it as, “culturally derived and historically situated interpretations of the social life world,” (p. 76). The present study is
rooted in understanding the lived experiences and perspectives that a coach has developed over the course of his career. As such, the historical nature of the participant’s work in the social world of coaching lends itself well to a perspective where historical and social context is of great importance.

Interpretivists view knowledge as a personal construct, and as such, aim to understand the realities that are constructed by individuals (Merriam, 2009). Researchers with the interpretivist perspective aim to understand the actions of individuals that are rooted in the meanings that they have created for themselves. Understanding these meaning-based actions occurs by building “abstractions, concepts, hypotheses, or theories” (Merriam, 1998, p. 7) from coaching knowledges and how they relate to the coaching decision-making process. This study does not use the framework to further verify what the coach uses to make decisions. Instead, the framework provides a robust grounding for the conceptualized applications of these knowledges, or how the coach makes decisions. Adoption of the Interpretivist perspective allows the researcher to interpret how the coach makes decisions in coaching.

Interpretivist research is rooted in Hermeneutics, or concern for meaning (Crotty, 1998). It is important to recognize that meaning is rooted in values that the participant has developed during lived experiences. Likewise, when I entered the study under an Interpretivist paradigm, I also brought my own values regarding the research topic. The involvement of the researcher in the analysis of data is a distinguishing characteristic between qualitative and quantitative research as a researcher enters a study as a “passionate participant” rather than a “disinterested scientist,” (Sparkes & Smith, 2014, p. 10). Pring (2000) additionally stated that Interpretivist studies are “framed by descriptions of, explanations for, or meanings given to phenomena by both the researcher
and the study participant,” (p. 31-32). Therefore, during the study, it was important to understand the lived experiences that have shaped the values of the participant as a coach, while also being reflexive about my own experiences and values.

A distinction of Interpretivist case study research is that rather than trying to understand what is true for an entire group, the purpose is to understand the unique “particularity of the case,” (Stake, 1995, p. 39). Understanding the uniqueness of the case requires descriptions that are “lifelike, believable, and possible,” (Ellis, 1999, p. 674). Provision of rich description is done so that the readers of this research can compare the experience of the participant to their own (Merriam, 1998). Therefore, it is the responsibility of the researcher to represent the context of the setting as authentically as possible.

**Theoretical Framework: Abraham and Colleagues’ Coaching Schematic**

Abraham and colleagues’ (2006) coaching schematic provides a validated systematic way of illustrating the coaching decision-making process (Figure 4). The schematic allows for the researcher to look for knowledges known to be associated with coaching, how these knowledges relate to competencies of coaching, and how these competencies are used for the organization and implementation of the coaching environment as the coach works towards an overall goal. The use of Abraham and colleagues’ (2006) schematic, therefore, provides a grounded framework in which this study is rooted.
Methodology

Case Study

Case study research is the study of bounded systems (Stake, 1995). Smith (1978) described this as a single entity, or a unit, enclosed by boundaries with which the researcher can fence in what will be studied. Merriam (2009) further highlighted the importance of the individuality of the case describing case study as a description and analysis of what is bounded. Case study focuses on answering the questions ‘how?’ and ‘why?’ regarding contemporary events in settings where the researcher has no control on the behavior of the participant (Stake, 1995). However, while case studies share common traits, the approach through which case study is conducted can vary depending on the interest of the study.

Case study types.

**Single-case, case study.** Single-case, case study involves the inclusion of a single bounded system. In the positivist view, single-case case study would not be a feasible design as positivist studies aim to globally represent the nature of overall populations; this simply cannot be done with a lone participant. However, in the constructivist view this is not necessarily a limitation. Stake (1995) stated that in case study research, the primary objective is to understand the present case rather than to understand other cases through it. Weiss (1994) additionally stated that single-case, case studies are valuable due to the complex interplay of circumstances and regularities of the lived experiences. However, in order for a single-case design to be valuable, either 1.) the case is extreme, deviant, or unique, or 2.) the researcher must have good reason to believe that the case is critical to understanding, testing, or elaborating on some theory or generalized concept of
the investigated social process (Schwandt, 1997). These single-case rationales are the defining traits for intrinsic and instrumental type case studies.

**Intrinsic case studies.** Intrinsic case studies are rooted in an interest in the uniqueness of the case (Stake, 1995). Rather than focusing on the issue, the interest in the research is rooted in a bounded system in which the circumstances are particularly unique. Yin (2009) identified this kind of case study as a *unique or extreme* case, where understanding of the unique case can provide valuable insight regarding cases that are not typical of the investigated population. Stake (2005) noted that the purpose of intrinsic case study is not to build theory but to better understand a particular site of interest. Thus, the purpose of intrinsic case study research is to understand a particular case of interest with little concern for how the issue may be similar or different outside of itself.

**Instrumental case studies.** Instrumental case studies focus on an issue of importance, using a case to illustrate the issue (Creswell, 2007). Instrumental case study leads to a better understanding of something else (Stake, 2005) and plays a supporting role in deepening the understanding of the issue by “redraw[ing] generalizations,” (p. 447). Instrumental case study is therefore best reserved for studies in which the case could help inform on a larger issue of interest. As such, while understanding the bounded system is important, it is secondary to the issue at hand.

**Special issues in case study.** A final characterization of case study research is the delineation between embedded vs. holistic designs (Yin, 2009). Embedded designs are used when understanding of the component parts of a single case is needed. In the context of a sports team, this might consist of coaches, support staff, and athletes acting as separate entities within the bounded system. Investigation then focuses on the component parts separately. Researchers employing holistic designs, do not divide up the case into
component parts. Rather, they investigate the case as a single entity. Therefore, when selecting a case study design, it is important to consider if understanding component parts of the case are important to achieving the purpose of the study.

**Defining the present case.** Merriam (2009) stated that in qualitative research, sufficient samples are acquired when there are an “adequate number of participants, sites, or activities to answer the question posed at the beginning of the study,” (p. 80). The present study aimed to understand how a coach who has a history of competitive success uses knowledge and makes decisions while coaching. Inclusion of a coach who is provided insight to the decision-making process of coaching based on an expert-novice rationale (Campbell et al., 1992). The expert-novice rationale has been used in both coaching research (e.g., Côté, 1995) and research outside of coaching (Glaser & Chi, 1988; Starkes & Allard, 1993) providing research findings on the nature of expertise. A challenge with the expert-novice is identifying relevant tasks to aspects of superior performance allowing an assessment of the mechanisms underlying the superior performance (Ericsson & Smith, 1991). In the present study, expertise is recognized through superiority in an ability of a coach to be competitively successful. Relevant tasks to his success are recognized through the mechanisms by which he coaches his team.

Because the focus of the present study is on a unique case, and because the case has no sub-components for investigation, this case study is characterized as holistic and intrinsic. Furthermore, this study uses Abraham and colleagues' (2006) coaching schematic to guide the study as a means to better understand the decision-making process in endurance running coaching. Consideration of the coaching schematic further characterizes this case study as instrumental, since the intent is to better understand the issue of decision-making during coaching, in light of prior knowledge from the coaching
schematic of Abraham and colleagues (2006). The multiple characterizations of the present study are justified by Stake (1995) who stated that case study types are not necessarily mutually exclusive, but rather elements of multiple types can be present in case study research. Thus, for this study, a holistic, instrumental, intrinsic, single-case, case study will be used for investigation.

Methods

The following sections describe the methods used for the present study. Included in this section is how I selected a site and participant for this study, collected, and analyzed the information. Important methodological issues that I accounted for during this part of the research process are included.

Selecting the Setting and Participant

In this study, I purposely selected a unique coach using criterion-based sampling. Purposeful sampling was employed to gain an “information rich” case that will inform the research study (Sparkes & Smith, 2014, p. 70). The sampling method is used in qualitative research to ensure that the information collected comes from the context of interest. Criterion-based sampling uses predetermined set criteria due to a feature of interest (Sparkes & Smith, 2014). This study used the criterion of “a coach who exhibited a history of competitive success.” Purposeful sampling through criterion-based and convenience sampling has been used in sport and exercise studies. Sparkes, Pérez-Samaniego, and Smith (2012) also used convenience sampling to understand the cancer experience of an elite athlete who was a former student of one of the authors. Additionally, Douglas and Hardin (2014) used a single case to better understand the
processes by which an expert wheelchair basketball coach acquires and develops the knowledge.

The present study included a coach who is considered a unique case who had a history of competitive success that exceeded the level of competitive success of other coaches who would also be considered to have “histories of competitive success.” The history of the coach’s competitive success was determined through review of competition records at conference and national championships. Using conference and national championship records as criterion to identify successful coaches is supported in previous literature (e.g., Carter & Bloom, 2009; Gillham et al., 2013; Mallett & Lara-Bercial, in press). Carter and Bloom (2009) included conference titles and national championship appearances in their descriptions of six successful coaches with ranges of 1-6 conference titles and 0-12 national championship appearances. Mallett and Lara-Bercial (in press) qualify outcome-based success as “repeated and sustained success over time.” Additionally, Gillham and colleagues (2013) simply reference “won-loss records or the number of championships,” as markers of competitive success without providing values by which either of these criteria indicate success. Taken together, there is support for using competitive success as a marker of success; however, there is some subjectivity in defining the frequency at which competitive success occurs to qualify the coach as successful. No objective gold standard for competitive success exists. Therefore, rather than pre-determining the inclusion criteria, I recruited a coach with a subjectively noteworthy history of competitive success at conference and national levels of competition.

To determine which coach was included, college endurance running coaches who competed in the same tier of intercollegiate sport who were also in the same geographic
region were included. Endurance running takes place in cross-country, indoor track and field, and outdoor track and field. The only one of these sports to exclusively include endurance runners is cross-country. Therefore, team results from the coaches’ cross-country histories were reviewed. Using public domain information including coach biographies on team websites to determine the years of tenure for the coaches, and conference and national championship results, a list of coaches who appeared to have a consistent history of conference championships, national championship appearances, and national championships was created from a common level of collegiate competition and athletic conference. This study took into account the number of national championships, top-5 finishes at the national championships, top-10 finishes at the national championships, qualifications to the national championships, and conference championships attained by each coach. Figures 5 and 6 show the number of years the considered coaches had been coaching and the number of markers of competitive success they had attained as defined by this study. Figure 7 normalized these markers for number of years coached, and considering men’s and women’s teams separately. Based on this information, coaches 1, 7, and 14 appeared to have histories of competitive success. Coach 1 is considered a unique case as the individual has a higher number of competitive successes when normalizing for year and men’s and women’s teams. Additionally, the coach had a much greater history of national championships per year per sub team. Therefore, Coach 1 was contacted by email and formally invited to participate in the study using the approved invitation letter (Appendix A). The coach accepted the invitation to participate, and provided a week-long period during which the onsite-visit would fit into his schedule.
This coach coached at her/his present school for an additional 15 years as part of a different collegiate level of competition and athletic conference. Information on this coach indicated that she/he led her/his team to “numerous top 5 finishes” at the national championships. This is not accounted for as this is not representative of competition at the level of competition of the athletic conference from which participants are considered in the present study.

At the time of this study, these had coaches concluded their tenure at these institutions and incoming coaches had not yet competed within the considered collegiate level and conference.
Figure 6. Coaches’ markers of competitive success attained at institution within the considered collegiate level and conference.

Figure 7. Coaches’ markers of competitive success attained at institution within the considered collegiate level and conference normalized for year and taking into consideration men and women’s teams.
Data Collection Procedures
and Tools

In this section, I describe the methods that I used to collect data for this study. This includes an onsite visit during which I interviewed the coach, two assistant coaches, and four athletes; made field notes during observations of training sessions, or sport practices; and collected documents and artifacts. Additionally, I conducted internet searches and created bookmarked lists of publicly available streaming videos and written articles in which the participant coach shared perspectives relevant to the present study. This section closes with a discussion of how I used an investigator’s journal as a data collection tool.

The onsite visit. The onsite visit occurred in April of 2017 and extended over a continuous four-day period, Monday through Thursday. I had originally planned to conduct a five-day onsite visit; however, the coach told me during the onsite visit that he would not be available the Friday of that week. While this limited the amount of time in which I engaged with the research context, the coach provided extra availability on the fourth and final day of the study to allow me to conduct a sufficient amount of interviewing. The schedule for the onsite visit is found in Table 6.
### Table 6

**Onsite Visit Schedule**

<table>
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<tr>
<th>Day</th>
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<th>Time</th>
<th>Activity</th>
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<td>Mon</td>
<td>Day 1</td>
<td>8:58 AM</td>
<td>Interview with head coach (pseudonym Gary Johnson)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11:00 AM</td>
<td>Observation of training session</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3:27 PM</td>
<td>Interview with head coach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:33 PM</td>
<td>Observation of team meeting</td>
</tr>
<tr>
<td>Tue</td>
<td>Day 2</td>
<td>8:35 AM</td>
<td>Interview with head coach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11:00 AM</td>
<td>Observation of training session</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:30 PM</td>
<td>Observation of training session</td>
</tr>
<tr>
<td>Wed</td>
<td>Day 3</td>
<td>9:40 AM</td>
<td>Interview with two assistant coaches (pseudonyms Drew and Chris)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11:00 AM</td>
<td>Observation of training session</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:30 PM</td>
<td>Observation of training session</td>
</tr>
<tr>
<td>Thu</td>
<td>Day 4</td>
<td>9:37 AM</td>
<td>Interview with head coach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10:35 AM</td>
<td>Interview with two female athletes (pseudonyms Rachel and Eve)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:30 PM</td>
<td>Interview with head coach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:02 PM</td>
<td>Interview with two male athletes (pseudonyms Thomas and Luther)</td>
</tr>
</tbody>
</table>

**Conducting interviews.** The principle purpose of case study was to obtain the descriptions and interpretations of participants within a bound system to understand its particularities (Stake, 1995). The best method of obtaining these descriptions is through interviews, especially in intensive case studies (Merriam, 2009). Interviews represent a relationship between two or more people (Randall & Phoenix, 2009) in which an interviewer obtains accounts of the perspectives, feelings, and perceptions from a respondent (Holloway, 1997) allowing the researcher to understand what is “in and on [the respondent’s] mind,” (Patton, 2002, p. 341). These conversations have to be focused on questions that relate to the research story (de Marrais, 2004) taking on a “conversation with purpose,” (Dexter, 1970, p. 136). Weiss (1994) identified that characteristics of this relationships include the interviewer defining areas for exploration, the interviewer and the respondent working together to produce useful information, and avoiding asking questions out of idle curiosity. Merriam (2009) further stated that criteria need to delineated in order to establish this purposeful conversation.

Semi-structured interviews were used for the present investigation; while questions were planned, they were asked in an open-ended way that allowed for
expression of thoughts and feelings (Sparkes & Smith, 2014). I asked questions based on previous responses which allowed for an assurance that the topic of interest would be addressed, while allowing for deep description of the unique experiences of the respondents. The interview questions reflected characteristics of semi-structured interviews identified by Merriam (2009) including:

- The largest part of the interview was guided by list of questions or issues to be explored
- The interview guide including a mix of more and less structured interview questions
- All questions were used flexibly
- Specific data were required from the respondents
- Questions were in no predetermined wording or order (p. 89).

In this study, I included the use of semi-structured interviews in order to clearly address the decision-making process, while still allowing for the uniqueness of the participants’ perspectives. Interview questions were developed prior to the interviews and can be found in Appendix B. The study included interviews with the coach, two assistant coaches who work directly under the coach, and four student-athletes (2 male, 2 female) who were being coached by the coach at the time of the onsite visit. Pseudonyms are used for all participants to provide confidentiality.

**Interviews with the participant.** This study included five interviews with the head coach totaling approximately 3 hours and 45 minutes. While only 3 hours and 45 minutes of formal interviews were conducted, the coach invited ongoing and continuous dialogue during the approximately 9 ½ hours of field observations. Therefore, there was more time spent gathering expressed perspectives outside of the interview schedule.

All formal interviews with the head coach were conducted in his personal office on the university’s campus, which was self-selected by the participant. The first interview ended earlier than I had anticipated due to a previously scheduled coaching staff meeting.
During subsequent interviews, there were a few brief interruptions due to a phone call, an athletic trainer giving an update, and an athlete briefly stopping in to give the coach an update on an ongoing issue.

The first interview focused on the philosophy and background of the coach and introduced questions focused on what knowledge sources he used in coaching. Subsequent interviews were shaped using the former interviews and information from practice sessions, with continued focus on the topics disclosed in the interview guide (Appendix B). Throughout the interviews, I purposefully sought out information that depicted the knowledges the coach used and how they contributed to his decisions. Expected themes that emerged during interviews, such as goals and objectives of decisions (particularly athlete development), were discussed, but were not focused on as this was peripheral to the expressed research questions in this study.

*Interviews with the assistant coaches and athletes.* One joint interview with two assistant coaches that lasted approximately 45 minutes was conducted. Additionally, two separate interviews that lasted approximately 20 minutes with two pairs of athletes. Two females were included in the first interview, and two males were included in the second interview. Interviews with the assistant coaches and the female athletes occurred in a publicly accessible athletic training room. The interview with the male athletes was conducted on a mezzanine that was above and adjacent to a gymnasium (i.e., basketball/volleyball court).

For athlete interviews, I provided the coach a list of seven athletes who I had identified as preferred interviewees during practice observations. I requested these particular athletes because of witnessed interactions between these athletes and the coach that were relevant to the present study. The coach arranged for three of the four athletes
(Rachel, Eve, and Luther) to participate in the interviews. The coach reported that the other athletes were not available during possible interview times. Throughout the athlete interviews, I purposefully sought out information to triangulate findings from the interviews with the participant coach and the field observations. All interviewees were provided with non-signed consent forms prior to the interviews.

All conducted interviews were transcribed with the use of a professional transcription service, were submitted within hours of each interview’s conclusion, and were returned within 12 hours of their submissions. Using a transcription service provided me with full transcripts in a timelier manner than if I had transcribed them myself. The importance of this practice is addressed in a later section.

**Observing practice sessions.** Observation is utilized in qualitative research to observe the real-life operation of the setting. Observation is used as a research tool when it is systematic, addresses a specific research question, and is subjected to the checks and balances in producing trustworthiness (Merriam, 2009). The distinguishing characteristic of observation as a research tool is the injection of purposeful rigor into observation that is not present in ordinary day-to-day attentiveness. Wolcott (1992) highlighted this when he stated, “Qualitative researchers demand selective attentiveness...[to] pay attention to a few things to which others ordinarily give passing attention...[All people] attend to certain things, and nobody attends to them all” (pp. 22-23). Stake (1995) further emphasized the necessity for focused attention in interviews stating that it is necessary for observation to be driven by, and focused on, issues that relate to and are relevant to the bound system of the case.

When observation is conducted using appropriate rigor, a deeper understanding of the research context may be developed. The use of observation allows for the researcher
to “record the mundane, taken-for-granted, and unremarkable,” (Sparkes & Smith, 2014, p. 100) providing deeper understanding of the people in the study rather than just knowing of them. Accounting of the ‘every day’ details that would otherwise be unaccounted for allows for a new dimension of understanding of the context that is not possible through interview alone (Yin, 2009)

During the four-day onsite visit, I observed five team practices, totaling approximately 9 ½ hours, and one team meeting that lasted approximately 30 minutes. My intent during the observations was to adopt a complete observer role assuming a “fly on the wall approach” (Gold, as cited by Sparkes & Smith, 2014, p. 101). However, during the observations, the coach invited me to shadow him and welcomed a continuous and on-going dialogue throughout. While this violates the sense of a “fly on the wall approach,” this did not violate the complete observer role. Observation of training sessions focused on the observed behavior of the coach with the team, particularly attending to actions that appeared to be part of a decision-making process (e.g., assigning athletic tasks, the appearance of adjusting an athlete’s assigned task, etc.). While it could be argued that my interaction during the observations could have changed the participant coach’s behavior in an unintended way, my interviews with assistant coaches and student-athletes strengthened the validity and reliability in forming conclusions from the coach’s behavior and statements.

Throughout the observations, I regularly asked the coach to explain his interactions with athletes, and asked questions focused on the requisite information he considered during those interactions. The interaction between the coach and me assumed a comfortable routine of the coach going about his team practice responsibilities, while answering questions and freely offering up his perspectives on why he was doing what he
was doing. Throughout the observations, the coach shared information freely with
detailed explanations and would often prompt me for additional questions if I remained
silent for long periods during. During the observations, I made cursory and notes. In
some cases, I attempted to write down statements exactly as stated by the coach and
recorded them as ‘in vivo’ codes, or codes that represented “themes that emerged in real-
life data” (Marshall & Rossman, 2011, p. 211). I reviewed the in vivo codes, memos, and
notes each evening during the onsite visit to help direct subsequent interviews and
provide additional focus for subsequent observations. I composed written descriptions of
my observations for further reflection and analysis.

**Collecting artifacts and documents.** Artifacts serve to triangulate data and look
for physical representations of the setting (Merriam, 2009). Therefore, I collected team
practice descriptions (i.e., posted workouts), team rules that had been hand-written by
athletes, an informational packet that served as educational material for a high school
running camp, and pictures of the setting. All of these artifacts provide identifying
information, and therefore accompany the presentation of this dissertation, but are not
included in the final report.

Additionally, using internet searches, I gathered publicly available information in
which expressed perspectives of the participant were shared. I reviewed 77 video clips
totaling 6 hours, 5 minutes, and 38 seconds. Seven of the video clips were either repeats
of other videos, or did not have audio tracks and otherwise provided no information. Two
additional videos were deemed to be outside the scope of the study. I retained 68 video
clips totaling 5 hours, 39 minutes, and 28 second for analysis. Videos were recorded
between 2004 and 2017, with the coach providing commentary in each of the years with
the exception for 2006. I treated these videos similar to field observations by recording
written memos and notes on the videos for further analysis. Appendix D provides a deidentified list of these videos describing the content, date, and length of each video.

Internet searches also returned two written articles on the history of Coach Johnson’s cross-country and track & field program. Four articles highlighting Coach Johnson’s success as a coach were also found and in some cases, provided expressed perspectives from the coach. Additionally, presentation slides presumably used by Coach Johnson during an invited presentation were also found and provided relevant information to the present study.

Using a researcher’s journal. I used a researcher journal to record notes during interviews, follow-up questions from the interviews, and integrative memos stemming from observations in the field (Janesick, 1999; Strauss, 1987). My use of a researcher’s journal augmented how I approached subsequent interviews and attuned myself to field observations during practice. The journal allowed me to reflect on my experiences as a coach, which helped me reflect honestly on my subjectivities and biases towards the coaching profession and how my values and experiences influenced my own interpretation of the findings. Many of my reflections were influenced by the regard I have for the participant, his program, and the rich history of both his program’s direct contributions to the endurance running community, and its indirect contribution to my own odyssey through coaching and academic study.

During the onsite visit, I was preoccupied with the initial analyses of interview transcripts and field notes, and because of this, much of my attention and time was spent on thorough review of formal data in order to implement deliberate and focused data collection efforts throughout the onsite visit. As such, topics for further reflection were recorded as a note and reflected on after the onsite visit. Altogether, the journal provided
increased credibility and trustworthiness of the study by providing context of the research setting, holding my subjectivities accountable in my interpretations, and serving as a component of my audit trail during data analysis.

Throughout the analysis of my data, I kept notes in the journal on the emergence, deletion, consolidation, and divergence of my codes. When writing the manuscript, the analysis continued as themes were continually adjusted to provide the clearest narrative possible. During the writing of the manuscript, my journaling changed from my narrative explanation of my decisions, to recording notes and memos in the form of comments in the electronic spreadsheet in which I kept track of the themes and subthemes, as well as the manuscript itself. Between revisions, I periodically saved new versions of the electronic documents before deleting or resolving comments so I could look back at the audit trail to remember the rationale for changes as the narrative took shape. Files were saved using a date and version number so I could easily view a chronologically organized index of the narrative.

