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## Research Article

# Championship Science Olympiad Team: Coaching Influences on Student Performance

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### Abstract

The influence of coaches working with students in grades 6 - 12 in the context of an extra-curricular academic competitive team such as Science Olympiad has not been well studied. The purpose of this study was to examine the influences of a successful head coach in the Science Olympiad program by studying a coach and team that has consistently reached the highest level of success in this program. This qualitative, intrinsic case study investigates one middle school Science Olympiad coach, Drew Kirian, and his team. Drew is one of only two coaches that has guided his team to six consecutive national championships in the Science Olympiad Program, making him a unique coach. Three categories emerged which help explain the components of successful coaching in the Science Olympiad program: structure, relationships, and expectations. These themes are well aligned with the coach-athlete relationship model developed by Mageau & Vallerand. This model may be useful in describing the necessary components of a successful coach in the academic competitive team context.

### Keywords

Science Olympiad, academic competition, coaching, extra-curricular activities, gifted

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**Introduction**

The term coaching is generally used to describe the interaction and relationship between an expert in an area and a novice. The novice may have a range of experience and abilities in this area, and receive individualized direction from the expert. Coaching has been applied to contexts beyond athletics, such as academic coaching and coaching psychology, which teach skills that promote academic learning and increase performance in work settings.

Academic coaching is a growing field that focuses on individualized student academic learning. Academic coaches build a relationship with students and help them learn skills that extend beyond content understanding. These skills include problem solving, conflict resolution, organizational skills, and time management, which enable students to be successful in an academic setting (Barkley, 2011). In post-secondary environments, academic coaches help students “deepen their learning, take responsibility for their actions, improve their effectiveness, and consciously create the outcomes in life” (Webberman, 2011, p.19). Academic coaching is concerned with improving the skills of individuals rather than preparing students for a competition.

Coaching psychology adapts therapeutic approaches used in a clinical setting for the purposes of improving performance in the work place and home life (Palmer & Whybrow, 2006). There are many psychological coaching techniques that have been studied in clinical settings, but this type of coaching does not yet have a unified theory of coaching (Franklin & Doran, 2009) and has not been applied to a competitive environment.

Academic coaching and coaching psychology may inform successful coaching of students in a competitive context. Academic coaching and coaching psychology use self-regulated learning through co-regulated learning to improve the personal performance of the student. Self-regulated learning promotes effective learning through controlling one’s motivations and emotions. As summarized by Ormrod (2012), there are nine factors that contribute to self-regulated learning: goal setting; planning; self-motivation; attention control; use of effective goal-relevant strategies; self-monitoring; appropriate help-seeking; self-evaluation; self-reflection (p.356). Self-regulated learning has its roots in the Vygotskian perspective of socially regulated learning, where students learn these skills by watching others and by engaging in self-directed learning opportunities. Students may grow in their self-regulated learning through co-regulated learning, when an adult “shares responsibility for directing the various aspects of the learning process” (Ormrod, 2012, p.358). Co-regulated learning involves the direction of an adult coach to promote self-regulated learning skills that can be used in an academic, work, or life setting. Applying self-regulated learning and co-regulated learning to coaching

students in an academic competitive environment may lead to an improvement of these skills.

### **Coach-athlete relationship model**

Self-regulated learning and co-regulated learning relies upon the strength of the relationship between the coach and the student. The relationship between a coach and athlete “is one of the most important influences on athletes’ motivation and subsequent performance” (Mageau & Vallerand, p. 884, 2003). Mageau and Vallerand (2003) summarized research on the three basic human needs for intrinsic and self-determined extrinsic motivation, which are perceived autonomy, competence, and relatedness. These authors define intrinsic motivation as participating in an activity for pleasure and satisfaction and define self-determined extrinsic motivation as participating in an activity that aligns with one’s values. Perceived autonomy is achieved when a person believes their actions are aligned with their values as opposed to feeling forced to act. Competence and relatedness are positively influenced by non-controlling feedback from a coach that engages in autonomy-supportive behaviors. Mageau and Vallerand (2003) have delineated that autonomy-supportive coaches:

- Provide choice within specific rules and limits
- Provide a rationale for tasks and limits
- Acknowledge the other person’s feelings and perspectives
- Provide athletes with opportunities for initiative taking and independent work
- Provide non-controlling competence feedback
- Avoid controlling behaviors such as: overt control; criticisms and controlling statements; tangible rewards for interesting tasks
- Prevent ego-involvement in athletes.