**Data Analysis**

I followed a similar process to the steps outlined by Marshall and Rossman (2011). I divided the analysis into five tasks: 1.) organizing the data, 2.) immersing myself in the data, 3.) generating themes and categories, 4.) coding the data, and 5.) searching for alternate understandings. While this would suggest a linear process, I experienced more of a “spiral” approach as previously described by Creswell (2007) where I found myself engaging in these tasks concurrently and repeatedly with components of each of these tasks showing presence within others. The spiral analysis approach is implicit in the following sections as components of tasks transcend its primary section.
Organizing the data. Data were organized in two distinct ways during this analysis, using both electronic and physical manipulation (Marshall & Rossman, 2011). My first iteration of organization consisted of transcribing open and in vivo codes, along with referencing information, into tables within word-processed documents and electronic spreadsheets. Each data source (e.g., first interview of coach, second interview of coach, etc.) was contained within its own sheet in a common workbook. My organizational technique allowed me to accomplish two tasks. First, my technique served as a way to “winnow” the data to only what was relevant to the study as not all collected data is used in qualitative studies (Creswell, 2007, p. 152.) Second, my organizational technique helped me consider the open codes efficiently during analysis. Eventually, all data were merged into a since worksheet later in the analysis.

The second iteration of organization came after I had generated themes and categories. At this point, I printed hard-copy reports sorted by theme, which were then grouped together in a binder. The second iteration of organization allowed me to focus my attention to each theme as the data were synthesized so that the data could provide a rich description of each theme. Both organization processes enabled me to process the information in an efficient way that made sense to me.

Immersion in the data. While immersed in the data, I took the opportunity to “cuddle up with, embrace, and get to know” (Marshall & Rossman, 2011, p. 210) my data until I had developed an intimate familiarity with the sheer mass of information I had collected. Intimate familiarity with the data was accomplished by engaging with the information repeatedly over a number of weeks. During my engagement with the data, I employed an approach that summarized emergent themes while minimizing my interpretation of them in order to see the data as they were. Thus, I initially employed an
open coding approach in the form of in-line memos in order to “fracture or split” (Saldaña, 2015, p. 42) the data into manageable pieces. My open coding approach allowed the emergence of concepts that represented blocks of raw data. My open coding approach also allowed me to identify theoretical properties of emergent categories (Corbin & Strauss, 2008; Glaser & Strauss, 1967). Alongside my open coding process, particularly with the video artifact and field observations, I used in vivo codes as a way to record the “exact words that were used by participants” (Creswell, 2007, p. 153). Altogether, my open coding process later allowed me to systematically and efficiently consider emerging themes and conduct more sophisticated analysis. The following sections, provide more insight on the progression of the analysis within the interviews, field notes, and artifacts.

**Immersion with the interviews.** During the onsite visit, I would listen to the audio recordings of the day’s interviews, while reading along with the transcripts. Use of the transcription service augmented my analysis by allowing me to focus my attention on making memos and notes, which helped guide subsequent interviews and observations. I repeated the joint process of listening to the interview recordings while reading their matched transcripts after the onsite visit also. I transitioned to analyzing the interviews in absence of the audio recordings when I was satisfied that I had an adequate understanding of the interviews content having repeatedly considered the tone and timbre of the participant’s responses. I later transcribed my open codes into electronic spreadsheets, which were used for further analysis.

**Immersion with the field notes.** During observations, I made short memos and notes that reminded me of interactions and points upon which I wanted to follow-up. Memos served as short descriptions of emerging themes or codes. Notes brought my
attention to statements or observations requiring additional explanation either from the coach in subsequent interactions, or from triangulating sources. Some of the field notes contained implications of interactions or statements which provided a level of description that would have been lost without relaying the context, events, or statements peripheral to the interaction. While there is a level of interpretation, I believe that the data are more representative of what was observed with the interpreted implication than without. I recorded in vivo codes in instances where my field notes contained quotes from the participant or concise description of a witnessed interaction. There are no recordings to confirm that these quotes were verbatim; however, every attempt was made to write down exactly what was said in these instances.

Post-observation, I created photocopies and continued to created additional open codes in the form of open-ended memos and notes. Using my open-ended memos and notes, I composed longer descriptions of what I had seen and heard. I transcribed my accounts into tables in a word processed document. The tables contained rows that represented single data points. Each row merged my composed descriptions of the observations, open codes, in vivo codes, and identities of people other than the coach who were involved with each datum. I provided a column across all rows in which I introduced additional open codes and notes. My immersion in the data continued as I cycled through the tables regularly and often, constantly comparing my open codes with current intuitive interpretations, making notes that would guide my later analyses or triangulate the data to other sources.

**Immersion with video artifacts.** While viewing videos, I used tables in a word processed document to record open codes in the form of open-ended memos and in vivo codes that represented the content in the videos including quotes, and succinct statements.
pertinent to the study. During this process, I drifted towards a holistic notation of anything that the video depicted regardless of relevance, in order to create a thorough representative picture of the video to increase the timeliness and referentiality to its information. My open codes were copied into electronic spreadsheets for later analysis, and similar to my immersion with my field notes, I cycled through these tables regularly and often, making notes that would guide my later analyses or triangulate the data to other sources.

Coding the data. Three concepts required consideration in this study. In order to answer the research questions, the study had to develop understanding about the following concepts:

- What forms of knowledge were used in the decision-making process. (RQ #1)
- What actions the coach did during the coaching process (implicit in RQs #2-4)
- How knowledges were used in the decisions leading up to coaching actions. (RQs #2-4)

The first two concepts implied an analysis of standalone themes while the third implied a relationship between the standalone themes. It is worth noting that the degree of understanding of these three concepts varies in existing literature.

Knowledges in coaching as a whole are well discussed in the literature (e.g., Abraham et al., 2006; Stoszkowski & Collins, 2016). However, while the coaching schematic depicts the decision-making process and provides some guidance for what might influence them, the schematic does not provide specific guidance how the knowledges moderate decisions. Because of this, I needed to adopt analysis styles that would be appropriate for the coding of multiple concepts with differing degrees of formed conceptualization. Marshall and Rossman (2011) discussed Crabtree and Miller’s continuum of “prefigured” to “emergent” codes, polarizing a “template of expected
codes” against a “naïve approach the data” (p. 155). Within this continuum, Crabtree and Miller (1992) identified multiple styles of analysis that allow the coding to be directed in ways that take into consideration existing knowledge, while still allowing for alternative explanations of the data (Figure 8). The employed analysis techniques used while coding each concept are described in the following sections that address ‘knowledge,’ ‘decision,’ and ‘goal’ codes.’

![Figure 8. Templates of Analysis Styles, from Crabtree and Miller (1992)](image_url)
Knowledge codes. Even at the earliest stage of analysis, I employed codes pertaining to knowledge because of the extent to which they are addressed in coaching literature (e.g., Abraham et al., 2006; Stoszkowski & Collins, 2016). The preexisting knowledge themes in coaching literature led me to employ a “template style” of coding in which a template of “predetermined” (Creswell, 2007) codes deriving from “theory, research tradition, preexisting knowledge … [were] applied to the text with the intent of identifying meaningful units or parts,” (p. 19) was created and used. The template style approach allowed me to modify the codes when the data indicated inadequacies within the template, and allowed the emergence of additional themes while still rooting the analysis in existing theory. As such, the coding approach allowed me to consider the knowledge themes within the framework, while also challenging myself to search for alternate explanations. Throughout the coding, I compared 14 predetermined themes codes with the themes that emerged during data collection and analysis, eventually converging on a set of 17 codes (Table 7). The list of resulting codes are provided in Appendix E.
Table 7

*Actions Taken During the Iterative Coding Process*

<table>
<thead>
<tr>
<th></th>
<th>Knowledge</th>
<th>Decisions</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predetermined</td>
<td>14</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Introduced and removed</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Removed</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Emerged</td>
<td>6</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Further divided into two</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Final number</td>
<td>17</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**Behavior codes.** Antithetical to literature on coaching knowledge, categories of coaching decisions are less formed. My first iteration of decision coding intended to explicitly identify the relationship that decisions had with its peripheral themes, including a solitary predetermined code for relationship between decisions and competitive goals. However, I quickly recognized that this approach was ineffective as it would have required dozens of codes because of the various intertwined relationships that began to emerge. Creswell (2007) recommended handling no more than 25-30 codes during analysis as exceeding this number can be problematic for reducing the data to a reasonable number of themes for meaningful discussion. Reflexively, I anticipated that attempting to keep codes that stemmed from nuanced relationships would have had an undesirable impact on my ability to assign codes reliably.

I turned my efforts to identifying behaviour typologies and reserved incorporation of the relationship the decision had with other themes for later in the analysis. While the coaching schematic identified some behaviour typologies that might be present in coaching process, the typologies were both general and limited. I decided to let codes emerge to better depict the coaching behaviours that were observed. Relying primarily on my engagement with the data during coding was representative of an ‘editing style’ analysis as I, as the “editor,” was largely responsible for identifying themes pertaining to
decisions and their representative codes (Crabtree & Miller, 1992). Consequently, I converged on 7 behaviour codes, two of which were further divided into lower order themes (Table 7).

**Goal codes.** Throughout my immersion in the data, it became apparent that the coach’s decisions were both explicitly and implicitly directed toward achieving goals and objectives. The coach’s orientation toward goals was not surprising as the presence of goals and objectives in the coaching decision-making process has been identified in prior literature (Abraham et al., 2006). Because the coach has an extensive history of competitive success, I felt comfortable predetermining a “competitive goals” code. However, I made the decision to allow for the remainder of the codes to be determined through an ‘editing style’ analytical approach (Crabtree & Miller, 1992). I employed the approach to allow the nuances of the coach’s own priorities to emerge. Resultantly, I converged on 5 codes, 1 of which was divided down further into lower order themes (Table 7).

**Analysis of decisions.** The previous coding sections addressed coding data for later analysis that allowed for categorization of standalone themes. However, the current study maintains a focus on the relationship of these themes throughout the decisions making process. To initially expose the relationships, I adopted a process of identifying memos that were representative of multiple codes. My coding approach does not imply that a common code can be described in multiple ways as this would violate the principle of mutual exclusivity that should be present between codes (Merriam, 2009). Rather, my coding approach indicated that within a memo, multiple characterizable themes appeared to be present. Table 8 shows a single example of the process of assigning predetermined codes to memo. Th example shows the assignment of implicit indication of a knowledge
source, a coaching action, and an implied objective for the decision. The resultant group implies a relationship between the themes.

Table 8

<table>
<thead>
<tr>
<th>Memo</th>
<th>Predetermined Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coach gave an athlete the option to ease up a workout so she wouldn't become overtrained</td>
<td>KNW: SprtSci</td>
</tr>
<tr>
<td></td>
<td>ACT: Prsc-Rsp</td>
</tr>
<tr>
<td></td>
<td>GOL: DevPhys</td>
</tr>
</tbody>
</table>

In the above sections, I outlined my coding process and indicate the number of codes that emerged. Some researchers have used counts as a way to indicate the frequency of the codes’ occurrences (e.g., Miles & Huberman, 1994) including some in the field of coaching research (e.g., Abraham et al., 2006). However, Creswell (2007) stated that providing frequency of code occurrences is contrary to qualitative methodology because of the implication that all codes receive equal emphasis and disregard the possibility that the codes may represent opposing viewpoints within a theme. Additionally, providing frequency of code occurrences is more representative of the “quasi-statistical” approach (Crabtree & Miller, 1992). As such, providing a the frequency at which codes emerge is apart from the chosen methods of analysis. Codes’ counts have been disclosed up to this point in the chapter to clearly and specifically present the steps of the coding process and to demonstrate that these steps were reasonably representative of existing coding guidelines (e.g., Creswell, 2007). However, in order to stay rooted in qualitative methodology, frequency of code occurrences are not discussed in the analysis of the data.
**Generation of themes and categories.** Themes and categories emerged through an iterative process of inductive and deductive analyses common in qualitative research; the iterative process started inductively becoming increasingly deductive as the analysis progressed (Merriam, 2009). Inductive analyses are characterized by patterns, themes and categories emerging from the data rather than having them imposed on them prior to analysis (Patton, 1980). During my analysis, I engaged in a process to represent what I heard and witnessed during the onsite visit, creating “analyst-constructed” (Patton, 1980, p. 309) themes that illustrated contrasts within the data. The process started by creating sections of analysis based on the groupings that were found in my theme tables. The process continued throughout the construction of the narrative. As I constructed the narrative, immersion in the context influenced the inductive processes. While constructing the narrative, I made ‘memos’ by making in-document comments in my word processor to summarize what themes I thought were present. Used more widely, I also made ‘notes’ to indicate follow-up actions that I needed to take to bring clarity to the narrative. Follow-up actions included the incorporation of triangulating sources. Additionally, as themes converged, notes were made to reconsider the placement of sections of narrative especially in cases where multiple themes were present.

The process of generating themes became increasingly deductive throughout my constant comparison with the predetermined themes and the emergent themes. Guided by the work of Guba (1978), I formed higher-order themes as “recurring regularities” (p. 53) became increasingly present. As themes converged, I examined the higher-order themes’ and categories’ “internal homogeneity” and “external heterogeneity” to ensure that they encompassed common concepts, were logically related, and “dovetailed” in a meaningful way while maintaining “bold and clear” differences with other categories. In some cases,
I identified “divergence” within categories; therefore, I then extended the theme by separating it into lower order themes using known information about the data within the theme. Yet in other cases, I reconsidered the heterogeneity of the themes and combined themes in order to present a simpler picture. Throughout the process of constructing the narrative, I saved new electronic versions of the analysis whenever a set of new memos or notes were created or resolved; each electronic file was labeled with a date and version number. The process of creating a trail of file versions replaced my formal journaling as my audit trail.

The constant comparison between the themes continued until modifications became rare, concepts were assigned into established categories, and themes were well-described by and fit with the data. Analysis reached theoretical sufficiency with the establishment of relationships between the categories and were integrated into an elegant, credible, interpretation (Dey, 1999; Marshall & Rossman, 2011).

**Analysis of the coach’s decisions.** To analyze how knowledge sources influenced the coach’s decisions, the narrative was organized into sections that indicated knowledge sources that were interpreted to be primary influences on lower-order coaching actions themes. The narrative was then organized hierarchically by highest order themes with sub-themes identified by knowledge sources and the coaching actions that they influenced. Themes higher in the hierarchy were not considered more important than lower-order themes. Rather, higher-order themes were increasingly more analytic and interpretative, and required greater inference as the analysis moved conceptually upward (Scanlan, Stein, & Ravizza, 1989).

When I considered the construction of the narrative to be sufficient, the decision-making process was analyzed visually, through the use of integrative diagrams (Strauss,
The integrative diagram drew connections between lowest-order knowledge themes and the actions that the influenced. Furthermore, distinction between knowledge sources that had primary and supporting influences was made. The diagram was additionally able to be “collapsed” so that the relationship between the coaching actions and the highest-order knowledge themes was able to be visually represented. This practice of “pattern matching” is useful for explaining relationships of typologies within a relationship (Yin, 2009).

**Searching for alternate understandings.** Throughout the analysis I challenged myself to find alternative explanations, especially in instances when I found myself trying to fit data into codes that were biased to my own understanding of coaching. Throughout my handwritten, and electronic notes, I regularly would note “reexamine” or “revisit” in instances where I felt the analysis would benefit from “fresh eyes” on a different day. In my electronic spreadsheets, I inserted a column that served as a space for me to flag codes that I thought could be better suited in a different classification. Lastly, during one stage of my analysis, I sorted the codes by lower order themes, separating lower order codes from the codes that were assigned to common open codes. I used this approach to maintain a constant mindset while reviewing code reliability in a way that would allow constant comparison within theme without diverting my attention from the theme itself. During this stage of constant comparison, I made notes to verify that codes in adjacent categories that had been originally assigned to the open code. When the data were reorganized by open code (physically gathering related lower order themes around their open codes), I found that in every case my notes matched the code I had originally assigned to it. The congruency between the assigned codes and my notes helped me infer that the analysis had reached a satisfactory stage.
Important Methodological Issues

Building rapport. I took great care in building rapport between the participants to foster a relationship where the participants did not withhold information that could be valuable to the study. Throughout the onsite visit, I took care to make my intentions clear along with the purpose of the study (Taylor & Bogdan, 1984). In interviews, I used wording that was formulated carefully so as to not indicate my attitudes or stances about the setting or those in it (Merriam, 2009). Dexter (1970) highlighted the importance of the personality and skill of the interviewer as well as their attitudes toward the informant. I believe that I accomplished this by being friendly, yet professional; and engaged, but not interfering with the day-to-day operation of the setting which I was observing. I made every effort to verbalize that the intent of the study is not to challenge or question the stances of the participant. Additionally, I made every effort to ask clarifying questions in a way that did not imply judgement or disagreement with the information shared in the participant’s answers.

Trustworthiness. Trustworthiness addresses the major concern of how a researcher presents the findings of the study in qualitative research. The term trustworthiness can be used to describe the issues pertaining to the truthfulness and relevance of the findings. Among these are issues of credibility, dependability, and transferability which are discussed in the following sections.

Credibility. Credibility addresses the internal validity of the findings in qualitative research, or confidence that the findings that are produced are truly representative of the setting. In Interpretivist research, the perspective of the researcher is critical to producing the findings of the study. Therefore, in order to produce research that is representative of the settings, steps were taken to ensure that my own voice did not
overpower the voice of the participant. One way I did this was by keeping my own subjectivities in check while conducting observations and interviews. This was accomplished by keeping track of my own thoughts and reactions in the margins of my field notes and interview notes. This strategy was also used to regulate my subjectivities when producing the findings of this study (Alvermann, 1999).

Additionally, steps were taken to enhance the credibility of the participant’s voice. Enhancing the voice of the participant was accomplished by attempting to write down exactly what was said by the participant coach or others (i.e., assistant coaches, athletes, support staff, etc.) during field observations to help ensure credibility of what was observed (Wolcott, 1992). For interviews, member-checking (Merriam, 2009) of both interview transcripts was employed. The coach was emailed the transcripts from the interviews, and did not indicate that they were misrepresentative of our conversations. Additionally, during the interviews themselves, I summarized and restated the respondents’ thoughts during interviews to confirm that I was correctly interpreting their responses. In many of these instances, the respondents confirmed my understanding of their perspectives, while other times they went on to provide additional perspective.

Another way to strengthen credibility is by keeping a researcher’s journal (Janesick, 1999). I left an audit trail of my decisions made during the research process as well as when and how data were collected. I made memos and kept track of my reflections and reactions during the data collection and analysis process for my use during analysis. The audit trail additionally was present throughout the electronic files I used for analysis. As I completed a stage of analysis I would save my document as a new file, leaving the prior document unedited. This trail of documents would allow for a
reviewer to examine in-line memos and notes, as well as changes to my characterization of data points throughout the analysis.

Lastly, I triangulated my themes between of all data sources. The triangulation between interview, observation, and video is implicit as data from each source is present under common themes. Additionally, I provided supporting evidence from inanimate artifacts (e.g., packets of information, team rules, etc.) throughout the report. Triangulation therefore allowed me to drawing connections between statements the coach and others in the coaching setting made, observations I saw during team practices, and information found in artifacts and documents which strengthened the findings.

**Dependability.** Dependability addresses the reliability of the information. In quantitative studies, this addresses the ability for other researchers to replicate results. However, in qualitative research, especially in interpretivist research, this is not necessarily needed nor possible. Merriam (2009) recommended using multiple forms of data collection and the use of a researcher’s journal to provide dependability, both of which are used to provide credibility. This use of a researcher’s journal is referred to as an “audit trail” which can be used by the reader to evaluate the decision-making process of the researcher and determine if the trail is consistent and accurate (Sparkes & Smith, 2014). Additionally, my reliability is additionally evident in my disclosure that as I repeatedly considered open codes and their assigned characterizations, that edits became increasingly seldom, and that I found myself consistently concluding upon themes for individual data pieces.

**Transferability.** Transferability refers to the external validity of the study or the degree to which a study can be generalized to a research field. In quantitative research, transferability often references the degree to which the findings of the study are
representative of larger population. Generalization in qualitative research, however, takes on a different implication. In the constructivist sense, qualitative research is generalized by adding the findings of the case to the larger body of knowledge on the topic. Citing Piaget’s schema theory, Donmeyer (2000) stated that the generalizability of the case study comes through the vicarious experience that the researcher provides to the reader. Through the vicarious experience, the reader can assimilate the findings to her or his own experience, accommodate the results by altering prior perceptions on the topic, integrate the new perspectives with the former, and differentiate between the present case and other. A perspective of Piagetian generalization is especially salient in coaching research that readily acknowledges that coaching is context-dependent (Côté et al., 2007) and allows for the reader to generalize the present results to her or his own context for assimilation, accommodation, integration, and differentiation.

**Ethical considerations.** Ethical considerations take into account the protection of the participant, formulation of the study itself, and integrity of the findings. In qualitative research, the risks to the participant are minimal. However, it is important to recognize that the integrity and confidentiality of the participant be preserved throughout the course of the study. In this study, pseudonyms were used for individuals contained within the study. Care was taken to not include any identifying information including reducing the specificity of characterizing description of the participants and their context. Additionally, during interviews, I respected the respondents’ integrity and ensured that no damage or disadvantage to the respondent occurred (Weiss, 1994).

The integrity of the findings must also be maintained. Interpretivist research heavily relies on the researcher being truthful in his descriptions of the research setting
and conveyance of the findings. Citing Bronowski’s (1956) “habit of truth,” (p. 25)

Locke, Spirduso, and Silverman (2014) stated:

Without the ‘habit of truth’ there could be no accumulation of reliable knowledge, and thus no science. The rules for this habit of conscience are absolute: no compromises, no evasions, no shortcuts, no excuses, and no saving face. Planning, conducting, and reporting research make sense only so long as the social contract among scholars is honored—everyone tells the truth as well as he or she can know it (p.25)

While the truthfulness of the researcher could be considered a moral endeavor, it is this very component of scientific inquiry that allows science to expand human knowledge. Patton (2002) commented that in addition to the precautions taken to ensure that credibility of information is sound, that the credibility of the researcher through training and track record is also considered. While I am early in my academic career, prior to this study I completed a pilot study related to this topic to prepare myself for this study so that I am equipped to fulfill my responsibility to produce findings that are credible, dependable, and generalizable. The findings from this pilot study was accepted for international presentation through a peer-reviewed process additionally indicating my ability to represent the current findings fairly and accurately. The criticality of this has been emphasized to me in my formal education as I took a research ethics class as part of my doctoral work and also possess a research ethics training certificate.

Lastly, ethics involves the very formulation of the study itself. While this study examined the decision-making process of an endurance running coach for the first time, it does so using an existing framework to explain the components of the decision-making process. Using a predetermined framework implicates a research paradigm where the researcher operates under the assumption that the current framework is the best explanation for the findings (Misak, 1995). The use of such an approach sets a stage for
confirmation bias where expected results can be found in an eagerness to find them. Other research philosophies that approach scientific study with the objective to disprove theory, with the failure to do so speaking to the robustness of the theoretical framework (Parry, 2005; Popper, 1963). To frame the study under the umbrella of a single framework could be considered unethical as it fails to consider alternative explanations, and thus lends itself to confirmation bias. To avoid imposing predetermined interpretations on the present study’s data, I acknowledged two things. First, this study did not aim to further prove the robustness of Abraham and colleagues’ (2006) schematic, but rather it used it as a means of describing and organizing the investigation of the decision-making process in coaching. Second, theories may take decades before they get off the ground and become empirically progressive (Hacking, 1981). To balance the use of the framework while avoiding the imposition of pre-determined findings, it was importance for me to examine not only my own biases during the presentation of the findings, but to examine the data with a discerning eye to consider alternative explanations to the decision-making process that fall outside of the current framework.

**Personal subjectivities.** My personal experiences as an athlete and as a coach have influenced my interest in how coaches of endurance runners coach their athletes. In the section, I point back to my experiences as an athlete, coach, and coach educator that have contributed to why I believe a better understanding of the decision-making process in coaching is necessary.

**Experience as an athlete.** I began to develop an identity as a distance runner the spring of my seventh-grade year at the age of thirteen. The prior two years I had started competing in the 800-meter run at interscholastic track meets. I first did this because my father had suggested that it was my best chance to get a ribbon (awarded to the top eight
places in each event). He had also suggested that instead of showing up to run it the day of the meet, I should train for it. This seemed logical to me, so every day when I would get home from school, I would run a half-mile loop around my neighborhood. However, after the final track meet was completed, I had no reason to continue the routine; but this 7th grade year was different, this was the year where I could compete in the 1600-meter run. I figured that I needed to run more than just a half-mile a day and decided, to not only run a full mile every day, but I wanted to run miles a day; I wanted to become a runner.

When I went to high school, I decided to join the cross-country team. I used to say to my friends, “A lot of people run because they are on the cross-country team, I’m on the team because I run.” I was very invested in the sport and strived to learn as much about training as I could. I bought the books my coaches had, combed through the websites that they used (e.g. Payan, n.d.) (which, as of 2017, still looks very similar to how it did between 1999 and 2003), and religiously kept a detailed training journal. During my high school career, I had a good deal of success, much of which I attribute to an intrinsic interest, value, and commitment to running. By the end of high school, I was excited to continue my running career in college.

I competed for a NCAA Division III cross-country team. My team won the conference championship my first three years, and I was All-Conference those same three years. However, college was where my career took a downward turn. I stopped improving after my sophomore year. Workouts that were easy and enjoyable became unattainable and unpleasant. In my final conference championship, the year we snapped our eight-year conference championship streak, I placed 8th on my team making me the
alternate for our NCAA Regional squad. I would spend my last meet on the sidelines, the only race in my career I was not a varsity athlete.

After that last meet, I put my shoes in my closest and did not run for a year and a half. I was resentful, confused, and felt like I had lost sight of who I was. I often wondered what had happened that led to my demise as an athlete. Training had been different in college. The mentality on the team was there are two speeds at which one trains, as hard as you can run for the distance, and an easy jog. This was different from what I had done in high school. My coach had times calculated for specific purposes and rarely were we running “as hard as we could” and we never did slow jogs. However, between seasons, I would still do similar workouts with which I was familiar though they had become increasingly difficult with each passing year. I wondered to myself if this conflict between what I was familiar with and what I was obligated to do had contributed to my decreased abilities as a runner. I wondered if one of the approaches to training was simply wrong. According to my teammates in college, what my coach in high school had me doing was not allowing me to recover. But if that was the case, why did I consistently improve in high school, but was getting worse in college? I developed the opinion that “hard” is different for everyone. But if that is the case, how do we know what is too hard?

**Experience as a coach.** My first opportunity to coach was immediately after college. My first position was coaching cross-country, indoor, and outdoor track at a high school across the street from the middle school where I was teaching. From the beginning, I was meticulous in the way I would prescribe workouts making calculations using Daniels’ Running Formula (1998) to ensure that each athlete had workouts that were appropriate for their developmental level. While my practice as a coach deepened, my attention turned to the appropriateness of training for individual athletes. One of the
biggest influences from my days as a coach was the clinics and coaching education schools I attended. In November of 2008, I attended a USATF Level 1 School. I started to learn about terms like ‘periodization’ which holds the purpose of measuring and charting training loads along with the running volumes and running intensities that compose them. The following January, I attended an endurance running clinic where I learned more ways to prescribe training in a more physiologically-based way. Consistently, I would hear that appropriate training is characterized by increasing effort throughout a training cycle. But I was still left with questions of how this progression was determined. How does a coach know that an increased amount of intensity is appropriate and that it will not be too much for the athlete to handle? What does a coach look for when increasing the work? Questions like these prompted me to go back to graduate school and investigate this question.

**Experience as a coach educator.** While in graduate school, I became a USATF Coaching Education instructor. The USATF Level 1 Curriculum is largely rooted in the teaching of ‘ological and sport-specific knowledge. I have found myself wondering how the curriculum could be expanded to teach components of the decision-making process while coaching. Better understanding of how coaches do this would enable coaching education to more thoroughly teach this topic to coaches.

**Chapter Summary**

The mode of investigation for this study was qualitative case study through an interpretivist lens. This study has the expressed purpose of understanding the decision-making process of a competitively successful endurance running coach and the knowledges that contribute to his decision-making process. Semi-structured interviews, and field observations were conducted and were strengthened through collected artifacts
and documents. Ethical considerations were documented by the researcher, and credibility and dependability factors common to qualitative case study research were reported. Additionally, data analysis procedures were discussed in detail, taking great care to provide rationales for the employed techniques. Findings of the present study are presented in Chapter Four.
CHAPTER IV

FINDINGS

Schell’s University (a pseudonym) is located in the western United States at a high elevation in a high desert climate. The University has a reputation in track and field that extends to before Coach Gary Johnson arrived as the head coach of the program. A visible presence of track and field was present both in the university’s athletic center and around the campus. Additionally, statements in videos reviewed as part of this study credit the university for holding a deep love for cross-country and track and field. There was a genuine respect for the cross-country and track programmes in the university at large. The week of my campus visit to Schell’s University followed a weekend at an especially large, out-of-state, three-day, track and field meet. The outcomes of the competition resulted in many situations in which multiple athletes needed to have training sessions adjusted due to their performance the prior weekend. These different situations set the stage for decisions that Coach Johnson would make over the course of the week. During the visit, Johnson said several times, “This isn’t a typical week for us.” During my first observation of a team training session, female and male students milled around. Prior to practices, Coach Johnson routinely made his way through the athletes and engaged in small talk, occasionally either teasing lightheartedly or commenting on the appropriateness of athletes’ apparel selections as it pertained to the day’s training. Coach Johnson posted workout sheets to a light post near their meeting site that provided training session parameters for different groups of athletes. After quickly looking at the
sheets, the athletes went for their run, and Johnson invited me to accompany him in his pickup truck as he monitored their progress. During my observations, practices generally started with the same routine in which he would mingle with the students, explain the day’s workouts, release athletes to do their respective workouts, and then monitor their progress. Athlete monitoring occurred while athletes ran around the track or by Johnson driving up to runners in his truck as they ran around town.

The first formal interview took place in Coach Johnson’s office during the first day of my visit. Reminders of individual and team accomplishments from his coaching adorned the office space. During the interview, I reminded him of the purpose of the study, and before I could ask my first question, he stated, “There are no secrets here, we just do what works for us. Each coach has a different environment, so you have to learn how to be successful in your own environment, you know?”

Coach Johnson stated that becoming a coach was an accident. He had originally come to Schell’s University to get a master’s degree in exercise physiology, and had intended to find a career in corporate wellness, wanting to serve as an exercise instructor for business executives. However, while at Schell’s University, he assumed a position as a graduate assistant coach for the track team under Steve Weber, the coach who would become his mentor.

Coach Johnson shared that Coach Weber was a giant in the track and field community, amassing many national championship titles, and working with athletes at an international level of competition. Coach Johnson’s time learning under Coach Weber was invaluable, as it had provided opportunities not only to learn from a successful coach, but also to learn from other successful coaches who were friends of Coach Weber’s. Throughout my visit, Coach Johnson referred to insights he had learned from
Coach Weber, referencing the legacy that he left behind. Coach Weber’s ongoing influence on Coach Johnson’s team was apparent on the university’s campus, where athletes made passing statements about Coach Weber or wore t-shirts bearing his name.

Coach Johnson shared his background with me and how he came to be the cross-country and track and field coach at Schell’s University:

I didn't come to Schell’s University to be a coach. I came to get my Master’s degree…I knew I probably wanted to do something with human physiology and so I went into that kind of degree in my undergrad and then I came here. What I really want to do was get my Masters and go and be a corporate fitness guide. I wanted to work for Xerox or IBM or something like that and work for all the corporates in Chicago, the vice presidents, presidents and help them lose body weight or body percent fat and lower the cholesterol levels and all that. I had no idea I wanted to be a coach.

He further discussed how his experience as a graduate student, particularly learning under Coach Weber, influenced him to become a coach:

The physiology and the classes I took were very good classes for coaching. It gave me a background on how the body works…when I came here I had the opportunity to learn under Dr. Steve Weber as one of the revolutionary forefathers of coaching…He was working for USA Track and Field… I was very fortunate to help him and learn from a lot of different people.

Coach Johnson was first a graduate assistant coach for the women’s cross-country team and described some of the dynamics of coaching with people who had different styles than he did:

I was a graduate assistant, so right away when I started coaching and having a background in physiology and different things, biomechanics, it helped me… I was a GA for the first year. After that I really didn't get along so well with the guy that I worked for. I was working under a different coach. We just didn't have the same philosophy…One [way] I think was is that just verbally the way he would talk to kids. He probably talked a little bit more like he was out on the football field talking to offensive linemen. [When he was] coaching the ladies, I think that they didn't respond so well to that. The second thing would be I think that

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2 The coach shared Weber’s role with USA Track and Field. The details are left out to protect confidentiality, as the particular role of Coach Weber would allow informed readers to easily figure out the participant’s identity.
sometimes maybe he would overpromise and under-deliver a little bit. I think after a while that became frustrating because they felt they wanted somebody that cared about them and their program and developing them, and they felt that wasn't being met.

Coach Johnson then had the opportunity to be an interim head coach for the men’s cross-country team when Coach Weber went to coach at the Olympics:³

Coach Weber was one of the Olympic coaches. It was in the fall, and so while he was gone, he asked me to coach the boys’ team while he was gone, so I was the interim coach that year and we had a lot of success. He came back right before the nationals before the end of the season, and that was enjoyable.

Finally, Coach Johnson commented on how he came to take the reins of both the men and women’s teams as the head coach:⁴

The next fall, the guy that they hired [to coach the women]…They had already fired him and hired another guy and they were going to fire him. That was over a two- or three-year period, and so they asked me to be the interim coach for the women, starting right away. I couldn't believe it. We won the national meet the first year, and I just fell in love with [coaching.] They reopened the [women’s] position and through a lengthy process I eventually did get the job and we had lots of success. I started with the women. I did that for about seven years before I started coaching the men. I started coaching them [seven years later].

I think my personality I gravitated to that. I did that and just fell in love with it and then over time a couple different jobs opened up and I just took them. It wasn't like it was a focus, more as just an opportunity. As time went, I started to really enjoy it.

Coach Johnson noted that part of his coaching approach was formed by purposeful avoidance of the mistakes he had seen other coaches make, but also from attitudes instilled in him by his parents to always focus on people’s best qualities.

Throughout our interviews, his experience as a coach and the influence of those he

³ The coach identified the year in which Coach Weber was an Olympic Coach, which is omitted to protect confidentiality. The statement was triangulated against public records.

⁴ The coach referred to the years in which he started coaching the women’s teams, as well as the year he started coaching the men’s team. The years are omitted to protect confidentiality. The statements were triangulated against public records.
worked with early in his career permeated his answers. During our conversations, Johnson often referred to topics he associated with knowledge of sport science, or the importance of coach-athlete interactions. He also often referenced his own history of coaching experience, once mentioning, “Sometimes I don’t really know why I know what I know, but I know it works.”

During this study, I investigated how the coach’s knowledge sources contributed to his decision-making. Consistent with the Coaching Schematic (Abraham et al., 2006), the findings in this chapter present the coach’s decision-making process through analysis of the relationships between the coach’s knowledge and his disclosed behavioral/observable actions. The interpreted knowledge and action themes were organized in a hierarchical fashion (Figure 9) (e.g., Abraham et al., 2006; Scanlan et al., 1989). Following the figure from the left to the right, higher-order themes comprised those to its left. Themes higher in the hierarchy were increasingly more analytic and interpretative, and thus required greater inference as the analysis moved conceptually upward. During the data analysis, three knowledge sources were identified in the participant’s coaching approach: scientific knowledge, sport-specific knowledge, and pedagogical knowledge.

Consistent with the Coaching Schematic (Abraham et al., 2006), the present findings indicated that the relationships of constructs within coaching decisions often included multiple and sometimes competing knowledge sources, and as such, these sources of knowledge were not mutually exclusive to any influenced coaching actions. To present the relationships between knowledge and action, I organized the present chapter by the knowledges that I interpreted were most influential on identified coaching
actions. I then addressed the decision-making process in each section by describing the relationship of the knowledge source to the actions and behaviors of the coach.

In my analysis, I found that the knowledge sources and actions shared an interwoven and non-mutually exclusive relationship with coaching behaviors. Because of the interwoven nature of the relationships, I applied the work of Nash and Collins (2006) and Kreber and Cranton (1997, 2000) to this chapter’s format. I addressed themes in the order of “why the coach does what he does” (i.e., scientific), “what the coach does” (i.e., sport-specific), and “how the coach coaches” (i.e., pedagogical). Through inductive and deductive analysis, I interpreted that subthemes emerged within the three knowledge categories. I define the subthemes in the sections in which they are presented.

Additionally, I identified coaching actions were present in the study and characterized them as either “person-focused actions” or “sport-focused actions.” Person-focused actions were those taken by the coach that focused primarily on the members of the team. Specific actions within the person-focused action category included “explaining and instructing”, “cultivating a team environment”, and “learning about athletes”. These actions are further defined in the sections in which they are presented.
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| Explaining and Instructing        |                    |                             |                                               | Person-Focused Actions |
| Cultivating Team Environment      |                    |                             |                                               | Actions               |
| Learning about Athletes           |                    |                             |                                               |                     |
| Competition Planning              |                    |                             |                                               |                     |
| Organizing Training Schedules     |                    |                             |                                               | Sport-Focused Actions |
| Implementing Responsive Training  |                    |                             |                                               |                     |
| Implementing Planned Training     |                    |                             |                                               |                     |

*Figure 9. Hierarchical themes developed through to categories*
Theme #1: The Coach Used Scientific Knowledge to Make Decisions

During the visit, Coach Johnson indicated that he used sources of scientific knowledge to inform his decisions. Scientific knowledge was interpreted to be a component of basic sport science. In particular, Gary shared scientific knowledge of physiology and psychology.

Knowledge of Physiology Influenced Training Decisions

During the visit, evidence suggested that Coach Johnson made decisions about training organization and implementation using knowledge of physiology. Training organization actions were interpreted as those in which the coach shared how he created medium to long-term training plans. I defined “training implementation” as actions taken by the coach when formulating or conducting training sessions, (i.e., workouts, team practices). Training implementation actions were indicated by the coach’s disclosed reasons for creating a training session the way that he did, or how he prompted athletes to do the intended workouts. I interpreted training implementation to take two distinct forms: “planned training”, or training that was part of the training plan, and “responsive training”, or adjusted training in response to unanticipated events.

In one interview, Johnson stated, “I think that the background that I think I got in physiology and biomechanics and kinesiology has been very helpful in developing strategies and workouts that are going to be good in developing our student-athletes.”

During our interviews, Coach Johnson emphasized the scientific basis of his training approach, stating that the process of training is “very science-based and we’re not guessing.” Throughout the visit, Coach Johnson regularly used terms such as “max VO₂,”
“aerobic threshold,” “anaerobic threshold,” “lactate,” and “hydrogen ions” to describe the rationale behind his teams’ training sessions. Deductively, I interpreted physiological knowledge to be scientific knowledge because it was consistent with the classification of physiology provided in by Abraham et al. (2006). Additionally, the knowledge base, as described by the coach, appeared to be related specifically to identified scientific fields. Furthermore, knowledge of physiology appeared to be indicative of "why the coach does what he does" rather than describing what he does, or how he does it. Coach Johnson’s use of physiological knowledge in training decisions was triangulated in a video artifact recorded in a 2013 interview, where he stated that his understanding of exercise physiology helps him form the basis for the decisions he makes in training.

Sub-themes that emerged were Coach Johnson’s particular focuses on training “energy systems” and on “neuromuscular training.” During one interview, Johnson said, “You have to know the energy requirements of the race that the person is running. That has to be the driving factor.” He added later that because of the university’s high altitude, he had to be “creative to do the same thing to get the same neuromuscular component, but still work the same energy system.” He elaborated,

If I made them run the neuromuscular pace that they would run at sea level under a classic system that most people do at sea level, then the workout is going to change from being maybe an anaerobic threshold work to lactate work because their pace is that intense.

Throughout my visit, I interpreted Coach Johnson’s understanding of energy systems as physiological processes that allow the body to meet the energy production demands of endurance running. Additionally, I interpreted Coach Johnson’s understanding of neuromuscular training as training in which athletes become better able to sustain leg speeds necessary for successful racing.
Decisions on training implementation used knowledge of energy systems.

Coach Johnson’s use of knowledge of energy system training in training implementation decisions was demonstrated through his use of information from athletes. He stated that some of his athletes will participate in physiology lab testing, usually as part of a study being conducted on campus. The athletes then share the results of the physiological test with him for his use. Coach Johnson said he applies energy system training by training with cardiovascular improvements in mind, “having [athletes] do a lot of anaerobic threshold running [and] a lot of max VO₂ workouts.” To create sessions with this focus, Coach Johnson stated that in cases where he has physiological measurements of the athletes, he uses the results to produce training sessions for those individuals. He described this process, stating:

I might look at what velocity a person is running at their max VO₂. If they did a max VO₂ test, I might look and see what their millimoles of lactate were, at what paces they were running on the treadmill. At about 3.8 to 4.2 millimoles of lactate is going to be their anaerobic threshold level. Therefore, when I'm doing [anaerobic threshold] runs I may start them off at that pace and try to lengthen out the amount of duration of how far they can run at that.

For athletes who do not have testing done, he said he uses a field test to measure athletes’ velocity of max VO₂ (max vVO₂), which he would then use alongside published charts that associate fractionalization of the max vVO₂ with physiological training emphases. He then used information from the charts to prescribe training paces that have designated physiological goals.

Coach Johnson said another training approach is to create training sessions in which athletes run at a pace indicative of fractionalizations of max VO₂. He stated the goal of this type of training is to:
Work at a fractionalization of either [athletes’] max VO$_2$ try to get them more efficient at running faster paces so that way they can break down energy at a quicker rate and not have the byproducts of lactic acid and hydrogen ions.

Johnson’s use of energy system training was supported by statements recorded in a 2015 video artifact, where he said he implemented lactate tolerance training in order to train the body to remove and buffer lactate.

**Decisions on training implementation used knowledge of neuromuscular systems.** Coach Johnson described how knowledge of neuromuscular training influenced training implementation decisions. Since his athletes are training at a high altitude, they are limited in cardiovascular terms in their ability to run at necessary speeds for endurance running success because of their physical environment. Because of the limitations of the environment, Johnson had to use a different training approach in order to develop the cardiovascular system while also developing the neuromuscular components necessary for running at speeds necessary for success in competition. Gary explained that in some cases, rather than having an athlete complete an 8-mile continuous run, he might have an athlete run a 12 x 1 kilometer (running one kilometer, twelve times), giving the athlete 30 seconds of rest between each running bout. Coach Johnson explained that providing rest allows athletes to run at necessary speeds during the training session. Thus, implementing periods of rest allows athletes to train at a cardiovascular level of interest while also allowing athletes to run at speeds necessary for achieving neuromuscular goals. Coach Johnson’s assistant coaches, Drew and Chris, explained Johnson’s approach further, stating:

Because of the altitude we're at, we also have to do some stuff at sea level pace, otherwise you go down to sea level and you try and run a 10-K and you feel like you're sprinting the whole time. At sea level you can do, say, 6 x 1 mile at sea level 10-K pace. Up here, what he'll do is instead of doing six by a mile he might have them do six set of 4 x 400 meters, and give them say 60 seconds rest
between the 400s and two and a half minutes rest between the sets, and run sea
level pace. So for a 29:10 (10k race time) boy, they'd be running 69, 70 second
quarters, and for them they feel like it's not that hard, but they're doing 10-K
worth of work at 4:40 mile pace, it's just broken up into smaller segments so they
can handle it at this altitude...It's more for the neuromuscular effect rather than a
necessarily like an energy system or a physiological effect, and then maybe the
next week what we'll do is he'll do six by a mile at physiological 10-K pace, so
the 10-K pace that they would run up here.

The above statement indicated that while Johnson used physiological knowledge
of neuromuscular training, it was accompanied by sport-specific knowledge of the
requirements of endurance running. The co-existence of these knowledge bases was
illustrated further in the following statement:

[Reference point training] takes into a little bit more consideration of [athletes']
neuromuscular components versus their cardiovascular components, which is kind
of an issue here. Being at this high altitude, it's sometimes hard to replicate the
euromuscular components and strength endurance. Although the altitude is very
good, you can't sustain hard, long efforts because the altitude is like a governor.

As such, Johnson used his knowledge of neuromuscular physiology to make
decisions on providing training sessions for his athletes.

**Decisions on training implementation used knowledge of heart rate.** Coach

Johnson also used knowledge of heart rate to help guide decisions on training
implementation. He stated:

[During training sessions], I might want [athletes] to be between 168 and 174
heart rate. If they’re 180, [that indicates a different type of workout], so then I
would say, “You’re running way too fast. You need to slow it down and run at
your pace.” Well over time I might have a kid run at 170 heart rate every time and
over time eventually as he gets fitter his pace per mile should be faster but still be
running at the same heart rate. The goal is not to get to a higher heart rate; it’s to
be at a faster pace at the same heart rate.

Coach Johnson added that he bases his use of heart rates on physiological
research from Karnoven, sharing that Karnoven’s work indicated that the heart must be
operating at least at “60% of heart rate reserve” to train the heart. Because of this
concept, Johnson said he wanted his athletes’ heart rates to be “in the 140s” because a heart rate in the 140s is typically associated with 60% of heart rate reserve. As such, he used further physiological heart rate knowledge in making decisions on training implementation.

**Knowledge of Psychology Influenced Training and Competition Decisions**

In one of our interviews, Johnson stated that training endurance runners included applying knowledge of psychology. My interpretation of psychological knowledge was consistent with the interpretation shared by Abraham et al. (2006) who characterized psychology in the words of one of their participants who stated:

> Whether it’s sport psychology or just psychology in general, man management, call it what you like but basically that, that psychology aspect of the knowledge of players and how to handle players, how to deal with performers and the sport-specific knowledge are the most important things. (p. 559)

As such, my characterization of psychological knowledge was consistent with the chosen framework for this instrumental case study. Consistent with the Coaching Schematic, I deductively interpreted psychological knowledge as scientific knowledge. Additionally, the characterizations of the knowledge-base in the present study was indicative of "why the coach does what he does" rather than describing what he does, or how he does it.

Throughout the study, I interpreted psychological knowledge was an influence on how Johnson made decisions in implementing training and in competitions. Evidence indicated that Johnson associated confidence with psychology, about which he stated:

> In distance running, it becomes very painful sometimes, and a person who's not confident will certainly back out of that or give up before a person who has made such an ultimate commitment. I think that's the psychology of winning distance running.
Johnson further believed that “mental growth” is a result of increased confidence, stating:

I think you want to see consistent growth mentally and physically. As the athletes start to be able to handle the training better, as they start to get fitter, as they start to get more efficient. Those are the things that you want to see. You want to see their fitness levels continually growing but you also want to see them get more confident as time goes.

Coach Johnson spoke particularly about the importance of confidence and how he uses training to develop it. He promotes mental growth by prescribing tough workouts. He described this approach further, stating:

Some of the workouts are harder than [competition]. I think as they have success getting through and executing the workout here and there I think it really builds a callous athlete, which is what I want…There’s days that I just have particularly hard workouts knowing it’s even maybe a little harder than my percentage, but it’s also, “Okay this is going to be good for their mental development and trying to get the team to be a cohesive unit and all of them being tough on the same given day.” In cross-country you get to run 7, you get to score 5. If you go in with only five kids that are mentally right, then one of them might have a bad physical day and so then you’re not going to have a good effort from the whole team. Whereas if you get all seven of them right and one or two have a bad day, then you still have a great shot at maybe winning or being successful.

Coach Johnson’s focus on mental growth through training was supported by statements made in a video artifact of him at a high school running camp in 2011, where he told athletes that when looking for athletes for his team, he wants athletes who are consistent in their work in order to develop mental toughness as well as improve physically.

Johnson also said he avoids some training techniques because they can have undesirable impacts on athletes’ confidence. He stated:

I think what I try not to do is [have] one particular workout that's going to make a kid great and get them away from that way of thinking. It's more that if your last six months have been more solid than the six months previous, then over time if we do things right, I do things right, then you’re going to run faster… I think going for it in one particular workout [is] for people that aren't very confident.
They’re grasping for some kind of confidence in one particular workout that has nothing to do with helping you during the race.