The coaches’ personal approach to interacting with athletes influences their autonomy-supportive behaviors which can lead to satisfying the needs of the students (Mageau & Vallerand, 2003). In addition, coaches need to provide structure and be involved with their athletes. This relationship between coach and athlete may apply to other contexts where an adult is coaching students to develop their talents and improve their performance. Science Olympiad is an example of an academic competitive environment where the relationship between the students and their coach may influence student motivation and ultimate success.

### **What is Science Olympiad?**

Science Olympiad is an academic extra-curricular science competition for students in grades K-12 in countries around the world. There are multiple-country International Science Olympiad competitions focused on a specific discipline. While the U.S. competes in these international competitions, they are limited to a small

group of elite students. Many more U.S. students from all 50 states compete in local, regional, state and national competitions. At the middle school and high school levels, teams consist of up to 15 students who compete in 23 varied events. These events cover many science disciplines including: life sciences; physical science and chemistry; earth and space science; technology and engineering; and inquiry and nature of science. These events incorporate aspects of content knowledge, scientific process, engineering application and/or engineering design (Kulbago, Mulvey & Alamri, 2016; Science Olympiad, 2014). Participating in Science Olympiad leads to the perceived outcomes of learning, talent development, social and life skills development, and entry into Science, Technology, Engineering, and Math (STEM) pathways (Kulbago et. al.). Students gifted in STEM disciplines perceive Science Olympiad to be an avenue for talent development and enrichment.

One measure of success is consistent team achievement at competitions. The highest level for team placement is first place at the national competition, and reaching this highest level several years in a row is quite an accomplishment. As of 2013, in the 30 year history of the U.S. National Science Olympiad program, only two teams have had six consecutive national titles in Science Olympiad: Booth Middle School from Georgia and Solon Middle School from Ohio. Most recently, the Solon Middle School has won the national title, from 2008 to 2013. The head coach of the 2013 National Champion middle school team reflects on his sixth national title:

*I am still in shock. Every year my assistant coach and I say that we have had a good run and wonder if we should go out on top. I am going out on top this year. The students showed how important it is to be a team. Their consistency is what won it for Solon. 167 points at Nationals is amazing. It feels good (Drew).*

Winning and recognition for their achievements is an important component of the Science Olympiad program and a definite measure of success.

### **Purpose of Study**

While many studies have examined the influence of coaches in competitive athletic contexts, no studies to date have examined the influence of coaches in a competitive academic context. This study will examine the competitive academic program U.S. Science Olympiad and the influence of a successful head coach on his team. This study will examine one specific successful head coach, Drew Kirian, who lead the Solon Middle School team to the National Science Olympiad competition numerous times and finished in first place for six consecutive years, from 2008–2013. This feat has only been matched by one other school in the history of the Science Olympiad program. While many factors contribute to this high level of success, the purpose of this study is to examine the influence of the head coach of a Science Olympiad middle school team that has consistently reached the highest level of achievement

in this program. This study will attempt to explore some of the key components of a highly successful team due to the contributions of the head coach. Once uncovered, these key components will be compared to a coach-athlete relationship model in order to identify similarities between a competitive athletic context and a competitive academic context.

## **Methods**

This qualitative intrinsic case study investigates one middle school Science Olympiad coach, Drew Kirian, and his team. Creswell (2007) defines an intrinsic case study as a unique case among many within a program. Drew is one of only two coaches that has guided his team to six consecutive national championships in the Science Olympiad Program, making him a unique coach.