Johnson’s assistant coach, Drew, provided additional support for Johnson’s statements of avoiding “magic” workouts, stating, “[Gary]’s said a couple of times that there's no magic workout, that's why we don't have those key sessions or anything like that.” Drew and Chris triangulated this approach, stating that Johnson avoids “magic” workouts to avoid creating situations in which athletes are fixated on individual training sessions rather than on steady improvement.

Coach Johnson also showed his understanding of psychology when making competition decisions. During a field observation, the team was preparing for an upcoming race. Coach Johnson said that he was withholding an athlete from an upcoming race because he was recovering from an injury, and he did not want the athlete to get hurt or have a bad race by returning too prematurely. Johnson believed having a bad race could have had a negative psychological impact on him, since he was a “high caliber” athlete and was not used to having bad races. In short, Johnson considered confidence and mental growth as psychological traits. His knowledge of these psychological traits influenced his decisions on training implementation and competitions.

**Theme #2: The Coach used Sport-Specific Knowledge to Make Decisions**

During the visit, Coach Johnson indicated that he used sources of sport-specific knowledge to inform his decisions. Consistent with the characterization provided by the coaching schematic, I interpreted sport-specific knowledge as knowledge that requires familiarity with sport (Abraham et al., 2006). Sub-themes within sport-specific knowledge are not specific to endurance running, but rather require the context of sport, whether generally or specific to endurance running, to be understood. Furthermore,
consistent with the definition of sport-specific knowledge offered by Nash and Collins (2006), sport-specific knowledge bases provided knowledge of “what the coach does.” Sub-themes that emerged as part of Johnson’s sport-specific knowledge included knowledge of 1) periodization, 2) requirements of endurance running, and 3) past and future competitions. The following sections demonstrate how the different types of sport-specific knowledge fit into Coach Johnson’s decision-making process.

Knowledge of Periodization Influenced Training Decisions

Johnson’s decisions on training organization included the incorporation of “training cycles” or set periods of time in which specified training goals were focused. Coach Johnson stated his organizational decisions were influenced by a training approach referred to as “periodization,” which he identified as a way to describe patterns for the effective physical training of athletes. He shared that early in his career, he would study and read as much as he could about different training methods, training modules, and periodization. During our interviews, Johnson referenced periodization topics, making statements like “classic Bompa,” (an author Johnson considered to be influential in periodization) to describe his organization of training. I interpreted periodization to be encapsulated by the sport-specific typology because of periodization’s reliance on sport contexts. Furthermore, the responsibility of increased fitness comes directly from the assigned training, or “what” the coach has athletes do.

Coach Johnson’s use of periodization was triangulated in a video artifact of a conference presentation he gave in 2009 on endurance running training, and a 2016 interview revealed additional details to his periodized approach. Johnson said he uses 14-to-21-day training cycles in which he emphasized particular training focuses. The cycles
were organized to elicit specific physiological adaptations with training meant to foster the desired adaptations. He further stated in the interview that physiological adaptation takes 28-31 days, but that at 21 days, 90% of the adaptation has occurred. He is then comfortable moving on to different training focuses with adaptive ranges to achieve more diverse adaptations during training. Coach Johnson added that in his organization of training, the number of days in the training cycles will vary depending on the time of year, stating that he shortens cycles to 7 to 14 days towards the end of a training season.

I interpreted knowledge of periodization as sport-specific knowledge because the knowledge base as described by the coach appeared to be related specifically to “what the coach does”—in this case, how he schedules training. During the visit, specific sub-themes within periodization emerged as part of Coach Johnson’s coaching knowledge, including training volume and intensity.

While the coach’s knowledge of physiology was also connected to the coach’s knowledge of periodization, periodization is always an application to sport, whereas physiology can be understood apart from sport. I thus interpreted periodization to be sport-specific because of the context of its understanding (i.e., always in the presence of sport) and the role it plays in the coach’s approach (i.e. “what” the coach does.)

**Decisions on training organization used knowledge of training volume.**

Johnson identified training volume (i.e., the distance athletes run) as an important component of his approach to periodizing training. Coach Johnson referred to a periodization principle called “Yakolev’s Model” as a guide to scheduling training volume. Coach Johnson explained that Yakolev’s Model indicates that when an athlete experiences “stress” (i.e., physical wear-and-tear from training) that the athlete’s fitness level will at first decrease and that rest is needed in order to recover from the stress.
Coach Johnson went on to explain that when rest is implemented correctly, the result is an adaptive response in which the athlete comes away from the stress and recovery with a higher fitness status. Coach Johnson explained that he uses a “step method” based in Bompa’s work to organize training volumes, stating:

At the beginning of the summer, I'm going to start them at 50%, 60% of their total volume and over a four- to six-week period. I'm going to increase their volume up to about 100% and then we’re going to maintain that, but undulate it every so often, the step method … Step [up], Step [up], Step [up], and then step down. Step, step, step and then step down…As we get into the season we’re going to stay somewhat between 90% and 100% volume throughout the first six to eight weeks, nine weeks.

Johnson’s statement on his use of the step method was triangulated by statements found in a video artifact of a 2009 conference presentation in which he disclosed its use. In the artifact, he said at the beginning of the season, he has athletes running 60% of their total overall volume, building to 100% over a six- to eight-week period.

**Decisions on training organization used knowledge of training intensity.**

Coach Johnson also identified “training intensity”, (i.e., how hard an athlete is running) as an important training topic in the composition of training cycles. Similar to training volume, Johnson used a similar step method of organizing training intensity. Johnson shared that he uses “fractionalizations” of running velocities that were estimated to be indicative of physiological benchmarks (i.e., physiologically focused training). Johnson provided charts of fractionalizations or running speeds that were percentages of estimated physiological benchmarks. Using the provided charts Johnson stated, “At the end of the summer, [athletes] are running at probably 75% to 80% of their max VO2 capabilities, but then once the season starts they’re going to run at 82%, probably to 85% intensity those first three weeks.” As such, Johnson described a process in which he has athletes incrementally increase their running intensity.
Knowledge of Endurance Running Requirements Influenced Training Decisions

Knowledge of endurance running’s requirements was characterized by Johnson’s knowledge of endurance-running related skills and fitness abilities that were necessary for success in endurance running. I interpreted knowledge of endurance running requirements as sport-specific knowledge, as appeared to be dependent on sport contexts and was exclusive to the sport of endurance running. Additionally, I interpreted knowledge of endurance running requirements to be indicative of “what the coach does,” particularly in training organization and training implementation. Knowledge of endurance running requirements was further elaborated as knowledge of specificity and knowledge of rest.

Decisions on training implementation used knowledge of specificity.

Knowledge of specificity was characterized by specific demands that existed between endurance running competition distances. Coach Johnson shared that in endurance running, while multiple competition events are similar, they are also have distinguishing differences. Coach Johnson accounted for these differences by being attuned to the specific physical demands of the events in which athletes were competing. Coach Johnson particularly commented that the physical demands of an event in which an athlete competes influences how he schedules training during the competitive season. He identified the physiological concepts of “aerobic” and “anaerobic” running, referring to systems that produce energy in the body. Johnson stated:

You have to know the energy requirements of the race that the person is running. That has to be the driving factor. If you’re running the 10K, it's about 88% aerobic and 12% anaerobic and so certainly the driving factor when you’re writing their training is, “Okay, I'm training these guys for the 10K,” cross-country for the men is 10K. Then for the women it's 6K and so it's a little less
aerobic and a little more anaerobic. I'm going to give them a little bit more anaerobic work just because of the criteria.

Johnson also described a similar use of “reference point training” as part of his training organization. Reference point training dictates training paces as a fraction of a race pace (e.g., 80% of 5000-meter race pace). Coach Johnson explained that the reference point could be either a goal pace, or the pace of an athlete’s personal best time in an event. Coach Johnson said he implements training with the intent of preparing athletes specifically for a race in which they compete. In one of our interviews, Johnson stated he provides training that directly mirrors the demands of the events in which an athlete is competing. Gary stated:

[I ascribe to] the S.A.I.D. principle – Specific Adaptation to Imposed Demand. [Athletes] have to be able to sustain a certain effort. If you're trying to be a four-flat miler, then you're going to have to be efficient at running four flat mile pace. If you never work at that pace or faster than that pace then you can never become efficient at that pace. Certainly, I think that's a very important concept and it has to be addressed throughout a yearly training program.

During my visit, I saw several occasions in which Coach Johnson applied the S.A.I.D. principle. In one training session, he explained that he was having athletes who competed primarily in the 800-meter run faster than athletes who ran in longer races in order to provide training more specific to the demands of their respective competition distances. Coach Johnson’s statements on reference point training were triangulated by a video artifact of a 2009 conference presentation, in which he said he formulates summer training by using reference points rather than fractionalizations of physiological benchmarks. In the artifact, he described that he would figure out the goal competition paces of his athletes and have athletes run at 70% of those goal paces at start of summer and progressing to 80% of that race pace by the beginning of the season in August.
However, in one of our interviews, Johnson said athletes who train only at speeds specific to one event are likely not going to be very successful at other meets with competitors who have a wide range of running skills. During my visit, Coach Johnson disclosed use of an organizational technique he called “multi-tiered training”, which had been adopted from a training theory book on endurance running training. Coach Johnson described multi-tiered training as a way to implement multiple training focuses concurrently. Referencing training that focused on either “aerobic” or “anaerobic” training and “reference-point training,” Johnson stated during one of our interviews that he uses both training approaches in every week of training.

During a field observation, an athlete was engaged in a workout where he would alternate between running laps over hurdles with running laps without hurdles. Johnson said he implemented the session in this way so the athlete could prepare for the 3000-meter steeplechase, which involves hurdling, while also training for the specific demands of the 3000- or 1500-meter races, in which hurdling is not involved. In the case of the steeplechase athlete, Coach Johnson organized the workout so the athlete could prepare for two different races, using a multi-tiered training approach while providing for the specific demands of both competitions.

Johnson’s multi-tiered approach was triangulated by two video artifacts. In the video artifact of his 2009 conference presentation, he said any given training week rarely looks like another week, but they still address a range of training focuses. In another video artifact recorded in 2016, Johnson said he is always cycling through multiple training focuses during training. He further said he spends time developing athletes who

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5 Statements that the coach attributed to the book (Martin & Coe, 1997) were triangulated by the book itself.
primarily run the 5000-meter race, developing the ability to run the 1-mile or the 3000-meter race, and that he implements training sessions typically associated with training for the 1-mile run during cross-country in order to develop multiple skills.

**Decisions on training implementation used knowledge of appropriate effort.**

In one of our interviews, Johnson stated:

[I want athletes] to successfully complete the challenge of the workout and to do it at the right level. By that like I can try to monitor if I’m having them do five times a mile repeat and I’m saying I want you to do it at this pace. Then I’m monitoring the recovery heart rates. If the recovery heart rates are not coming down, then I realize maybe they’re running too hard in the workout effort wise. So when I say run at 85% intensity, maybe they’re maintaining the pace of the workout but they’re running at 88 or 90% intensity, and so therefore they’re not recovering in the amount of time that I’ve given them to recover. So I want them to make consistent progress, run the times but also recover and do it at the [correct] level.

The above statement indicated that he wanted athletes to complete work necessary for the training focus of the day. Coach Johnson wanted athletes to engage in training as the sessions are intended so athletes achieve the intended purpose of the training session.

The focus on appropriate effort was indicative of sport-specific knowledge, as it included Gary’s association of effort with athlete behaviors that are specific to running.

During our interviews, Gary stated he also uses measures of heart rate and blood lactate to determine if athletes were training while using efforts appropriate for the desired training outcome. During one observation, Johnson shared the example that if an athlete’s heart rate was between 160-170 bpm, the athlete was likely training their lactic threshold. Coach Johnson could then look at what pace the runner was running to determine the speed at which the athlete would be training at their lactic threshold. The coach reported that he later adjusted future workouts for each individual depending on the appropriateness of the heart rate in comparison with the session’s focus. Gary also
reported taking lactate measures using a handheld lactate monitor in the past, but that he was not currently using that method because his monitor had broken. In the past Coach Johnson has used measures of athletes’ morning heart rates (i.e., the heart rate of an athlete immediately upon waking up in the morning) to assess the extent of athletes’ recovery between different types of workout. Coach Johnson’s attention to appropriate effort in training was triangulated by video artifacts of interviews in 2015 and 2016. The interviews indicated that he has used heart rate to assess the appropriateness of athletes’ training and the rate at which athletes recover in order to account for differences in individual physiological response.

My field observations provided additional triangulation of Johnson’s disclosed use of knowledge of appropriate effort during training implementation decisions. During my visit, I observed Johnson tell an athlete to not “race” the workout, instead instructing him to “just have a solid day.” This interaction demonstrated that he wanted athletes to do workouts as intended, particularly dissuading athletes from running harder than needed and related to training implementation, as he described what he wanted the athlete to do in the training session. Coach Johnson went on to further state:

I could probably get any kid to do our workouts for a week or two weeks or three weeks but you go much beyond that…some are going to be well over-trained because they’ve run way too fast for their fitness level. So I’m trying to get them to do it at the correct intensity, at the right heart rate and make consistent progress.

In the above statement, Johnson acknowledged that some athletes might be able to physically do work that is better suited for athletes with comparatively higher fitness levels. However, he associated these types of efforts with a likelihood of overtraining, or cessation of physical development. His association of appropriate signs of physical
during training sessions indicated a sport-specific knowledge as he described “what” he wants athletes to do in training sessions.

During a field observation, I observed Johnson attuned to athletes’ signs of effort while he also individualized the training for a group of athletes. During a session, Coach Johnson pointed out a girl who was running with a group different from the group with whom she usually trains. Johnson said that he was having her run with them to keep the other girls from running too fast while providing incentive to the girl to run a little faster for the purpose of avoiding what he referred to “pace lock.” Johnson explained to me that by having her run a little faster, he was providing a neurologic stimulus to help her run at faster speeds while also preventing the other girls from running harder than he wanted them to. As such, Johnson provided a training session in which athletes worked together to maintain appropriate efforts despite having different training objectives for the session.

Johnson’s use of knowledge of endurance running requirements was triangulated by a video artifact from 2008 in which the coach was candidly addressing groups of high school athletes. In the artifact, Johnson reinforced his perspective on appropriate training efforts as he urged a group of high school athletes at a camp to adopt a habit of showing up to training sessions and completing workouts as intended, focusing on finishing the workout well. A 2015 video artifact produced by a well-known running community news outlet triangulated Johnson’s desire to have athletes making appropriate effort. In the video, Johnson stated to a group of his own athletes before a workout, “I don't want any workout heroes today, all right? Today you run the paces that you're supposed to run, ok? I know [cameras are] here, don't be doin' anything stupid, all right?” Altogether, Johnson used his knowledge of the appropriate efforts within the requirements of endurance running requirements in his training implementation decisions.
Decisions on training implementation used knowledge of the necessity of rest.

Coach Johnson’s knowledge of the effective use of rest was demonstrated by his application of rest days, or days on which he had athletes refrain from running. He stated during a field observation that he is required by rules set by the National College Athletics Association to hold no practice one day per week. However, he said he does not use the mandatory day off as a regular day off of training. Instead, he shared that he instructs athletes to run on their own without his supervision, which was permissible under the rules. Coach Johnson shared that he usually has athletes run on their own on Thursdays because it is usually the easiest day in their weekly training schedule, and that having athletes train on the easiest day of the week was most appropriate. Johnson added that Saturdays would be another good day for a required day off, but he does not use Saturdays as the required day off in order to discourage “bad behavior” on Friday evenings.

Johnson said that the reason he avoids having athletes take a day off every week is that it equates to seven weeks off over the course of a year. Gary believed that taking seven weeks off, in addition to other scheduled time off throughout the year, would have a negative impact on training. Instead, Johnson would assign days off on a case-by-case basis as athletes need them. His statements on how he handled the mandatory day off was triangulated by my own observations, as he did not hold practice on the Thursday of my site visit. I classified his knowledge of the necessity of rest as sport-specific, as knowledge of the necessity of rest was specific to endurance running. Additionally, Gary’s use of rest days indicated “what the coach did” when determining when athletes should rest when training.
In addition to purposefully providing rest days for athletes, Johnson also shared that he uses recovery times during training sessions in order to facilitate training sessions during which athletes can run speeds that they would otherwise be unable to sustain.

When I asked him how he chooses recovery times during workouts, he said he bases rest times in workouts on the training session’s intensity. He stated:

If you’re running at 85% you are probably going to want to take maybe three minutes recovery [between running bouts]. Whereas if you’re doing lower intensity mile [repeats] with 30 seconds rest, that’s plenty because at the velocities they’re running they’re not accumulating any lactate. When they were doing the faster ones, if you don’t give them three minutes, then they’re going to start to accumulate more lactate during that time and are not going to be able to sustain the quality of the workout because of [physiological] byproducts.

Johnson went on to say that he uses rest time guidelines from sports science literature that has determined appropriate ranges for these recoveries. Gary’s use of sport-specific knowledge in his decisions to use rest during training sessions was triangulated by a video artifact of a 2015 interview where he said he is particularly cognizant of providing rest times that allow the athletes to complete the workout as intended.

Knowledge of Past and Future Competitions Influenced Decisions

Knowledge of past and future competitions was characterized by Johnson’s knowledge of how athletes’ had performed in past competitions and the characteristics of upcoming competitions. I interpreted knowledge of past and future competitions as sport-specific knowledge because the characterizations of competition-centric knowledge appeared to be related specifically to the sport itself, rather than knowledge that could be characteristic of out-of-sport contexts. Additionally, knowledge of past and future competitions was included in “what the coach did” when providing training based on past performances and upcoming competition characteristics.
Knowledge of past performance influenced decisions regarding competition planning. In the present study, I interpreted “competition planning” as creating strategies or tactics for use by athletes in competition. One interview indicated that Coach Johnson used knowledge of past performance to influence future competition strategy decisions. Johnson said using knowledge of past performance to develop competition strategies involves trying different race strategies over multiple competitions in order to determine athletes’ strengths and weaknesses and to discover effective racing strategies. After trying a strategy, if the athlete was not successful, Johnson said he might suggest a different tactic and compare the athlete’s success between the two strategies, possibly using the more successful tactic more regularly in competition. However, he added:

[We won’t give up on a failed strategy] just because they didn't have success with it the first time, maybe they got scared, and we talk through, and then maybe we'll do it again…We try to figure out, is it a physical limitation? Is it a mental limitation? Is it a physiological limitation?

Coach Johnson added that the process of understanding past performance often involved sitting down with an athlete after the race to discuss how the race plan went. Eve and Rachel (pseudonyms), two athletes who were interviewed in the study, provided triangulation for Coach Johnson’s race strategy process by stating:

Rachel: If you're doing an 800-meter and you went out pretty slow and then had way too much [energy left] in the last 400 he knows you can [start the race] a little faster and run a faster time.

Eve: If he sees you dying towards the end, he knows that you went too hard. He'll tell you in the future to hold back a bit so that you can kick better and finish stronger.

Johnson’s use of knowledge of past performances in his decisions for competition planning was triangulated by a video artifact of a 2013 interview. In the interview, an interviewer commented that his team looked “completely different” between the
conference championships, where Coach Johnson’s team lost, and the national
campionships, where Coach Johnson’s team won. Gary said his athletes were not
mentally well prepared for competitions that happened earlier in the year, including the
conference championships. Coach Johnson added that he used his team’s past failure,
particularly at the conference meet, to refine their approach to the national
championships, which they won.

Further evidence suggested that Coach Johnson used knowledge of the
characteristics of future competitions in competition planning decisions. Coach Johnson
stated:

Things that [athletes and I] talk about would be, "Hey, I've studied this other
athlete and he's the top athlete in there, and this is his tendencies, this is what he
likes to do. He likes to push the pace," or, "He likes to do this," or, "He likes to
kick." Then you try to formulate plans to beat somebody like that.

I think that I try to really look at each [athlete] and say, "Hey, these [opponents]
have this tool, the way to combat it is to use this tool"... We're always trying to,
on a daily basis, develop different skillsets, so that way when we get to a big
meet, that when we start to look at strategy that they have a few different ways to
become successful.

The influence of Johnson’s knowledge of competition characteristics on
competition strategy was triangulated by several collected artifacts. In an 2013 interview,
he commented on how the very nature of a competition itself affected his athletes’ race
plans. In the instance pertaining to the 2013 interview, Johnson was preparing to compete
in a meet with teams from a larger competitive division. He told the interviewer that
before the race he and the athletes would talk about race management or strategy,
especially since that race was different from what they were normally used to. Coach
Johnson went on to specify that the starting pace of the overall field would be much faster
than what his team was used to experiencing.
In another video artifact from a conference championship race in 2012, Johnson stated in a post-competition interview that during that regular season he would sometimes have his only senior woman (and fastest female runner) hold back and run slower than she was able in order to help other athletes on her team run faster by keeping them on pace. However, on that day he had told her to get out front, push the pace, and win a conference title. In this example, Johnson used his knowledge of the competition’s importance to the individual in creating a strategy that focused on the athlete’s pursuit of winning a conference title.

In another video artifact of a post-national championship race interview in 2007, Johnson said he had an athlete whose skills, although best suited to the 1500-meter race, compete in the 800-meter in order to get additional team points. Coach Johnson said the rationale for that decision was that the national championships is a “team” event in which he needed athletes to step into different roles in order to help benefit the team as a whole. In this example, Johnson used his knowledge of the competition’s importance to the team in his decision to assign an athlete to run in the 800-meter.

**Theme #3: The Coach Used Pedagogical Knowledge to Make Decisions**

The word “pedagogy” was not used by the coach in the present study at any point. However, similar to Abraham and colleagues (2006), evidence related to knowledge used for the effective development of the athletes’ abilities as endurance runners, “acquiring skill” as identified in this study’s framework (p. 562). Further analysis and interpretation of pedagogical knowledge sources was conducted through an application of prior literature on pedagogical knowledge using the “editing” style of analysis (Crabtree & Miller, 1992). The present instrumental case study used the Coaching Schematic
(Abraham et al., 2006) as the instrument to frame its findings. However, the Coaching Schematic has been predicated on the work of Shulman (1986, 1987), which has been subject to divergent interpretations (e.g., Nash & Collins, 2006; Ball et al., 2008).

Shulman originally separated pedagogical knowledge of “principles and strategies of classroom management and organization that appear to transcend subject matter,” from knowledge of both “learners and their characteristics” and “educational contexts” (p. 8). In coaching, these typologies could be interpreted as design, organization, and development of practice tasks while coaching, knowledge of athletes, and knowledge of team-specific influences. However, a more recent interpretation of Shulman’s knowledge typologies by Ball et al. (2008) retitled them “knowledge of content and students” (KCS) and “knowledge of content and teaching” (KCT). Ball et al. placed “knowledge of content and students” and “knowledge of content and teaching” within a new interpretation of Shulman’s (1986) original pedagogical content knowledge (PCK) typology (p. 403), a map in which “pedagogical knowledge” is excluded. Ball et al. further comment on PCK, stating that it “is often not clearly distinguished from other forms of teacher knowledge, sometimes referring to something that is simply content knowledge and sometimes to something that is largely pedagogical skill” (p. 394). Ball et al. further argue that the placement of KCS and KCT within PCK is justified, as they believe the placement coincides with Shulman’s two central dimensions of PCK. Shulman (1986, 1987) identified that PCK is influenced by “the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons” and “the ways of representing and formulating the subject that make it comprehensible to others” (p. 9).
Similar descriptions of pedagogical knowledge by Abraham et al. (2006) are offered, as they defined pedagogical knowledge through the following participant quotes:

You’ve got to be able to understand how to construct the practice and increase the information load appropriately ‘til it becomes realistic and full on…You have to be able to communicate with players in a way that they believe in the, you know, they believe in your knowledge. (p.559)

In comparison, Shulman’s (1986) described dimensions of PCK adopted by Ball et al. (2008) and the described dimensions of pedagogical knowledge by Abraham et al. (2006) are similar in their focus on acquisition of skill and ability to make sense to individuals. Additionally, the acknowledged inconsistency in the definition of PCK allowed for a reasonable interpretation that pedagogical knowledge, as conceptualized by the Coaching Schematic, can be further described in terms of pedagogical knowledge of “how to coach endurance running” and pedagogical knowledge of “how to coach his athletes” similar to the KCT and KCS typologies postulated by Ball et al..

Taken together, in the present study, my interpretation of pedagogical knowledge was influenced by past literature on teaching and coaching knowledge. Within the present data, pedagogical knowledge consisted of two second-order themes: “knowledge of endurance running and coaching” and “knowledge of endurance running and individuals”. The following sections identify these pedagogical knowledge subthemes and how they fit into the coach’s decision-making process.

**Knowledge of Endurance Running and Coaching Influenced Coaching Decisions**

Coach Johnson demonstrated his knowledge of endurance running and coaching during my visit. I interpreted knowledge of how to coach endurance running as knowledge used for coaching endurance running that appeared to be part of the coach’s
“wholesale” approach to coaching. Knowledge of coaching endurance running was knowledge the coach found important for coaching endurance running that was applicable to coaching, regardless of who was on the team. Deductively, I interpreted, knowledge of endurance running and coaching to be pedagogical knowledge because prior characterizations of pedagogical knowledge have included the application of context specific settings in teaching as pedagogical (e.g., Ball et al., 2008). Furthermore, I characterized knowledge of endurance running and coaching as pedagogical because of its consistency with Nash and Collins’ (2006) characterization of pedagogical knowledge as knowledge that describes “how the coach coaches.”

**Decisions on how to cultivate team environment were influenced by the adoption of values and attitudes.** I interpreted cultivation of team environment as actions the coach took to create and maintain a necessary environment for success in endurance running. Evidence indicated that Coach Johnson’s commitment to excellence and creating a team where all of his athletes felt like they belonged and contributed to the team characterized values and attitudes necessary for successful endurance running.

Interpretations under different frameworks might characterize the knowledge of values and attitudes as knowledge of the context of learning (e.g., Shulman, 1986). However, I interpreted the coach’s values and attitudes as a form of pedagogical knowledge because the coach appeared to use them to get athletes to fully engage with what he knew to be necessary for success in endurance running. Additionally, the purposeful cultivation of attitudes and values by the coach is consistent with explaining “how the coach coaches.” Evidence suggested that the use of purposeful cultivation of values and attitudes by the coach was integral in moderating athletes’ development. The coach employed knowledge of necessary attitudes and values by creating an environment
where athletes would be most engaged in the work needed for the athletes’ success. The following sections provide evidence of how the coach used shared values and attitudes to engage athletes.

**The coach fostered an attitude of commitment to excellence when cultivating his team’s environment.** During the visit, Coach Johnson said that a commitment to excellence is importance in coaching distance running. Evidence suggested that he considered a commitment to excellence generally applicable to all athletes as he spoke about the importance of such a commitment in general terms without indicating belief that it is necessary for some athletes and not others. As such, Coach Johnson appeared to purposefully create a team environment that focused on a commitment to excellence because it was necessary for athletes to learn how to become the best runners that they could be. Johnson described what he meant by “excellence”, stating:

[We] set the bar really high…very seldom probably anything in this life is 100 percent, but I think we're getting closer than a lot of other people…I think that if you're saying only a hundred percent [is excellent], then I think kids would find it hard to measure up to that bar. When we're striving for excellence, we're okay with them just doing their best at trying to do that, then I think that they see the value in it. They see that we appreciate that…a lot of times, you don't always have to hit a hundred percent, you just have to hit one percent more than another team does.

Johnson went on to describe in more detail what excellence looks like to him and its importance to endurance running success, stating:

I think that a lot of programmes overemphasize [achieving personal bests.] I think we probably put a good emphasis on that, but we also put a great amount and emphasis on “Let's try to win.” There's no shame in trying to win, and I think that sometimes people say “Oh, that's maybe too much pressure,” or whatever. I think, unless you truly aim for that, then you never put your back against the wall, and I think people fight hardest and perform best when they have to. I think the teams that truly have the best chance to win are ones that kind of draw a line in the sand and say this is what's acceptable, on the other side it's not. I think that kind of psychology benefits our program.
Johnson stated further that in his program, there is just as much emphasis on winning a conference or national title as there on running fast and continually improving. Coach Johnson went on to specify that “winning” is not mutually exclusive with finishing first at a championship meet, stating:

I think that [winning is] putting your best foot forward to try to win. I’ve told kids all the time, “Our goal is to try to win, we might not win, and I'm okay with that, but what winning should be is that you're turning over every stone physically and mentally between what you're good at, what the other people are not good at, and trying to impose your will.” I think that kind of psychology is putting your best foot forward, and that's winning, right? Not so much the place, but [the feeling that] I've done everything [to try to win]… In distance running, it becomes very painful sometimes, and a person who's not confident will certainly back out of that or give up before a person who has made such an ultimate commitment. I think that's the psychology of winning distance running.

In short, Johnson defined excellence as a continual striving to do the best that one can do while also trying to win competitions. He further defined “winning” not exclusively as beating other teams, but as doing everything that one can do to win competitions.

The assistant coaches and athletes interviewed in this study triangulated Coach Johnson’s values and characterizations of excellence. Coach Johnson’s assistant coaches, Drew and Chris (pseudonyms), shared that while a main goal of the team is to win the national title every year, individual progress and improvement are also emphasized. Eve added in our interview:

The main goal every year is nail it at Nationals because it's such a huge tradition of excellence, that every year the automatic goal is to win nationals no matter what. Everyone knows that and works towards it… [Coach Johnson regularly reminds us] to achieve excellence no matter even if you don't make the cross-country team for nationals, you improve [as a runner].

Johnson’s athletes, Luther and Thomas (pseudonyms), supported the team’s focus on excellence, further stating:
Luther: In general, I think everyone improving from where they first started, or when they first got here is the biggest goal that we all have as a team, is just to improve… just the whole in general from the fastest person to the slowest person. Just everyone improving.

Thomas: That's for the people who are on the team and the people who don't make Nationals as well. Each [person] is important.

The emphasis on using a commitment to excellence was additionally triangulated by collected artifacts including goal sheets that had been created by the men and women’s cross-country teams from the fall prior to the site visit. The goal sheets indicated what their self-declared goals were for the 2016 cross-country season. These sheets supported the importance of topics contributing to excellence further with the following statements from athletes:

- “Win Nationals,”
- “Be excellent at every meet,”
- “Win conference and regionals,”
- “6 All-Americans,”
- “All girls, All-conference”
- “Be a better person, runner than last year, be better every day,”
- “Defend National Championship.”

Video artifacts of interviews dating from 2008 to 2015 triangulated the team’s focus on excellence. In these interviews, Johnson articulated the importance that winning a national title has for his program. However, he also emphasized that excellence and success include successful contributions to the team by all its members in whatever way they are able.

_The coach fostered feelings of belonging and contribution when cultivating his team’s environment._ During the visit Johnson stated, “I think that when [athletes] feel like they're part of something big, or a part of something bigger than they are, then it's easy to give [their best effort].” He went on to state, “Kids crave being wanted, needed and appreciated…I think if they feel wanted, needed and appreciated, then they will do
just about anything they can humanly possible to help do something that they believe in”.

This statement identified two values that were important for coaching endurance running: athletes want to feel like they belong to the team (i.e., belonging), and athletes want to feel like they are meaningful contributors to the team (i.e., contribution.) Furthermore, I interpreted the importance the coach placed on athletes’ feelings of belonging and contribution as pedagogical knowledge of “how to coach endurance running”. I justified my interpretation through the coach’s implied connection between feelings of belonging and contribution and their moderating influences on athletes’ willingness to do the work necessary for success. In essence, cultivation of feelings of belonging and contribution were used to teach athletes how they were to engage with their training. Furthermore, the coach’s knowledge of the necessity of creating feelings of belonging and contribution appeared to be inclusive of how he taught athletes how to be successful runners.

Evidence suggested that Coach Johnson considered fostering feelings of belonging and contribution to be generally applicable to all athletes as he spoke about the importance of a feeling “wanted, needed, and appreciated” in general terms without indicating that it is necessary for some athletes and not others. Coach Johnson went on to describe how he fostered feelings of belonging and contribution on the team.

Statements by all interviewees during the visit suggested that Coach Johnson purposefully facilitated feelings of belonging by creating a close-knit team. Johnson stated:

I think that one of the things we like to do in our programme is build a family culture, a family atmosphere. One of the sayings that I say to kids all the time is “Do it for something bigger than yourself.” I think that there are a lot of times you will do things for family that you won't do for other people. I think the more we can create a family culture and dependence, then I think it's a positive thing. Even with family, sometimes you have to get on them, but they always know that “Hey, we’re family. We’re going to stick together and we’re going to be through it thick
and thin.” I think that makes that constructive criticism a little bit easier process because they never question that they’re still part of the family.

Perspectives shared by the athletes triangulated Gary’s statements. Thomas stated:

“Everyone wants themselves to do really well, but [they] also want everyone else on the team to do really well. Everyone works together… I think we all get along very well. And we all have a really good laugh together.”

Eve and Rachel added that they felt that the team was encouraging, supportive, and worked to motivate team members in a way that made athletes feel valued. They said Coach Johnson adds to that environment by encouraging and supporting everyone on the team. Eve and Rachel shared that one of the ways Coach Johnson supports everyone is by highlighting the positive performances of everyone on the team in front of the team; Eve and Rachel’s statement was triangulated when I observed the coach doing this very thing during my visit. Eve and Rachel stated further that the support they experienced on the team made them feel like the team is part of themselves. They added that they also felt like each of them made a difference to the team as individuals, and that feeling like they are part of a team motivates them to run harder and do big things for the team.

Evidence suggested that while Johnson’s attention to athletes’ feelings of belonging was likely part of his innate personality, his facilitation of a close-knit team was not serendipitous, but rather was a purposeful part of his coaching. He shared ways that he tried to cultivate the close-knit culture within his team:

Sometimes a kid will come to practice and they will have an issue. Their mom and dad are getting divorced. Their mom has cancer and their dad is in prison. You come across all these real-life situations, and I think that if an athlete feels like they can trust you as a coach and you’re fostering this, “Hey, you can come in here and you can share stuff and I'm still going to help you and work with you,” then you build loyalty. I don't think that happens just in one sit-down setting, but it's just a constant, everyday assurance that kids feel comfortable and that can do that.
Luther and Thomas said Coach Johnson directly contributes to the close-knit atmosphere of the team by getting to know athletes on a personal level and by spending as much time as athletes need talking as it fits into his schedule. Luther and Thomas both said Johnson would welcome athletes who were not able to go home during the holidays. Luther added a personal story:

Because I'm from California, my family wanted to visit at Christmas, so they came to here and Coach invited us all and we all got together, had really good bonding moments and stuff. My family came over here to his house for Christmas [and] he like engaged in conversations with my family, and got to know them more and got to know me more at the same time. So it was pretty nice to have that...For him to get more involved in my family and know my background, it just helps. He gets to know me as a person and as a runner as well.

Chris further triangulated the personal attention that Coach Johnson provides his athletes, stating:

If there's ever an athlete [whose] family member that passes away or that kind of thing, he'll pull them into his office and talk to them and just have a good talk with them ... He'll call athletes in and talk to them about it and then in a team meeting, he'll bring it up and be like, “Hey, so and so, this is what they're going through. Please help them out. Just make them feel better. Show them your support.” That kind of thing. So he's doing that for them in those aspects.

Chris added that Coach Johnson’s level of personal investment in his athletes is particularly helpful in learning about athletes’ personal traits and characteristics. Drew added to Chris’ statements about the coach’s personal relationships with athletes, stating:

[Gary’s] always in meetings with kids. If anybody needs anything, he might not have time right that very second to sit down and give them one-on-one, undivided attention, but he'll schedule a time, he'll say, “Come back in at this time and we can spend 15 minutes.” He'll close the door and ... he'll come out from behind the desk and sit next to them and the kids just call it the eyeballs, because he'll give them the big eyeballs and almost uncomfortably direct eye contact sometimes, and really listen to them and make sure they know they're heard... I think it's a reflection of Gary’s values, because when you talk to him behind closed doors, it's not like he changes as a person, it's the same talking to the team as it is like us coaching staff. I think that's what it reflects off of.
During my interviews with Coach Johnson, support of his commitment to creating athletes’ feelings of belonging was readily apparent. In his office, he had reminders of athletes with whom he has worked over the years: a senior-year art project from an art major with a running-centered theme, framed pictures of him and athletes displaying post-competition smiles at meaningful races, and a clock containing the shell from the starter’s pistol from the race in which the athlete won a national championship. Inside the clock was inscribed, “There is only one thing more precious than time, and that’s who we spend it with,” a statement adapted from the poet Leo Christopher. At one point, Coach Johnson walked me around the room showing me these mementos of his athletes, sharing stories of their accomplishments, stating that he displays these because he is proud of them and all that they have accomplished. In short, additional trustworthiness for the statements of the interviewees regarding Coach Johnson’s personal attention to his athletes was present.

Finally, the close-knit dynamic of the team was triangulated further by collected goal sheet artifacts. Team goal sheets created at the beginning of the season by athletes on the men and women’s teams further depicted a team where athletes felt like they belonged. Statements on these sheets included the following quotes:

- “Be supporting always”
- “Team bonding”
- “Make team a priority”
- “No women left behind”
- “Be a brother (treat with respect, have their backs, love them; support them, be understanding)”
- “Have pride for the program!”

Evidence suggested that the coach created a close-knit environment where athletes felt they belonged, and that feelings of belonging contributed to athletes’
engagement on the team. Coach Johnson said he thinks a “bigger than self” attitude helps motivate athletes to engage in the necessary work needed for excellence. Coach Johnson described the “bigger than self” attitude:

I think that when they feel like they're part of something big, or a part of something bigger than they are, then it's easy to give [their best effort...Kids crave being wanted, needed, and appreciated...I think if they feel wanted, needed, and appreciated, then they will do just about anything they can humanly possible to help do something that they believe in.

Drew added his perspective, stating: “I think almost everyone wants to do well, but they want to do well because they want the team to do well, and they don't want to let their teammates down.” Drew went on to reference a speech Coach Johnson gave to the team once where he said that athletes should want people on their own team to do well, and if someone is going to get second place in a race, that they should want the winner to be from their own team. Drew contrasted the attitude of Schell’s team with other teams where some athletes might be happy because they were the first runners on their team that day, even if their team finished last. As such, comments from the assistant coaches indicated that Coach Johnson influences athletes to place the needs of the team above their own wants in order to pursue excellence in its various forms.

Five video artifacts showing statements from Johnson from 2008 to 2015 triangulated his emphasis on a “bigger than self” attitude. In these five artifacts, Johnson emphasized the importance of a team-before-self mindset, stating that on his team, past national champions “had set out to do something for their program.” Johnson said the national championships his team has won represent hundreds of athletes and emphasized during a team reunion that being on the Schell’s University team does not end with an athlete’s last race; it stays with them “in their soul” for a lifetime.
Additionally, five other video artifacts of past athletes sharing their perspectives were also found representing athletes in interviews conducted between 2008 and 2015. Athletes shared perspectives of “not wanting to let the team down,” further sharing their excitement for working as a team, success as a team, and future improvement as a team. One athlete gave credit not to a single star athlete, but to their “contingency of 5-7 [athletes] who all contribute to the team.” One athlete in a nationally televised news feature in the early 2000s reiterated what emerged from my own interviews and observations: “You have to do something not for yourself, but for something greater than yourself.” Taken altogether, the evidence suggested that feelings of personal contribution were fostered within the team to engage athletes.

**Decisions on competition planning were influenced by knowledge of goals.**

During the visit, evidence indicated that the coach's competition planning decisions were influenced by his knowledge of goals that he would use with athletes.

I interpreted the coach’s knowledge of goals as a form of pedagogical knowledge because goals were used as a way to get athletes to compete effectively while continuing to encourage long-term development as endurance runners. As such, goals were interpreted to be partially representative of “how the coach did what he did” when it came to competition decisions. Furthermore, goals were interpreted as a pedagogical knowledge of endurance running because the use of goals was a wholesale part of his coaching approach.

Consistent with the findings from the validation of the Coaching Schematic, the coach in this study set goals that were focused both on processes and outcomes. Abraham et al. (2006) shared one coach’s perspective:
Well, if I want to keep my job we have to win medals at major championships. So no matter what other ideas you have when you come into a job that is focused around that, you need to win medals…I try to think, and most of my colleagues try to think that it [the programme] is centred around the athlete because if the athletes don’t win medals, we have no programme and we are out of a job. We try to satisfy the athlete’s needs. (p. 555)

This perspective was similar to that of the coach in the present study, who focused both on outcome goals such as winning championship titles, and process goals during racing such as executing individually appropriate race plans.

In an interview, the coach mentioned that winning national championships is what they are judged on, both by the university and by alumni of the program, and it is therefore an important goal for the team each year. Drew and Chris supported the importance of winning national championships as a main goal of the team. However, they also added that pursuing national titles was not done at the expense of personal improvement of individual athletes. Chris added that performance goals were set so that athletes would be able to focus on their own performances.

Evidence indicated that the coach purposefully spent time planning competition strategies to help athletes focus on personal performances, and that the coach’s knowledge of goals influenced his competition strategy decisions. In one of our interviews, Johnson stated:

One of the things that I do a lot...is I sit down with every single kid when we go to a meet and I give them race plans. I talk to them about executing what we set out for them. I think this is particularly helpful with a lot of the young athletes to start with, and even some of the older ones. It gives them a sense of confidence, and it's not always just one exact plan, sometimes it's one or two plans depending on how the race unfolds…

In another interview, Johnson described why he takes the time to provide individual race plans, stating, “I think it's very beneficial in [athletes’] development with the psychology of what's going to happen [in a race]...It gives them an idea to think about
[the race] and not just [go] into races with an unknown.” He further commented on how race plans are created, stating:

We talk about [the athletes’] effort to execute a plan to maximize their own strengths. I think that's very much based on execution of what their skillset is. I think that when we talk about that, it gets them focusing on the things that they can control, and I think that's been a good mindset.

Coach Johnson said he wants athletes to feel confident, not only with their race plans, but also with adapting or changing those race plans if circumstances require it. He further explained:

We're developing different components all the time and trying to realize, “Okay, this is what [the athlete is] best at. We've worked at one thing, but the athlete might be better at something else, so we're going to try another thing.” As we sit down in that 5- or 10-minute race strategy, we're talking about these kinds of issues and trying to give [athletes] clues and scenarios…”If it unfolds this way, then you do this. If it unfolds this way, then you do that.” That way, it's not like they get out there and something happens and then they don't know what to do. We've kind of gone through all the different scenarios.

Johnson’s race planning process showed a particular focus on how the race plan will mentally prepare his athletes. While Johnson wanted the athletes to learn skills so that they can race better, he also wanted them to be confident about the race. He commented further on why he thought race planning was so important:

I think [race planning] gives an athlete a certain confidence level that they go into a competition and they fight much harder because they're confident that they've not just done the physical part [of training], but they've done the mental part, they've done the nutrition part, they've done the sleep, they've kind of committed. I think that the higher the commitment, the more the backbone of the athlete to fight when it becomes that crunch time.

While Coach Johnson shared that he would plan races so athletes can accomplish competition goals, he also shared that sometimes the primary focus of a race was use as a training technique with the goal of improving athletes’ racing skills. Gary stated:

[One] reason [athletes] race is to hone their skills. Sometimes we won't talk so much about [the race's outcome], but maybe we're going to learn how to be a
more proficient kicker. I'm not really worried about the pace, I'm just more worried that they execute a strategy to kick and learn that skillset. Sometimes I might give them a race plan to, “All right, we're going to see how much you can lead from the front and still be able to sustain a good effort at the end,” and so we teach them that skill.

He went on to say that sometimes he may have athletes run in shorter, faster races because they will get a better speed workout in that setting than they would during a training session. He went on to say, “[Racing is] part of their development and developing a certain component of their own fitness that's going to help them in a race later on.” During my observations, he was preparing a female athlete who would be running in the 1500-meter, although she was primarily a 5000-meter runner. Coach Johnson shared that in this instance, the purpose of the race was to provide additional training for the neuromuscular development of faster speed. As such, the coach used knowledge of training techniques when planning competitions.

Luther and Tim indicated that while competitive goals were a high priority, they did not come at the expense of their overall improvement as endurance runners. Drew and Chris additionally said Johnson’s attention to each individual athlete provides individual progress in order to develop athletes to their full potential. Coach Johnson said some of the things he looks for that are indicative of physical development include athletes being able to run at higher intensities but without more effort, and also seeing athletes continually get stronger to meet the demands of the race. Likewise, Johnson also wanted to see athletes improve psychologically through increased confidence and toughness during workouts.

Johnson’s practice of providing individual race plans was triangulated by a statement in video artifact from 2010 of a pre-championship race interview where Johnson said that he challenges athletes to execute individual race plans. Taken together,
the coach used knowledge of goals to influence how he made competition decisions. Some goals were focused on winning competitions, while others focused on athletes’ personal performance or long-term development as endurance runners.

**Knowledge of Endurance Running and Individuals Influenced Coaching Decisions**

Coach Johnson demonstrated that he uses knowledge of endurance running and individuals when making coaching decisions. My interpretation that knowledge of endurance running and individuals was characterized as pedagogical was influenced by the application of Shulman’s work (1986, 1987) by Ball et al. (2008). I interpreted knowledge of athletes as pedagogical because of its fit within Ball’s adapted framework of the nested relationship of knowledge of content and students under pedagogical content knowledge. According to Ball, pedagogical content knowledge in the literature is sometimes indistinguishable from pedagogical knowledge. Additionally, raw data within the thematic analysis of the Coaching Schematic’s knowledge typologies characterized “pedagogy” as “creating understanding” and “how people learn” (Abraham et al., 2006, p. 556). The following sections indicate that both creating understanding and understanding individuals were present in the coach’s decisions and were thus characterized as pedagogical. Knowledge of endurance running and individuals was further distinguishable by the coach’s knowledge of an athlete’s individual characteristics, circumstances, and communication style.

**Decisions on training and competition were influenced by knowledge of athletes’ individual characteristics.** During the visit, Coach Johnson displayed and shared his perspective on the importance of individual attention during coaching. Evidence showed that he was particularly attuned to “physical abilities”, “personality
characteristics”, and “individual circumstances” of his athletes, and that he used these knowledges of each individual during the coaching process. The following sections describe actions taken by the coach used to learn the individual characteristics of his athletes, as well as how he used knowledge of his athletes when making coaching decisions.

*The coach learned about and used knowledge of the physical abilities of his athletes when organizing and implementing training.* Coach Johnson said he tries to understand the individual characteristics of his athletes by attending to the physical abilities of his athletes. In one interview, Coach Johnson talked about the importance of knowing how to work with different types of athletes, stating:

I think when you have somebody that is a freak physically, which we've had some, and sometimes you have somebody that's just superiorly fit, you can tend to make a few, I don't want to say mistakes, but [mistakes] doesn't seem to affect them. Whereas with a developing athlete that maybe has talent but it needs to be developed a little bit more physically, if you make a mistake with them, it can be devastating.

Johnson went on to say that one way he developed his understanding of individual athletes was through trial and error, and through getting to know athletes intuitively. He said he particularly tries to understand the sources of athletes’ limitations when they have trouble. He stated:

What we start to do right away is we start to assess, “Hey, are you doing this, are you doing that?” We start to try to figure out why they're not improving. Training at this high altitude and training hard really can predispose people to being anemic. We're talking to them about their nutritional requirements to stay strong with their iron levels and things of that nature. If they're not running well because they're not getting enough sleep, or they're not running well because they're training a little too hard and they're spending too much time, we start to try to assess why they're not improving.

Johnson’s use of multi-tiered training contributed to learning athletes’ physical abilities. He further explained the multi-tiered approach, stating, “We're developing
different components all the time and trying to realize, ‘Okay, this is what [an athlete is] best at. We've worked at [one thing], but somebody might be better at this so we're going to try [something else].’”

Evidence during the visit suggested that Coach Johnson used knowledge of athletes’ physical characteristics to individualize training for his athletes. During my visit, he said that he uses a basic training approach for most athletes and adjusts it for individuals based on their physical abilities. My interview with Drew and Chris triangulated Johnson’s individualized organizational approach, adding that training can look very different depending on the characteristics of the athletes on the team. Drew stated:

Gary changes things a little bit depending on the team. My first year here, we had a lot of older guys. The core group of the team was three or four guys who were all sub-four-minute milers [who also ran 13:30 to 13:40 [in the 5000-meter]. The following year we had a lot of younger guys, and Gary definitely didn't train them the same way. The focus wasn't the same just because you're talking to a different caliber of athletes and different level of runners.

Chris added, “The core development remains constant, but the people that are within it change. So [Gary] has to approach them differently, and train them a little differently,” indicating that Johnson balanced knowledge of “how to coach” with knowledge of individual athletes. This approach was further triangulated by statements in Johnson’s 2009 conference presentation when he said he adjusts training workloads according to the sex and age of his athletes. As such, pedagogical knowledge of coaching and individuals through the coach’s knowledge of athletes’ physical abilities, and pedagogical knowledge of coaching endurance running through knowledge of “how to coach” influenced training organization decisions.
Further evidence suggested that Coach Johnson used knowledge of athletes’ physical abilities to individualize his training implementation. He stated in one of our interviews that individualizing training produces better teams by getting more individuals to reach their full potentials. Coach Johnson added that individualized training can make the difference between winning and losing championships. He stated:

I really believe that you have to individualize a little bit of everything. If you don't, then you're not going to have teams consistently perform at a high level, you're not going to have individuals perform at a high level…If you don't customize a little bit then you're going to miss people that maybe could score a point, or three points at a national meet that can be the difference in your team winning or not winning.

Johnson shared that one way he individualizes training sessions is by using knowledge of how long it takes for athletes to recover from hard training sessions. He said he will often assign athletes workouts that are different from their peers because he knows that they are likely not yet recovered from an earlier day’s training. He stated:

If I give athletes too hard of a stimulus, then they’re going to fatigue too much and they’re not going to get back up to their old fitness level or [adapt] before the next training stimulus. That’s the artistic part because for some kids, that might be 24 hours. For some kids it might be 48. Some might be 96. So [it is important] to understand that with your athletes.

Luther and Thomas shared that they have experienced Coach Johnson’s individualized approach in their own training. Thomas stated:

Before I came out here, my endurance background was very poor. So especially when I first came here, he'd give me a lot longer recoveries in between repeats and less repeats to do. [He wanted to] make sure the quality is still there, but I'd just do much less quantity. So I've just been loading up, I've been catching up on everyone slowly. So that's how he asked me to do it. So he looks at the athlete's style and he plays to those strengths.

Luther commented further on how Johnson had individualized things for himself, stating:
For me, being a transfer, last year was my third year as a college runner, I guess, so he kind of knew my old coach as well, so he got a better background of how I am. He knows I'm [better at running] longer distances...my endurance was high, but not as high as it should [have been]. He helped me build that up and just add more mileage and more mileage in workouts. My repeats before I would do 3 to 4. Now I can do 5 to 6 reps. So it was just kind of increasing slowly. It's not drastic, but he gets us up there and helps us step by step to build up each year. Because now I'm running more than I did last year.

My field observations triangulated Johnson’s statement that he differentiated training between athletes. During one field observation, the training session was started by Chris, the assistant coach. Holding documents with details of the training session, he stated, “We have a whole lot of different things today!” He went on to tell different groups of athletes what their workouts would be for the day’s session. I collected documents used to communicate to athletes what they would be doing during training sessions. The documents displayed multiple running volumes and intensities for different groups of athletes, further triangulating the statement that training implementation was differentiated.

During one of my field observations, Johnson said that while he uses physiological guidelines to implement training, he only uses them as they apply to individual athletes. He went on to say that he did not think scientists are good coaches because of their inability to get to know individuals and be artistic in the way that they adjust training. He further stated:

Yeah. I think [coaching is] very science-based. It’s very much artistic depending on listening to the athlete and when they’re ready to be applied the next hard training cycle...You have to realize that when you're coaching a student-athlete, they might have a certain amount of leg fast-twitch fibers and slow-twitch fibers, they might have a different chemistry. You can't become a world-class elite middle-distance runner unless you can produce maybe 15 to 18 millimoles of lactate. Well, a longer distance runner doesn't have the ability to do that. A lot of times people think, “Oh, it's just down to fast-twitch fiber, or lung capacity,” but then it's also a little bit related to blood chemistry, biomechanics. When you realize that you're coaching these different individuals, they're all created
differently. I think where the art part of coaching comes in is understanding that and being able to relate maybe your philosophy but tweak it to where it works for each person.

Johnson’s use of an individualized approach was triangulated in a video artifact of a 2015 interview where Coach Johnson said he has men and women varsity runners do different workouts, and that he has non-varsity runners do different workouts than varsity runners under the rationale that these groups need different types of training. In sum, evidence suggested that the coach assessed and used knowledge of his athletes’ physical abilities when organizing and implementing training.

**The coach learned about and used knowledge of the personality characteristics of his athletes during training and competition.** Evidence suggested that Coach Johnson also purposefully tried to learn about the personalities of his athletes. When I asked him what he looks for when getting to know his athletes, he stated:

I think that when they get challenged with a particular workout, how they respond to it. When it gets tough, do they keep their hand over the fire? Can they continually push themselves or when they start to get fatigued a little bit and it starts to get a little hard, do they back away from that?

Johnson said he associated the above characteristics with athletes who were more confident than athletes who did not exhibit those characteristics. He stated further:

I think it has a lot to do with confidence. [Athletes ask themselves] can I really handle this? Physically, am I going to be able to push myself and be hurting and continually stay at it? The focused athlete, the one that can do that, is a confident one and typically performs really high consistently. The one that backs out of it is very inconsistent sometimes and they have one good week and a bad week. Typically what happens with that is that the bad weeks typically follow more the higher pressure situations like the conference meets, the big meet, the national meet. Whereas the person [who] is more confident that is always consistent that foundation of mental strength allows them to sometimes think, “Okay, I’m just going to go deep into the well.” You’ll always want to think its physical development and the better person wins, but sometimes it’s the person who fights the hardest. You find this with long distance running a lot.
During my observations, Coach Johnson assessed athletes’ personality characteristics through observation of their demeanor and body language during training sessions. In multiple cases, I observed Johnson intently watching athletes who were bending at the waist with their hands on their knees after running efforts. He commented that he watches athletes who display that kind of body language carefully to make sure that the athletes are not overexerting themselves. In one instance, Johnson pointed out a male athlete who seemed uncharacteristically solemn, stating, “I watch those really closely” and told me that uncharacteristically subdued moods may tell him that something is wrong. Coach Johnson used his knowledge of an athlete’s mood and body language to understand their individual characteristics. Personality traits of interest to the coach included demeanor and body language during training. The coach particularly identified that he looks for deviations between his athletes’ characteristics and personality characteristics that he considers congruent with good performance. Overall, evidence suggested that the coach assessed athletes using multiple knowledge sources to better understand athletes’ personality characteristics.

Coach Johnson said he uses knowledge of individual characteristics when making decisions about competition strategies. He explained his approach to individualized race planning, stating:

First and foremost, I [think], “Okay, this is this kid's skillset. How can I best prepare this person to do well at whatever the biggest meet they may encounter?”… If a kid, like some of the kids that we've had, has really good leg speed, then they might be in [a shorter race that requires greater overall speed].

Coach Johnson contrasted different types of athletes to illustrate his individualized approach further, saying some athletes are able to run short distances very fast and are able to “kick” at the end of a race by accelerating in order to distance
themselves from other competitors at the end of races. Athletes who are effective
“kickers” experience the drawback of not being able to run at their kicking speed for very
long. Conversely, other athletes may not be able to run as fast as kickers, but can run
faster over longer distances, which can tire out opponents and leave them unable to kick
at the end of the race. Johnson referenced the later type of athlete:

One of my female runners is not somebody that has a lot of leg speed. She was an
average runner in high school, [but] she really developed into a really good runner
here. She won four national titles. Part of how we did it with her is we realized,
“All right, you don't have the leg speed, so you're going to have to [run faster] like
really, really hard from [earlier in the race].

In this instance, Johnson had advised the athlete based on her physical abilities,
how to run the race in order to be best positioned to win. I asked the athletes I
interviewed for their perspectives on how Coach Johnson planned competition strategies.

Eve and Rachel stated:

Eve: He race plans individually with people the night before the race. He'll tell
you individually what he wants you to do.

Rachel: He'll look up and just say it was a track race, he'll look up other people in
your race. Their [personal best] to know if you should sit in a certain position in
the pack or when you should make your move.

Eve: He individualizes it for each person. If one person races better from staying
back and working their way through, he looks into what each person is best at and
he'll tell you to do that.

Eve and Rachel went on to comment on how he differentiates race plans, using
themselves as examples:

Eve: He'll probably tell Rachel to kick later than me because I don't have as much
speed to finish the race.

Rachel: Yeah, and our race times would be slightly different just because of past
races, endurance, and speed stuff. Some [athletes] use more leg speed and know
they can finish strong, so they can hold off a bit until the last 100 meters, whereas
if someone is like aerobically stronger then probably go out from the very start.
Luther and Thomas provided similar perspectives. Thomas stated, “If someone's strength is their speed at the end, so he's got such a good kick, he just needs to be [near the front of the race] and then just go for it [at the end of the race].” When I asked what Johnson might do with athletes who are not as good at kicking, Luther added that the coach would have him start in the middle of the pack of runners, work his way up, and make a final push at a designated spot further out from where a typical “kicker” would be able to kick.

Further evidence from collected artifacts triangulated Coach Johnson’s individualized approach. In a post-national championship race interview with Coach Johnson in 2013, he commented that he did not want a particular athlete’s race to come down to a kick, so he and the athlete set up a race plan in which the athlete increased the pace at an earlier point. Coach Johnson’s rationale was that the athlete would be able to sustain a faster pace while competitors would be less likely able to keep up. In a 2012 post-race interview, he commented that he had instructed an athlete who had just won the conference championship to “chase the cart,” referring to a lead vehicle in cross-country races. Coach Johnson’s comment implied that he had wanted her to lead from the start of the race as a racing strategy. While Coach Johnson did not share specific race plans, he shared that he thought his team was able to win the team conference championship because all the athletes ran their respective race plans. Gary’s comment implied that the individualized race plans of his athletes were valuable to his team’s overall performance. Altogether, evidence suggested that “pedagogical knowledge of coaching and individuals” influenced the coach’s decisions when planning for a competition. Evidence also suggested that sport-specific knowledge of racing tactics (e.g., “kicking”) also influenced competition-planning decisions along with “pedagogical knowledge of
coaching endurance running” as evidenced by the influence of goals in competition decisions.

**Decisions on responsive training were influenced by knowledge of athletes’ individual circumstances.** Knowledge of individual circumstances was characterized by existing conditions or state of affairs surrounding an athlete. I observed that the coach was often aware of an athlete’s circumstances prior to implementation of an athlete’s training session, and also during last-minute decisions to adjust an athlete’s training session due to happenstance. Knowledge of individual circumstances exclusively contributed to Johnson’s decisions to provide “responsive training” to an athlete. In this study, “responsive training” referred to training that was adjusted from what was originally scheduled in order to suit the needs of an athlete.

In one of our interviews, Johnson explained that while he uses a science-based training approach, he artistically adjusts training to suit athletes’ circumstances. During one of my observations, Coach Johnson almost joked about his artistic approach, stating, “We kind of fly by the seat of our pants here,” while chuckling. Drew and Chris added that Coach Johnson makes last-minute changes to training sessions “every day.” The following sections further describe how Coach Johnson’s knowledge of athletes’ individual circumstances influenced responsive training decisions.

**Responsive training was provided for athletes who needed a short-term plan.** During a field observation, Coach Johnson referred to an athlete whom he said had been “in a rut” (i.e., had experienced a lack of progress in his training and racing.) Coach Johnson said he was having the athlete complete easier training until the athlete felt better. Gary said when the athlete felt better, he would introduce hard work gradually but would not assign him hard workouts if it seemed like it would be too hard for the athlete.
Coach Johnson further said he was giving the athlete workouts to build his confidence to help the athlete get out of his rut. However, the coach commented that the athlete may not be having a confidence issue, acknowledging that other explanations might exist.

During a different observation, Johnson shared that a training session that was being conducted was harder than normal for a particular female athlete in order to achieve a desired training outcome. The athlete would be racing in two days and normally would not do a hard workout that close to a race. Coach Johnson said the race was being approached as a training session, rather than placing primary emphasis on the competition outcome, so he had her “train through” the race. Additionally, Johnson said the athlete was normally a 5000-meter runner, but he was having the athlete race in the 1500-meter in order to train at faster running speeds.

In another situation, Coach Johnson told an athlete, Ben (pseudonym), who was scheduled to run high intensity efforts, to warm up and see how he felt after the warm-up. Ben reported back, and the coach elected to have him to “cross-train,” or do a workout that was different from and less stressful than running. Coach Johnson mentioned that Ben had been experiencing a lingering injury and that because of the injury, he had Ben minimize his running. Coach Johnson further shared that he was comfortable minimizing the athlete’s running because of his knowledge of how long it takes athletes to lose fitness in situations similar to his. Coach Johnson added that the physical abilities of the athlete were such that he anticipated the adjusted approach to have only minimal detriment to the athlete’s performance in competition. Coach Johnson showed me to a room with several different types of cross-training equipment, further sharing that he regularly uses cross-training as an option for athletes experiencing discomfort as a way to train without exacerbating that discomfort. His statement about regularly using cross-
training as a type of responsive training was triangulated by my observations, as several times I observed athletes engaged in work involving cross-training equipment. In short, Coach Johnson provided responsive training by providing an alternate day-to-day training plan that spanned several days, using both knowledge of Ben’s lingering injury and his physical characteristics.

Another example of Coach Johnson’s knowledge of circumstances influencing responsive training decisions was observed during his handling of a female athlete’s training after a competition. The athlete had qualified for the national championships in the 10,000-meter run a few days prior and had also set a personal best time. During and observation, the coach said that the 10,000-meter is a very tough race, and that when an athlete performs beyond what they have previously done, he tends to give the athlete a recovery day to ensure that the athlete recovers from the event rather than risk injury. As such, the coach used knowledge of an athlete’s post-race circumstance in a decision to provide responsive training to the athlete.

Johnson went on to explain that he uses knowledge of athletes’ circumstances to provide responsive training during the summer. He shared that he does not meet with athletes for training sessions during the summer, but that he does provide athletes training with summer-long training schedules at the beginning of the summer and communicates with his athletes by email. Coach Johnson added, “Of course certain things are going to come up, and maybe they’ll get sick, or maybe they have to go to a wedding, or they have to do this or that. We augment and adjust [when that happens].” Johnson’s adjustment of the summer plan indicated that the he would provide responsive training to athletes in the form of short-term plans when athletes have circumstances spanning multiple days that interfere with scheduled training.
Responsive training was provided for athletes who needed a last-minute adjustment. Drew and Chris said the most common reason for Johnson “cutting a workout back” was due to an athlete being more tired than what would be appropriate for the day’s training. Coach Johnson said if an athlete showed signs of physical exertion that were different than what he expected for the day’s session, it would indicate to him that the training session might need to be changed. Eve shared her experiences of having a workout reduced, stating:

This past weekend, when [the team] traveled [out of state], when we got back we were kind of tired, so I got my workout cut down [and] some people didn't do a workout, so he's more about recovering instead of beating yourself up and overdoing it.

Johnson also shared that he will sometimes use physiological knowledge through the use of morning heart rates to interpret athletes’ circumstances and subsequently provide responsive training. He stated:

I’ll have [athletes] take their basal heart rate. They’ll take it every morning when they wake up before they get out of bed for a full minute. If the resting heart rate is maybe 10% to 15% high, then I tell them to let me know that. So then, if I have a hard day scheduled that day, maybe we’ll skip it.

Johnson further said that in prior years, he would have athletes take their basal heart rates and chart their measurements regularly. However, he said during my visit that he was not doing it as much because of time constraints.

Johnson also provided responsive training due to an athlete reporting heightened physical discomfort. I witnessed Coach Johnson’s focus on “not overdoing it” during his interactions with multiple athletes. During one training session, he offered an athlete the option to reduce the amount of work in her workout, stating to the athlete, “Better 1% under trained than 1% over trained”. In another session, I observed Coach Johnson change an athlete’s training session when an athlete reported that his knee hurt. Johnson
had the athlete cross-train because he wanted him to *train* and not *race* through the workout. Coach Johnson’s differentiation between training and racing the workout implied that the session would have required greater effort than was intended and was sufficient reason to change the day’s session for the athlete.

In another field observation, Rachel reported to Coach Johnson that her ankle hurt when she would start running. Again, Coach Johnson asked her to rate the pain on a 1-10 scale, and she reported that it would start at a 5 and would reduce to a 4 after she had been running for a bit. Coach Johnson told her to see the athletic trainer to determine if she would need to cross-train or run. He followed up with the athletic trainer, who said it was ankle inflammation. The coach decided it was all right for her to run because the pain was lessening. He also said it sounded like tendonitis and that blood flow from exercise can help. Furthermore, his experience told him it would be all right. Later, Rachel was running high-intensity intervals around the track. At one point during the session, Johnson asked her how she was feeling. Rachel replied that she was tired. The coach told her to do just one more, and after she had completed the session, he said “I’m very proud of you, good session.” Rachel commented on this interaction in our interview, stating, “Yeah, when I was feeling like was something was kind of bugging me in my ankle. He wants me to be safe instead of pushing through, just stay safe.”

Another situation that resulted in the coach providing responsive training involved a phone call he received during one of our interviews. The phone call was from one of his athletes who called to tell him that she had been vomiting and did not think she would be able to run. The coach told her to stay home for the day and check in with him the next day. The following day at practice, the athlete spoke with Johnson and reported that she felt much better. He told her to go on an easy run rather than doing the planned training
for the day so that she would avoid a bad workout by resuming intense training too quickly after having been sick.

During another training session, Coach Johnson spoke with Luther prior to the workout, who told him that he was experiencing some tightness in his thigh. Coach Johnson asked him how uncomfortable it was on a scale from one to ten. He shared that when the issue first presented itself that Luther’s discomfort was at an eight or nine on a discomfort scale of one to ten, and said his general rule was that five or more was not ok to run on while a one or a two was ok to run on. Later in the training session, Luther and other athletes were running on roads around town. Coach Johnson drove up alongside Luther in his pickup truck and asked him how he was feeling. After hearing the athlete’s response, Johnson told him to take it easy for the rest of the run but otherwise did not change the parameters of the workout. As we drove off, Johnson mentioned that Luther was uncharacteristically solemn, and that he watches athletes who display that kind of mood very carefully. Luther spoke about this interaction during my interview with him:

Our long run was supposed to be [that day] and I wasn't feeling too well. My [thigh] was kind of annoying me, so he just told me to do about 10 miles or so, so I did that. But if I was feeling good, he would have just told me to do more. First he asked me “How are you feeling?” and I said, “I'm feeling okay”, and then he said, “Do about 15 to 16 [miles].” And I was like, “Well, my IT band is annoying me.” So then he said, “Okay, do 10.” So he kind of knows backup plans…So like if [he’ll say] “You do this. Oh, you're not feeling well? Okay, do [something else].”

In Luther’s case, while the coach appeared to be primarily focused on understanding the extent of Luther’s discomfort, he also took into account the athlete’s demeanor in comparison to his typical personality. Johnson additionally said if he saw that an athlete was in an uncharacteristically downtrodden mood, then it might be a sign that something was wrong. Prior to one training session, an athlete told Coach Johnson...
that the workout he had done the day before had not gone well. The athlete hung his head while he spoke with Johnson, who told the athlete to take the day off, telling me later that he gave the athlete the day off because he was acting out of character. Johnson’s observation of athletes’ departures from their typical demeanors would be a sign that he should provide responsive training to the athlete by easing up the athlete’s session for that day. In short, his pedagogical knowledge of coaching and individuals influenced his decisions on responsive training through his knowledge of athletes’ typical personalities.

**Responsive training was sometimes not provided.** During the visit, there were also instances where Johnson would refrain from adjusting a session after receiving negative feedback from an athlete. In other words, sometimes Coach Johnson’s response was to not change the session. I observed several such instances. Before one training session, an athlete approached Coach Johnson telling him that he felt tired. Coach Johnson acknowledged the athlete and told him to run 7-8 miles, later stating that he did not change the workout from what was planned. Coach Johnson explained that while the athlete shared that he was tired, he did not think that the athlete was tired enough to warrant a reduction in the athlete’s work for the day.

Coach Johnson’s assistant coaches, Drew and Chris, added that the frequency at which individual athletes have their workouts adjusted was based on knowledge of the athletes as individuals. They went on to state that a major component of determining the necessity of an adjustment was rooted in knowledge of the characteristics of the individual athletes, stating that there would be cases where athletes may feel tired, but were not yet at a point where a reduction in workload was needed.

During another training session, during which athletes were running on local roads in town, Coach Johnson pulled up to a small group and asked how they were doing.
One athlete did not respond. Coach Johnson asked the athlete why he did not answer and prompted him specifically to answer how he was doing. The athlete responded that he felt tired. Coach Johnson ended up not changing the workout and said sometimes he might cut the workout back for such a response, but decided not to because the athlete’s behavior was not uncharacteristic of his personality. Johnson added that in general, he feels comfortable revising a training session when an athlete is tired if the athlete is not showing any uncharacteristic traits. Johnson’s tendency to sometimes keep workouts the same was supported by Eve and Rachel. They said they could recall times where they felt sore or tired, but Coach Johnson would tell them to push through it, adding:

If something is sore or bugging us, or we're just feeling a little tired, he'll often be like, “Push through it. We'll get through it. You're just tired.” Sometimes I feel like doing a mile less just because I don't really want to do [the full amount], but he'll make you because he knows you're capable of it.

In my interview with the male athletes, Thomas commented on Coach Johnson’s ability to determine the necessity of a training session adjustment, stating:

I think [Coach Johnson] can tell when [an athlete] actually, genuinely needs the break. Sometimes you think you need a break, but you don't…I hadn't done a session for a while, and I didn't really need a break, I was just tired. But I think he knows when it's important to give people a rest and when it's important for people to keep training.

Altogether, evidence suggested that the coach would make decisions to provide responsive training for athletes whose circumstances merited either a short-term plan or a last-minute adjustment. The coach made responsive training decisions using knowledge of the circumstance itself and the individual characteristics of the athletes, as well as knowledge of requirements of endurance running, and physiological principles related to endurance running training.
Decisions on how to provide explanations and instructions to athletes were influenced by knowledge of individual communication styles. During the visit, Coach Johnson discussed having athletes understand what was necessary for successful endurance running. He said that communicating expectations and rationales in ways that made sense to each athlete was important in creating understanding.

During the visit, Coach Johnson was purposeful in how he explained the objectives for training sessions. During these explanations, He was usually direct and to-the-point. In one of my observations, he was joking around with some athletes shortly after meeting for a training session and quickly transitioned to directly instructing the athletes as to what the format for the day’s training session would be. Luther and Thomas said Coach Johnson explains workout purposes in terms of what the workout is meant to accomplish, but does not explain his rationale for workouts. Eve and Rachel shared that while Coach Johnson will explain rationales for training sessions, he communicates rationales in simple terms that make his explanations easy to understand while refraining from getting too technical. Chris and Drew stated in our interview that Johnson often explains the purpose of training sessions to athletes, but the way explanations are offered vary based on the characteristics of individual athletes. They stated:

Drew: Some kids respond best to being told what to do. Some athletes will try to weasel out of stuff because they're always testing boundaries, and those are the kids you just need to go, “No, you're doing it.” Then there are other kids that they just want to know why because they're curious, or they need to be talked into it from the perspective of, “Well here's why it would be good for you to do it.” You need to sell them on it.

Chris: Sometimes kids won't want to do [a workout they have never done before], or they'll ask for an easier version of it, where then he'll go to [an authoritarian] approach and say, “This is why you need to do this. This is how it's going to benefit you.” So [he is] very informative at times.
Thomas and Luther added that most of the athletes on the team do not question much of what Coach Johnson asks them to do, further stating that athletes generally trust that his approach will work. However, Johnson said he sometimes needs to get athletes to buy back into their system of training. Gary stated:

There’s probably 60%, 65% of our athletes who just trust me, like “Whatever you say, Coach.” There’s a certain amount that they don’t trust themselves, much less me. They think, “I got to do more. I got to do it harder. I got to do…” They don’t feel like they’ve had a workout until they run themselves into the dirt. So I feel like sometimes I really have to convince them to buy in to … I tell them all the time, “Our training system is like Novocain.” When you go to the dentist and you get a Novocain shot, it just seems like for the first 3, 5 minutes, 10 minutes, sometimes it’s not working. Then all of a sudden you’re drooling all over yourself. It works. I think that you’ve got to have faith because [success does not come from] one particular home run workout. It’s being able to do those workouts week after week after week.

In many of my observations, Johnson’s explanation of a training session was often focused on what athletes would be doing without any explanation for why they were doing it. However, there were exceptions. During one field observation, Coach Johnson alerted athletes to the level of difficulty to expect during a particular workout. He said the difficulty of the session might be unexpected for the athletes, which could have an undesirable psychological impact. He explained to his athletes that the session might be harder than that anticipated so that they would be psychologically prepared for and fully engage in the work.

During one of my observations, Coach Johnson said that he tries to get buy-in from his athletes and tries to get them to invest in the team by paying attention to peripheral details of training, or details not directly related to the act of running itself. During the week of the visit, the topic of “heat training” was of particular emphasis. Heat training included having athletes dress warmer than what was necessary during training sessions in order to help them acclimate for the national championships, which were
being held in a location much warmer than Schell’s University. Coach Johnson described that the purpose of the training technique was to encourage physiological adaptation that would prepare them for the climate of the location of the national championships.

Throughout the week, I observed varying degrees of compliance with Coach Johnson’s prescribed heat training approach. I observed Coach Johnson using multiple ways of communicating heat training’s importance. In one instance, Johnson got the attention of an athlete who was wearing running shorts and no shirt, gently tugging on the sleeves of an athlete who was dressed in long-sleeves and running tights, he said with a smile, “This is the correct dress attire.” On a later occasion, he drove up to an athlete running on a public road and dressed in multiple layers, and with a smile said, “You’re doing heat training today. I appreciate that.”

During another field observation, I observed Coach Johnson explaining the necessity of recovery between hard training sessions. In one interaction, Coach Johnson told an athlete, “There are lots of slow people that run every day,” implying that training at high intensities every day was not necessary and even could be harmful. In a 2009 interview, Johnson stated that he spends time explaining to athletes that “backing off” or recovering is part of the process of improvement.

In many of my observations, Johnson maintained a friendly and approachable demeanor while interacting with athletes. However, there were instances when he assumed a sterner tone when communicating. In one case, Coach Johnson drove up to an athlete who was dressed in short sleeves and shorts on a day when heat training was expected and said, “You’re not going to Nationals? You’re not wearing your heat gear.” He went on to tell the athlete that in a prior track and field season, an athlete who was nationally ranked second in an event did not race well at Nationals, in a hot race. Coach
Johnson asked the athlete, “Are you coachable?” The following day, the coach called out athletes during pre-practice instruction whom he felt were not taking heat training seriously and asked some of the athletes if they thought a 20-year-old athlete knows more than a 50-year-old coach, further emphasizing the point by sternly saying, “Don’t be an idiot.” He commented on this interaction in a later interview, stating:

There's a certain segment of kids who respond much better to getting six inches away from their face and being a little more stern. That's not something that is easier for me to do, but I also know that if that's what that kid needs, then I'm going to underperform if I don't do what [the athlete] needs.

The coach added that when athletes struggle to meet expectations, he will ask them, “Do you lack knowledge, or do you lack motivation?” a question he additionally reported using in coaching in a video artifact of a 2013 interview. Altogether, evidence suggested the coach used his knowledge of individual communication styles when providing instructions and explanations while coaching.

**Chapter Summary**

This chapter provided an analysis of the data collected in the present study. Interpretation of the analysis indicated that the coach used scientific, sport-specific, and pedagogical knowledge sources when coaching. Pedagogical sources were divided between knowledge of endurance running and coaching, and endurance running and individuals. Actions taken by the coach included planning competition strategies, organizing training, implementing planned and responsive training, providing instruction and explanations to athletes, assessing athletes, and creating a strong team environment. The coach’s actions were further characterized as sport-focused or person-focused. Decisions were illustrated by describing the relationship between knowledge sources and
coaching actions. The following chapter discusses the analysis in light of past literature and implications for further research and practice.
CHAPTER V
CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to examine what types of knowledge contributed to the decision-making process of a competitively successful endurance running coach. Additionally, this study aimed to understand how the identified types of knowledge contributed to coaching. This chapter addresses conclusions pertaining to each of the research questions identified in Chapter 1:

Q1 What sources of knowledge contribute to the decision-making process of an endurance running coach with a history of competitive success?

Q2 How does an endurance running coach with a history of competitive success use scientific (e.g., psychology, physiology, biomechanics, etc.) knowledge during coaching?

Q3 How does an endurance running coach with a history of competitive success use knowledge specific to endurance running training during coaching?

Q4 How does an endurance running coach with a history of competitive success use pedagogical knowledge during coaching?

Additionally, this chapter addresses implications for coaching and research in light of the discussed conclusions.

Sources of Knowledge that Contributed to the Coach’s Decision-Making

Figure 10 displays the hierarchical arrangement of the knowledge typologies and their lower-order themes presented in Chapter 2. Following the figure from left to right, higher-order themes comprised those to the left. Themes higher in the hierarchy represented those that were increasingly more analytic and interpretative, and required a
higher level of inference as the analysis moved conceptually upward. This approach has been used in previous research on coaching (e.g., Abraham et al., 2006; Scanlan et al., 1989). Four highest-order (fourth-order) themes denoted knowledge typologies that were present in the coach’s decision-making: scientific knowledge, sport-specific knowledge, and pedagogical knowledge. Pedagogical knowledge was further differentiated into two third-order themes of knowledge of coaching and endurance running (PCE) and knowledge of coaching and individuals (PCI). Lower-order themes were nested within these higher-order themes. As addressed in Chapter 2, the ontological relationships of knowledge sources within teaching and coaching have different applications and interpretations following the seminal work of Shulman (1986, 1987). The subsequent sections interpret these findings in light of these different applications.

<table>
<thead>
<tr>
<th>First-Order Themes</th>
<th>Second-Order Themes</th>
<th>Third-Order Themes</th>
<th>Fourth-Order Themes</th>
<th>Category</th>
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<tr>
<td>Physiology</td>
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<td>Psychology</td>
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<td>Endurance Running Requirements</td>
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<tr>
<td>Past and Future Competitions</td>
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<td>Periodization</td>
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<td>Adopted Values and Attitudes</td>
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<td>Knowledge of Goals</td>
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<td>Personal Development Goals</td>
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<td>Performance Goals</td>
<td>Knowledge of Goals</td>
<td>Knowledge of Endurance Running and Coaching</td>
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<td>Competition Goals</td>
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<td>Individual Communication Styles</td>
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<td>Knowledge of Endurance Running and Individuals</td>
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<td>Individual Personal Characteristics</td>
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| Explaining and Instructing       |                     |                               | Person-Focused Actions |         |
| Cultivating Team Environment     |                     |                               | Actions               |       |
| Learning about Athletes          |                     |                               |                      |     |
| Competition Planning             |                     |                               |                      |     |
| Organizing Training Schedules    |                     |                               |                      |     |
| Implementing Responsive Training |                     |                               |                      |     |
| Implementing Planned Training    |                     |                               |                      |     |

*Figure 10. Hierarchical arrangement of the knowledges and actions*

**Comparing Present Findings with Prior Teaching Knowledge Frameworks**

Understanding the ontological relationships with other knowledge sources of all knowledge typologies within the coaching knowledge described by Nash and Collins
(2006) can be augmented by examining other applications of Shulman’s (1986, 1987) framework. While Shulman’s (1986) original framework consisted of seven different contributing types of knowledge, more recent research has suggested that teaching knowledge is better represented by recognizing two categories, content knowledge (CK) and pedagogical content knowledge (PCK), under which multiple discrete categories exist (e.g., Ball et al., 2008). Within Shulman’s framework, PCK is of great interest for teaching, as it describes the bridging of content and teaching practice for the effective instruction of learners (Ball et al., 2008). The discrete categories of Shulman’s framework have garnered interest in classroom settings (e.g., Abell, 2008; Ball et al., 2008), as they are hypothesized to act through PCK (Gudmundsdottir & Shulman, 1987).

Ball et al. (2008) addressed characterizations and applications of several discrete categories. Categories included common content knowledge (CCK) and specialized content knowledge (SCK), both of which were classified as content knowledge, as well as knowledge of content and teaching (KCT) and knowledge of content and students (KCS), which shared the category of pedagogical content knowledge.

Table 9 depicts an extension of Table 2 presented in Chapter 2 and is inclusive of the present findings. In this extension, scientific knowledge is aligned with content knowledge. In the context of mathematics teaching, Ball et al. (2008) defined CCK as “knowledge and skill used in settings other than teaching” (p. 399). Scientific knowledge fits within CCK are justified through acknowledging that these knowledge sources are able to be understood without expertise in teaching or, in this case, coaching. Also grouped within content knowledge, Ball et al. defined SCK as “knowledge and skill unique to teaching [and] not typically needed for purposes other than teaching” (p. 400).
Sport-specific knowledge’s fit within SCK is justified, since sport-specific knowledge in the present study was characterized by knowledge of endurance running.

Table 9

<table>
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<tr>
<th>Alignment of Teaching Knowledge with Present Findings</th>
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<tr>
<td>Content Knowledge (CK)</td>
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<tr>
<td>Curricular Knowledge</td>
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<tr>
<td>Pedagogical Content Knowledge (PCK)</td>
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Additionally, pedagogical knowledge sources identified in the current investigation shared similar characteristics as discrete knowledge types contained within PCK (Ball et al., 2008). In the present study, the coach’s knowledge of “how to coach” independently of the individuals on his team characterized PCE. Ball et al. characterized KCT in the field of mathematics education as a combination of knowing about teaching and knowing about mathematics. The characterization of PCE in the present study is similar to that of KCT with combined knowledge of coaching and endurance running. Also grouped within PCK, Ball et al. characterized KCS in mathematics education as combining knowledge of students and knowledge of mathematics. They go on to describe KCS as knowledge that helped teachers anticipate and interpret problems and students reactions to teaching. In the present study, PCI is characterized by the coach’s knowledge of the individuals on the team and how he would work with each individual athlete. PCI is similar to KCS in its focus on individual needs.
The fits of the knowledge typologies found in this study are noteworthy, as they imply their importance for the coaching decisions of the participant. While many of the discrete categories of Shulman (1986, 1987) are placed in hypothetical relationships with PCK, empirical evidence in classroom settings indicated that 1) PCK is specific to content and context, 2) PCK shares a direct relationship with CK, and 3) PCK shares a direct relationship to the degree to which a teacher knows her or his learners (Ward & Ayvazo, 2016). Thus, the literature suggests that the ability to bridge content with teaching practice for the effective instruction of learners is related to KCT (i.e., content and context), SCK and CCK (i.e., content knowledge), and KCS (i.e., extent of knowing the learners). The present findings indicate that content knowledge (i.e., scientific and sport-specific), PCE, and PCI contributed to the bridging of content and coaching practice for a coach with a demonstrated record of competitive success. Therefore, it is reasonable to suggest that the findings of the present study mirror known empirical relationships that exist between the discrete categories of Shulman’s (1986) framework and effective instruction.

Comparing Present Findings with Prior Coaching Knowledge Frameworks

The knowledge themes in the present findings were representative of knowledge typologies in prior literature, including the Coaching Schematic, which served as the framework for this study (Abraham et al., 2006) (Table 10). Knowledge typologies included scientific, sport-specific and pedagogical knowledge as the most influential knowledge types in the schematic. The present findings are in line with the knowledge typologies identified by Nash and Collins (2006), including scientific, sport-specific, and
pedagogical knowledge typologies that answer questions like “Where do I get knowledge?” “What do I do?” and “How do I do it?” respectively (p. 472).

Table 10

<table>
<thead>
<tr>
<th>Alignment of Coaching Knowledge with Present Findings</th>
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<tr>
<td>Shulman (1987)</td>
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<tr>
<td>Content Knowledge</td>
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<tr>
<td>(CK) Instructional Knowledge</td>
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<td>Curricular Knowledge</td>
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<td>Sport Specific</td>
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<td>Present Study</td>
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Nash and Collins (2006) indicated that scientific knowledge is an extension of curricular knowledge, as indicated by Kreber and Cranton (1997, 2000). While Nash and Collins interpreted scientific knowledge as an extension of curricular knowledge, they presented a different characterization than Kreber and Cranton, who characterized curricular knowledge as that which explains “Why do I teach this way?” Nash and Collins stated that scientific knowledge answers the question of “Where do I get this knowledge?” Nash and Collins did not explain their reasoning behind changing the characterization from “why” to “where.” However, both sets of authors refer to curricular and scientific knowledge as a premise or foundation upon which decisions are made. While the present study interpreted scientific knowledge in part by asking if the knowledge source could answer the question of “Why am I doing what I am doing,” the
scientific knowledge typology could also be the premise upon which some of the coach’s actions were based.

Nash and Collins (2006) posited that sport-specific knowledges are an application of Kreber and Cranton’s (1997, 2000) characterization of instructional knowledge. Both sets of authors characterize instructional and sport-specific knowledges as explaining what the teacher or coach does. In the present study, sport-specific knowledge pertained to knowledge specifically of endurance running, and as a higher-order theme was used exclusively in coaching actions demonstrating an appropriate fit within “what coaches do.”

Lastly, both frameworks characterize pedagogical knowledge as an explanation of “how coaches do what they do.” In the present study, pedagogical knowledge was further differentiated into two lower-order themes, “knowledge of coaching and endurance running”, and “knowledge of endurance running and individuals”. The separation between the two sub-themes indicates separate sources of pedagogical knowledge that serve as a rationale for how the coach went about his coaching actions.

Comparing Present Findings with Studies on Coaching Knowledge

Stoszkowski and Collins (2016) investigated the knowledge sources that coaches said they found useful and about which they wanted to know more. Stoszkowski and Collins reported that coaches across several sports thought recently learned pedagogical knowledge sources had been the most helpful to their coaching. Stoszkowski and Collins also reported that coaches indicated that they also wanted to learn about new pedagogical skills that could be applied to their coaching more than scientific or sport-specific knowledge. While the purpose of this study was not to compare the frequency of
coaching knowledge typologies, it is worth noting that the present study identified that pedagogical knowledge sources were indeed more frequently observed in coaching actions. The abundance of pedagogical knowledge’s relationship with the participant’s coaching actions is supportive of Stoszkowski and Collins’ findings that pedagogical knowledge is often the most pertinent to coaching.

The present findings also support the findings of the pilot study that preceded the present investigation (Milbrath & Douglas, 2017). In the pilot investigation of a single case study of a successful swimming coach, knowledge types contributing to a swimming coach’s assessment of his athletes were investigated. The findings indicated congruence with Abraham et al. (2006), as the coach used scientific, sport-specific, and pedagogical knowledge in his assessment of swimmers. While the participant demonstrated use of all three knowledges, pedagogical knowledge was identified twice as often as both scientific and sport-specific knowledges in his assessment practices during coaching. The similarity of the findings between the present and pilot case studies and the work of Stoszkowski and Collins (2016) in a heterogeneous sample indicate that pedagogical knowledge may be especially important for successful coaching.

Taken together, the present findings mirror other studies that have indicated that pedagogical knowledge is important in coaching. Additionally, the findings were inclusive of knowledges identified in frameworks that identify knowledge typologies present in the coaching process (e.g., Nash & Collins, 2006; Abraham et al., 2006). Furthermore, the present findings were congruent with more recent research in knowledge sources in coaching with both a heterogeneous sample of coaches (Stoszkowski & Collins, 2016) and a single swimming coach (Milbrath & Douglas, 2017).
How the Coach Used Knowledge During Coaching

The findings presented in the previous chapter indicated that the decision-making process of the coach consisted of an interconnected and interwoven relationship of knowledge types and coaching actions (Figure 11). Consistent with the Coaching Schematic (Abraham et al., 2006), the findings indicated that coaching decisions often included multiple knowledge sources, and that knowledge types are not mutually exclusive of any influenced coaching actions. It is largely impossible to describe the influence that individual knowledge types had on coaching actions without also associating other different knowledge themes. The previous chapter was organized by knowledge themes and sub-themes and contained coaching actions within them.

The integrative diagram in Figure 11 illustrates connections between knowledge types and coaching actions that were identified in the findings. In the diagram, lines connecting knowledge sources with coaching actions indicate shared relationships between the knowledge sub-theme and coaching action. Knowledge types that were interpreted as primary influences are connected to actions that they influenced by solid lines and are interpreted as “primary” influences. Knowledge sources and coaching actions connected by dashed lines indicate relationships between other knowledge types that were also influential on coaching actions. Relationships between knowledge and action that were represented by dashed lines were characterized as “supporting” knowledge.
Figure 11. Integrative diagram showing knowledge sources’ relationships with coaching actions
For example, “cultivating a team environment” was interpreted to be influenced by “adopted values and attitudes.” The relationship between “cultivating a team environment” and “adopted values and attitudes” was described in the theme of PEC because actions taken by the coach to cultivate his team’s environment emerged as a way that “adopted values and attitudes” influenced coaching decisions. Alongside the narrative on how adopted values and attitudes influenced team environment cultivation, knowledge of individual communication styles emerged as an additional influence on team environment coaching actions.

Figure 12 shows a simplified view of the relationships among the knowledge typologies and coaching actions. Typologies were interpreted to have a primary influence on coaching actions if there was at least one primary influence between a sub-theme and the coaching action. The findings in the present study contrast with the “tidy and concise” Coaching Schematic (Abraham et al., 2006, p. 550). However, researchers in higher education have observed that such concepts can be presented in a way that is “experientially much too tidy” (Entwistle & Walker, 2000, p. 339). Abraham et al. (2006) acknowledged that structures like the Coaching Schematic “do not underpin thoughts and decisions, but rather represent the mental workspace where thoughts and decisions are made” (p. 551). As such, it is expected that when mapped out in an integrative diagram, the process of the coach would be far more complex than what is suggested by the conceptual model. Illustrating this complexity further, the actions of the coach appeared to share relationships with knowledge of multiple typologies in a non-mutually exclusive manner. The following sections address how each of the highest-order knowledge themes in the present study contributed to the coaching process as well as explanations for their complexity.
Figure 12. Integrative diagram showing knowledge typologies’ relationships with coaching actions
How the coach used scientific knowledge during coaching. Scientific knowledge included knowledge of physiology and psychology. Physiology was interpreted to have a primary emphasis on decision-making regarding training organization and implementation. Physiology contributed to the coach’s training organization by scheduling training in a way that would allow physiological adaptation to occur. Additionally, physiology contributed to the coach’s planned training implementation by creating training sessions that would elicit specific physiological adaptations dependent on speed, duration, and rest intervals included in the training session. Knowledge of physiology supported decisions on how to provide responsive training to athletes by providing the coach with rationales for why athletes might need to adjust their workouts. The coach often adjusted training by reducing the difficulty of training sessions when athletes had not recovered well enough to physiologically benefit from the training. However, the coach reported that he would also have athletes increase their efforts if it appeared that a planned workout underestimated what was needed for the session’s intended outcome. Knowledge of physiology further supported how the coach learned about his athletes through occasional physiological testing, as well as morning and training heart rate reports from his athletes.

Knowledge of psychology was also interpreted to have primary influence on how the coach implemented planned training. The coach used his own understanding of psychology in planned training implementation by creating workouts that would prepare his athletes for the physical demands of successful competition. Creating training sessions that allowed for increased “mental growth” and confidence prepared his athletes to handle the training demands and the stresses of successful competition. Knowledge of psychology also played a supporting role in competition planning, especially in cases
when he decided to withhold an athlete from competition to avoid damaging his confidence. Additionally, the coach used his knowledge of psychology as a rationale for explaining workouts to athletes when a workout might be harder than expected. The coach considered athletes’ confidence to be related to the psychology of endurance running. The coach informed athletes when a workout might be more difficult than expected because he did not want athletes to have reduced confidence due to the perception that they were struggling with a workout with which they should not be. Letting athletes know that a day’s training session would be hard was the coach’s way of preventing reductions in confidence. As a whole, scientific knowledge was a primary influence on training organization and planned training implementation, while serving as supportive influences on explaining and instructing, learning about his athletes, competition planning, and implementation of responsive training. It is worth noting that scientific knowledge was not limited to sport-focused actions, but also was an influence in the coach’s person-focused actions.

Consistent with characterizations of scientific knowledge typology (e.g., Kreber & Cranton, 1997, 2000; Nash & Collins, 2006), the use of scientific knowledge provided a rationale for the coach’s actions. These scientific knowledges identified “why” the coach did what he did, or “where” he got the knowledge to do it. Included in the coach’s decisions were actions that provided what the coach identified as physiological or psychological benefits, actions that were consistent with training principles from applied sport science, and actions that avoided exacerbating injury or sickness. The findings suggested that all coaching actions were accompanied by knowledge from both sport specific and pedagogical typologies, while all “interpersonal actions” that included scientific knowledge were also influenced by pedagogical knowledge.
How the coach used sport-specific knowledge during coaching. Sport-specific knowledge included knowledge of endurance running requirements, past and future competitions, and periodization. Knowledge of endurance running requirements was interpreted to be a primary influencer in training organization and the implementation of planned training. The coach used knowledge of endurance running requirements to influence organization of training by scheduling training sessions that were specific to the demands of endurance running events. Knowledge of endurance running requirements influenced his planned training sessions for athletes. One especially notable practice was his use of reference point training, in which athletes would run at paces that were specific to either their current or goal ability in a particular event. Knowledge of endurance running requirements was additionally interpreted to have a supporting influence on how the coach explained and instructed his athletes, learned about his athletes, and implemented responsive training for his athletes. The coach used knowledge of endurance running requirements in a supporting role when explaining the importance of heat training during the study. The coach’s attention to athletes' physical abilities like leg speed were also supported by the coach’s knowledge of endurance running requirements through his understanding of how physical abilities were applicable to the sport of endurance running. Furthermore, knowledge of endurance running requirements supported the coach’s implementation of responsive training by adjusting workouts when he recognized that an athlete may not be in a physical or mental state consistent with a productive effort in a planned workout.

The coach’s knowledge of past and future competitions was only interpreted to be a primary influence on how the coach learned about his athletes and how the coach planned for competition. Knowledge of past and future competitions contributed to how
the coach learned about his athletes as he evaluated how well an athlete implemented a race strategy. The coach later shared that he uses that information to further augment future competition approaches.

Lastly, knowledge of periodization was interpreted to be a major influence on training organization. The coach referenced a number of authors on periodization and described methods by which he altered volume, intensity, and rest during training to create effective training schedules. It should be noted that knowledge of periodization was interpreted to be the only knowledge source that influenced a single type of coaching action.

As a whole, sport-specific knowledge was interpreted to be a primary influence on how the coach learned about his athletes, planned for competition, organized training, and implemented planned training. It also served as a supporting knowledge source for explaining and instructing his athletes, as well as implementing responsive training. It should be noted that while sport-specific knowledge influenced both person-focused and sport-focused coaching actions, on the whole sport-specific knowledge was interpreted to be more influential on sport-focused coaching actions.

Consistent with characterizations of the sport-specific typology (e.g., Kreber & Cranton, 1997, 2000; Nash & Collins, 2006), sport-specific knowledges identified in the present study identified “what” the coach did during training. Sport-specific knowledges can be characterized as concepts that are well-formed either through declarative descriptions with underpinning knowledge, or through a “filing cabinet-like” organization useful for explicit reasoning (Abraham et al., 2006, p. 551). Knowledge of past performances consisted of objective competition marks, either place, time, or observation of what an athlete did during a competition.
How the coach used pedagogical knowledge during coaching. Evidence suggested that pedagogical knowledge was differentiated into pedagogical knowledge of endurance running and coaching (PEC) and pedagogical knowledge of endurance running and individuals (PEI). PEC consisted of adopted values and attitudes, as well as developmental, performance, and competition goals. Adopted values and attitudes were a primary influence on how the coach cultivated his team environment, where he purposefully tried to make athletes feel like they belonged and contributed to the team while being held to a high standard of excellence. The coach’s adopted values and goals were also a supporting knowledge source for his explanations and instructions, particularly when instructing his athletes in and explaining the importance of holding themselves to high standards of excellence.

The use of goals was present in the coach’s decision-making. Personal development goals were interpreted to be primary influences on competition planning. The coach focused on personal development of athletes in competition planning by having athletes try different racing strategies for the sake of improving in the strategy of interest. Additionally, the coach would have athletes compete in shorter events than their primary event in order to improve their ability to run at faster speeds than what their regular event typically required. Personal development goals were also interpreted to be a secondary influence on training organization and planned training implementation. Personal development goals influenced training organization and both planned and responsive training implementation. In this sense, personal development goals were often noted as increasing fitness, strength, speed, or endurance. In the case of responsive training, nearly all of the observed responsive training actions during the visit involved a reduction of work for the athlete. In these cases, the coach made statements about
avoiding injury or overtraining. As such, the focus on development was more of an implied avoidance of regression in fitness, strength, speed, or endurance.

Furthermore, personal development goals were present in the coach’s expressed statements as to what kind of a training outcomes he looked for as a result of his coaching actions. The coach’s focus on personal development was additionally apparent in that one of his goals with athletes is to “train fitness as it rises.” Additionally, the coach referenced a book as a major influence on his coaching approach. In the book, the authors stated:

There is no doubt that hard work over an extended period of time is the primary means for achieving athletic performance potential. A combination of training, competing, and sharing experience and emotional with other athletes forms the basis for development of expertise. Successful training and racing, however, can occur only in the context of excellent health. Thus, it becomes essential to ensure that a continual improvement in fitness results from the assigned training. (Martin & Coe, 1997, p. xxiv)

Based on these premises, it is reasonable to say that the coach should in theory have personal development goals in mind for anything he does while coaching, and that personal development goals should be a primary influence on everything that he does. However, the present study instead drew connections between the knowledge of personal development goals and coaching actions only when the coach expressed focused on the development of the athlete or athletes affected by the decision.

The findings indicated that when planning for competition, the coach would also consider both performance goals that focused on outcomes independent of opponents (e.g., setting a new personal best time, executing a racing strategy successfully, etc.) and competitive goals in which athletes would strive to outperform opponents. Competition goals were interpreted to be a primary influence on competition planning. The influence of competition goals influencing competition planning was triangulated by statements by
the coach that addressed setting goals with athletes to win races and for his team to win championship competitions. Competition goals were also interpreted to be a supporting influence on training organization. Competition goals influenced training organization as the coach prepared for key competitions, namely the national championship, and organized training so that athletes would be at their best. The findings indicated that the coach would plan the training of his athletes around the meet that would be most important for each individual. While that was most notably the national championships for his top runners, it also included athletes who needed to be best prepared for other races, which would include a qualifying competition for the national championships, or a conference meet for athletes whose seasons would end prior to the national championships.

Pedagogical knowledge of endurance running and individuals (PEI) consisted of knowledge of athletes’ individual communication styles, personal characteristics, and personal circumstances. Individual communication style was interpreted to be a primary influence on explaining and instructing. The coach used various communication styles with different athletes, ranging from lighthearted and joking to stern and reprimanding. The communication style that the coach adopted depended on what he was trying to explain or instruct and also depended on the style that was most effective with each individual athlete. Individual communication styles also were interpreted to be a supporting influence in how the coach cultivated his team environment. The coach’s team environment focused on athletes feeling like they belonged and contributed to the team while being held to a high standard of excellence. Individual communication styles influenced the coach’s cultivation of his team environment as he communicated with athletes in personal ways so that they felt like they belonged and were contributors, and
also how he cultivated a team environment in which high standards of excellence were expected.

The coach’s knowledge of individual circumstances was interpreted to be a primary influence on his implementation of responsive training. The coach used his knowledge of individual circumstances to alter training for athletes who needed last-minute adjustments in their training due to happenstance. The coach implemented responsive training by evaluating the athlete’s situation alongside knowledge of the athlete’s personal characteristics, while also considering knowledge of physiology and the requirements of endurance running.

Knowledge of individual circumstances was also a supporting influence on competition planning, as there was some evidence that the coach would make relatively short-term changes to an athlete’s competition events either to pursue a desired training outcome or avoid an undesirable result from competition that could be related to the athlete’s circumstances.

Finally, the coach’s knowledge of athletes’ individual characteristics was interpreted to be a primary influencer on all coaching actions with the exception of explaining and instructing, and cultivating a team environment. Knowledge of individual characteristics influenced how the coach learned about his athletes’ personal circumstances. For example, during the visit the coach reduced the difficulty of a workout for an athlete who was exhibiting a solemn demeanor, but did not reduce it for a different athlete who was also exhibiting a solemn demeanor. The coach explained that he would compare his observations of athletes against what he already knew about them, and he would be more likely to change a workout if they were acting out of character.
Knowledge of individual characteristics was also a primary influence on competition planning. The coach used knowledge of individual characteristics, particularly an athlete’s strengths and weaknesses in racing, to create individual racing strategies. Reported examples from interviewees indicated that athletes who had faster overall speed might have race plans in which they “kick” at the end to outrun their opponents. Other athletes with greater endurance might push the pace of races early on instead. Overall, evidence suggested that the athlete’s personal characteristics were accounted for when planning competitions.

Knowledge of individual characteristics was also a primary influence on training organization and implementation of both responsive and planned training. Knowledge of individual characteristics influenced training organization through the coach’s attention to competitions in which each athlete would participate at the end of the season. Not every athlete competes in the national championships, therefore having their final race prior to the national championships. Additionally, in track and field, athletes are required to attain qualifying times in order to participate in the national championships. Triangulated evidence shared by the coach indicated that he focuses athletes’ training schedules so that they have an opportunity to perform their best at meets of particular importance to them, whether that be a qualifying race, the national championship, or a different end-of-year race.

Knowledge of individual characteristics influenced planned training implementation. Evidence suggested that the coach took athletes’ strengths and weaknesses into consideration and then formulated their training to either maximize strengths or resolve weaknesses. Additionally, in responsive training, the coach took into
consideration athletes’ typical characteristics alongside present circumstances to determine if a training adjustment needed to be made and what the adjustment would be.

On the whole, PEC was interpreted to have primary influences on planned training implementation and competition planning. PEC also served as a supporting influence on explaining and instructing and organizing training schedules. PEI was interpreted to have primary influences on all coaching actions with the exception of cultivating a team environment, in which it was interpreted to be a supporting influence. Consistent with characterizations of the pedagogical typology (e.g., Kreber & Cranton, 1997, 2000; Nash & Collins, 2006), evidence showed that both PEC and PEI were indicative of “how” the coach did what he did, and knowledge of pedagogy seemed to permeate all coaching actions in the present study.

While coaching actions were influenced by pedagogical knowledge, coaching actions were additionally mediated by other knowledge typologies. Indeed, all coaching action typologies were influenced by all three highest-order knowledge typologies with the exception of “cultivating a team environment”, which appeared to be influenced only by PEC and PEI. Additionally, it should be noted that the remaining coaching actions were influenced by both PEC and PEI with the exceptions of “learning about athletes” and “implementing responsive training”, which did not appear to be influenced by PEC. The findings are especially interesting considering that the coach at no point identified “pedagogy” as a declarative knowledge source.

**Implications for Coaching**

The present study indicated that the coach used scientific, sport-specific, and pedagogical knowledges in his coaching and that as such, all are important knowledge sources. Drawing on naturalistic generalizations of the findings, the present study
recommends that endurance running coaches consider using all three knowledge sources purposefully in their coaching. Scientific knowledge appeared to be an important knowledge source for providing training that is rooted in evidence-based best practices. Using knowledge of physiology to organize and implement training creates training regimes that provide opportunities for purposeful adaptations that are known to be positively impactful on endurance running performance. Using knowledge of psychology when conducting training sessions or planning for competitions is useful for helping athletes approach workouts or races in a state where they will be most likely to perform in a beneficial way. Together, coaches are advised to use scientific knowledge to form bases for training that are rooted in known relationships between scientific principles and desirable training and competition outcomes.

Evidence also suggested that coaches should consider purposefully using sport-specific knowledge in their coaching as well. Sport-specific knowledge is indeed important for knowing best practices that are “tried and true” methods of successfully manipulating parameters for training and competition. Knowing competition specific needs, physical requirements of competition events, and principles of periodization can help coaches meet the specific needs of their sport. Together, coaches are advised to become intimately familiar with their sport in order to 1) provide training that reflects the physical demands of the races in which athletes compete, 2) structure training using known principles of effective training organization, and 3) provide competition plans that are suitable for the anticipated dynamics of the race.

Lastly, evidence suggested that pedagogical knowledge in the form of general approaches to “teaching the sport” and specific approaches for “teaching individuals” is important to coaching endurance runners as well. The present study identified the coach’s
general pedagogical approach through his attention to values and attitudes, as well as the importance of using developmental, performance, and competition goals in his coaching. Clearly established values and attitudes appear to be important because of their ability to get athletes’ to fully engage in the type of training and tactical racing approaches to be competitively successful. Furthermore, goal setting appeared to be important because it helped both the coach and his athletes stay focused on important developmental, performance, and competitive outcomes that are important for being consistently successful. Coaches are advised to consider clearly establishing values and attitudes, and explicitly teaching them to their athletes as well as explaining to athletes why they think values and attitudes are necessary. Additionally, coaches are advised to purposefully focus on setting and pursuing 1) competition goals with their athletes by laying out strategies for races taking into account dynamics of the competition, 2) performance goals by laying out strategies for races based on the physical environment of the competition, and 3) developmental goals by creating training that produces demonstrable evidence of improvement.

Pedagogical knowledge that focused on “teaching individuals” was identified through the coach’s knowledge of the individual characteristics, circumstances, and communication styles of each of his athletes. Individual knowledge appeared to be important because of its relationship with every action taken by the coach. Knowledge of individuals is important for teaching because it uses scientific, sport-specific, and general principles of teaching and caters it to the individual needs of the athlete. Coaches are therefore advised to purposefully learn and understand 1) the individual physical and personality characteristics of their athletes, 2) the circumstances that their athletes face on a daily basis, and 3) how each athlete communicates and is best communicated with.
Coaches then use the knowledge of these characteristics in light of their understanding of other knowledge sources to provide training that is appropriate for each individual athlete while still adhering to scientific and sport-specific principles. In short, coaches are advised to purposefully use scientific, sport-specific, and pedagogical knowledge sources when coaching.

**Implications for Researchers**

As a single-case, case study, this research cannot provide external validity for knowledge that all coaches use or how that knowledge influences coaching decisions. The naturalistic generalizations found in the present study instead provide information that researchers can apply to other populations (Creswell, 2007). A larger scale of understanding of the present topic within multiple coaching populations would better provide external validity of what types of knowledge are present in coaching and how those influence coaching decisions. A larger-scale understanding of the present topic could be developed through a multi-case, collectivistic case study (Stake, 1995). A multi-case case study solely inclusive of coaches who have demonstrated markers of success would allow researchers to examine commonalities in how knowledge influences coaching. Investigations that look for saturation within knowledge themes between multiple cases could provide new insights on the influence of knowledge on coaching decisions (Creswell, 2007). Results from multi-case investigations may provide a clearer picture of the topic of coaching knowledge on a larger scale, and provide a firmer standing for evidence-based decisions in the formulation of coaching education curricula and implementation of coaching skills.

Additionally, while the present study investigated the relationships between knowledges and coaching decisions, the present study did not attempt to quantify the
strength of the relationships, nor did it aim to establish a hierarchy of knowledge types to ascertain their comparative importance in endurance running coaching decisions. Prior literature (e.g., Ward & Ayvazo, 2016) on the relationships between PCK and discrete categories of Shulman’s (1986) teaching knowledges indicated that PCK is directly influenced by knowledge of content and the knowledge of the learners, and is context-specific. These conclusions were drawn from classroom populations. It is reasonable to hypothesize that the relationships between PCK, knowledge of content, knowledge of the learners, and context might hold true across contexts. However, the empirically acknowledged, context-specific nature of PCK directly indicates that the internal validity of these relationships cannot be assumed in coaching contexts. Undertaking investigations that aim to validate the strength of relationships between discrete categories of teaching knowledge and PCK in a coaching context is advisable. A better understanding of the strength of relationships between knowledges and PCK may also provide a firmer position from which to make evidence-based decisions in the formulation of coaching education curricula.

Finally, the present study was undertaken rooted in the Coaching Schematic (Abraham et al., 2006), which applied the coaching knowledge of Nash and Collins (2006) to the decision-making process. These knowledge typologies of Nash and Collins were adjusted from typologies identified by Kreber and Cranton (1997, 2000), who delineated curricular, instructional, and pedagogical knowledges as independent categories from the work of Shulman (1986, 1987). However, more recent investigations (e.g., Ball et al., 2008) have acknowledged that the placement of curricular knowledge within Shulman’s work might be in fact a subset of pedagogical knowledge based on the rationale of Grossman (1990), who was part of Shuman’s research group. Ward and
Ayvazo (2016) identified that few relationships between discrete categories of Shulman’s framework are empirically established, but are rather theory-based categorizations of teaching knowledge. In short, there is disagreement on whether curricular knowledge is a standalone category, or if it is a further characterization of pedagogical knowledge. The conflicting ontological relationships between knowledge categories indicate that further empirically based study is required in the area of teaching knowledge. Research that aims to understand the ontological relationships of knowledge types observed in the coaching process may help untangle the organization of knowledge types and better understand not only their relationship to coaching, but their relationships with each other and how those relationships in turn influence coaching. Developing a more empirically formed understanding of the ontological implications of coaching knowledge may provide a firmer standing for evidence-based decisions in the formulation of coaching education curricula.

**Limitations of the Study**

The present study is a single-case, instrumental, qualitative case study. As a single case, this study is limited in the generalizations that it is able to draw. A single case is not able to establish on a large scale that the present findings will hold true for other coaches. Generalizations from the present study are limited to naturalistic generalizations, in which the reader interprets how the findings might apply to their own context.

Additionally, while there was great interest in the case itself, an instrumental case study is characterized by its desire to understand something else better (Stake, 2005). In this case, great care was taken to focus the study on the knowledge typologies present in its declared framework, the Coaching Schematic (Abraham et al., 2006). Because of this, knowledge sources that did not fit within the parameters of scientific, sport-specific, and
pedagogical knowledges declared by the Coaching Schematic were omitted, as they were outside the scope of the study. As such, the present investigation is limited to examining the coach’s decision-making in light of predetermined knowledge typologies.

Limitations due to the length of visit were also identified. Indeed, to capture the entire approach of an effective coach in four days is not possible. A longer visit would have allowed for more observed examples of the coach’s decision-making, which would have strengthened the validity of the findings. Additionally, while the expressed purpose of this study was not to examine decision-making in competition, the lack of observed competition preparation during the visit reduced the ability to examine all the knowledge sources that influence a coach’s competition planning.

Summary

This chapter provides the conclusions and implications of a study that investigated what knowledge types contributed to the decision-making process of a competitively successful endurance running coach, and how that influenced coaching decisions. This study is the first to present how a successful coach integrates knowledge into his decision-making. Evidence suggested that scientific, sport-specific, and pedagogical knowledge all contributed to coaching. Pedagogical knowledge was further specified as either pedagogy of coaching and sport, and pedagogy of coaching and individuals. Knowledge types influenced coaching actions in an interconnected and interwoven way. The coach used knowledge from multiple typologies to make decisions on coaching actions. The findings of the present study emphasize pedagogical knowledge that is not reflected in formal coaching education curricula. Implications of the study indicate naturalistic generalizations that might be applied to formal coach education efforts. Furthermore, this investigation highlights research directions for the refinement
of coaching knowledge frameworks, as well as research on decision-making that may provide a larger-scale representation of the relationship between coaching knowledge and the coaching process.
REFERENCES


https://doi.org/10.1123/iscj.2015-0022


A lifespan perspective (pp. 101–144). Morgantown, WV: Fitness Information Technology.


APPENDIX A

INITIAL CONTACT OF PROSPECTIVE PARTICIPANT
The transcript below will be sent by email or mailed letter to the prospective participant:

Dear [Insert Name of Coach],

My name is Marshall Milbrath. I am a doctoral student at the University of Northern Colorado. I am conducting a study that aims to better understand the coaching methods of endurance running coaches who have a history of competitive success. This study also aims to understand how coaches developed the methods that they use over the course of their career. I am contacting you to invite you to be a part of this research. The reason I am reaching out to you specifically is due to the success you have had as a collegiate and post-collegiate coach.

This study will primarily consist of three interviews that will last 45-75 minutes each. Additional information that might be useful would be follow-up interviews, documents that you use to direct your coaching (graphs, charts, training log templates, electronic spreadsheets, etc.), or observation of one or more training sessions. However, agreeing to be interviewed would not obligate you to give me access to any further information.

I want to distinguish this request from a request for an interview in a news or entertainment source. This is a scientific study, and as such your identity would be kept CONFIDENTIAL. In the final composition of the study, any direct references to you would be done so with a pseudonym. The interview itself would consist of open ended questions focused to understand your methodology. The intent of the interview will not be to challenge what or how you coach your athletes, but rather to understand it. Nor is the intent of this interview to promote different training methods for your use.

I personally think that understanding how you have coached your athletes would be very enlightening to other coaches who aspire to maximize their athletes’ potential. If you are willing to participate, or interested in hearing more information, please contact me or my research advisor. Thanks for your consideration, and I hope to hear from you soon.

Most sincerely,

Marshall J. Milbrath, MEd
827 N. Garfield Avenue.
Loveland CO, 80537
970.541.4824
marshall.milbrath@unco.edu

Scott Douglas, PhD
University of Northern Colorado
Campus Box 39
Gunter Hall 2710
Greeley, CO 80639
970.351.2233
scott.douglas@unco.edu
APPENDIX B

INTERVIEW PROTOCOL
**Contextual Questions**

- Why did you decide to become a coach?
- Explain your approach to coaching endurance runners.

**Coaching Knowledge and Decision-Making**

- What kind of information do you use to direct training?
- How important is it to you to use scientific information when coaching? (e.g., physiology, biomechanics, psychology, etc.)
  - How do you use this information?
  - Will ask about the following topics if they don’t emerge in the participants’ answers
    - Psychology
    - Physiology
    - Biomechanics
    - Child development
    - “Sports science”
- How important is it to you to use information specific to track and field when coaching?
  - How do you use this information?
  - Will ask about the following topics if they don’t emerge in the participants’ answers
    - Tactical knowledge
    - Technical knowledge
    - Knowledge of the sport
    - Knowledge of other sports
- How important to you is the ability to teach when coaching?
  - How do you implement good teaching when you coach?
  - Will ask about the following topics if they don’t emerge in the participants’ answers
    - How to coach
    - Skill acquisition
    - Communication
    - “Pedagogy”
    - Performance analysis
- If training needs to be changed or redirect for an athlete/group of athletes, what do you base the change of direction on?
APPENDIX C

PREPARED DOCUMENT ON COMPETITIVE SUCCESS
Cross-Country

- How many combined men and women have won national championships in cross-country on your team while you have been the head cross-country coach of the respective teams?

- How many combined men and women have been awarded All-American honors in cross-country on your team while you have been the head cross-country coach of the respective teams?

- How many combined men and women have won conference championships in cross-country on your team while you have been the head cross-country coach of the respective teams?

Indoor Track and Field

- How many combined men and women have won national championships in the events 800 meters run and longer on your team while you have been in the lead endurance coach of the respective teams?

- How many combined men and women have been awarded All-American honors in the events 800 meters run and longer on your team while you have been in the lead endurance coach of the respective teams?

- How many combined men and women have won conference championships in the events 800 meters run and longer on your team while you have been in the lead endurance coach of the respective teams?

Outdoor Track and Field

- How many combined men and women have won national championships in the events 800 meters run and longer on your team while you have been in the lead endurance coach of the respective teams?

- How many combined men and women have been awarded All-American honors in the events 800 meters run and longer on your team while you have been in the lead endurance coach of the respective teams?

- How many combined men and women have won conference championships in the events 800 meters run and longer on your team while you have been in the lead endurance coach of the respective teams?
APPENDIX D

DEIDENTIFIED VIDEO LIST
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<thead>
<tr>
<th>De-ID Title</th>
<th>Year</th>
<th>Time</th>
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<td>July, 2005</td>
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<td>Interview post-competition at national championships in which team did not win</td>
<td>May, 2007</td>
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<tr>
<td>University broadcast featuring the participant and his program</td>
<td>August, 2008</td>
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<tr>
<td>Interview post-competition at regular season competition</td>
<td>September, 2008</td>
<td>03:02</td>
</tr>
<tr>
<td>Participant addressing a high school camp post-workout</td>
<td>November, 2008</td>
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</tr>
<tr>
<td>Interview at post-competition event</td>
<td>November, 2008</td>
<td>05:48</td>
</tr>
<tr>
<td>University promotional video for participant's program (Video 1 of 2)</td>
<td>February, 2009</td>
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</tr>
<tr>
<td>University promotional video for participant's program (Video 2 of 2)</td>
<td>February, 2009</td>
<td>02:06</td>
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<td>Interview after presenting at a conference</td>
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<tr>
<td>Presenting at a conference (Video 3 of 3)</td>
<td>December, 2009</td>
<td>13:21</td>
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<td>Participant speaking to a group of high school runners post-workout</td>
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<tr>
<td>Interview as part of a university sports cast</td>
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<td>Interview day(s) after competition</td>
<td>October, 2010</td>
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<td>Highlights (official production) of conference championships in which men's team won</td>
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<tr>
<td>Interview with participant for sport specific website</td>
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<tr>
<td>Interview day(s) prior to competition</td>
<td>December, 2010</td>
<td>02:53</td>
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<tr>
<td>Participant addressing a high school camp post-workout</td>
<td>January, 2011</td>
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<tr>
<td>Promo for a video highlighting a ceremony for the participant's mentor</td>
<td>March, 2011</td>
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<td>Interviews of multiple people, including participant, sharing stories of participant's mentor</td>
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<td>Highlights (official production) of conference championships in which men's team won</td>
<td>March, 2011</td>
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<tr>
<td>Highlights (official production) of conference championships in which women's team won</td>
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<td>Highlight video of a competition season made by participant's athlete</td>
<td>November, 2011</td>
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<td>Student-interview of the participant</td>
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<td>May, 2012</td>
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<td>Highlight video from competition hosted by the participant's university</td>
<td>September, 2012</td>
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<td>Event Description</td>
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<td>October, 2012</td>
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<td>Highlight video (official production) of conference championships in which men's team won</td>
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<td>Interview post-competition, winning conference championships</td>
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<td>Documentary on participant's team</td>
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<td>Hall-of-fame induction of past women's team coached by participant</td>
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<td>Duration</td>
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<td>Promotional type video displaying team values (no spoken words)</td>
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APPENDIX E

INITIAL RESULTANT CODES
KNW = Knowledge
DEC = Decisions
GOL = Goals

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<thead>
<tr>
<th>Code</th>
<th>Definition</th>
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<tbody>
<tr>
<td>KNW: AthNeed</td>
<td>Knowledge of Athletes' Needs</td>
</tr>
<tr>
<td>KNW: Self</td>
<td>Knowledge of Own Strengths and Limitations</td>
</tr>
<tr>
<td>KNW: Envirmt</td>
<td>Knowledge of Coaching Environment</td>
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<tr>
<td>KNW: Logistic</td>
<td>Knowledge of Logistic Restraints</td>
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<tr>
<td>KNW: SprtSci</td>
<td>Knowledge of Applied Sport Science</td>
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<td>KNW: Health</td>
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<td>KNW: PerfAn</td>
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<td>KNW: Coach</td>
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<tr>
<td>GOL: Excell</td>
<td>Goals for Pursuing Excellence</td>
</tr>
<tr>
<td>GOL: Program</td>
<td>Program Goals</td>
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