All the names used in this study are actual names and not pseudonyms. The identities of all the participants are easily discovered given the unique nature of the case in this study, making it impractical to attempt to use pseudonyms. All participants approved the use of their actual names in this article. This study received approval from the Institutional Review Board for research involving human subjects.

## **Participant Selection**

Drew was the head coach for the Solon Middle School team for 26 years before retiring from teaching and coaching. Solon Middle School is located in the Cleveland suburb Solon, Ohio in the United States of America. Solon had been rated one of the top school districts in the nation. According to U.S. News and World Report 2014 ranking of U.S. high schools, Solon High School ranked 11<sup>th</sup> in the State of Ohio, 264<sup>th</sup> in the U.S., and 100<sup>th</sup> STEM school based on college readiness, student to teacher ratio, and math and reading proficiency.

To include additional perspectives of the attributes of a successful head coach, additional participants were purposely selected that had varying degrees of contact with Drew. In Ohio, there have been several local invitational competitions each year prior to the regional competitions. Many teams from this area attended several competitions each year and had multiple opportunities to interact with both the Solon Middle School team and the head coach. Several middle school coaches from Ohio were invited to participate in this study and four coaches volunteered to participant. Two of these coaches were assistant coaches for the Solon Middle School team, Nevin Voll and Bryan Drost. Bryan Drost took over as the new head coach after Drew retired. These two coaches were selected because of their close working relationship with Drew and their association with the team. The third coach, CeAnn Chalker, has been highly involved with the national Science Olympiad program for many years. CeAnn has been a middle school coach for over 20 years,

has taken her team to the national competition eleven times in seventeen years, was a parent of four Science Olympiad students, served on national Science Olympiad committees, coordinated a regional weekend coaching clinic for several years, lead many coaching workshops at the national coaching clinic, organized the 2013 National Science Olympiad competition, and has been a close friend with Drew and Bryan. CeAnn's high level of involvement in all levels of Science Olympiad provided a broader national context in which to frame this in depth look at one team and head coach. The last participant is Laura Latham, a middle school coach with two years of experience as a head coach and several years of experience as a parent of Science Olympiad students. Laura's team competes in a neighboring region but regularly attends the local invitational competitions. Laura received advice from Drew before organizing her first local invitational at her school. Laura's relatively limited coaching experience and interaction with Drew offered a different perspective of him and his team, a perspective that would be based on acquaintance rather than on close association.

### **Data Collection**

Data sources were informal observations of Drew and the Solon Middle School team and semi-structured interviews that were audio recorded. During the spring of 2013, I interviewed Drew and Nevin regarding their general experiences as coaches in the Science Olympiad program as part of a separate research study (Kulbago, et al., 2016). I met with Drew and Nevin separately in a classroom at Solon Middle School in the evening during the team practice sessions. I asked them about the structure of their team, why they spent so many hours coaching the team, and what they did to motivate their students. Upon learning that Drew was retiring at the end of the current school year, I decided to interview him in more depth throughout the end of his last year as a science teacher and Science Olympiad coach.

I conducted three additional interviews with Drew in the spring of 2013, each lasting about 30 minutes. The interviews were scheduled before the State competition, between the State competition and the National competition, and after their sixth National championship finish. During the interview, I used a conversational responsive interview style where the tone was friendly, the pattern of questioning was flexible, and new questions evolve based on the participant's responses (Rubin & Rubin, 2012). I began by asking questions about his personal feeling regarding his last year as the Solon Middle School head coach, followed by questions regarding the structure of his team. I also asked about what he specifically did to motivate his students and the qualities of a good coach. After each interview, I reviewed the data and asked additional follow up questions to help "ask for missing information, explore themes and concepts, and test tentative explanations" (Rubin & Rubin, 2013, p. 169). After reviewing this initial data, I decided to include the

perceptions of additional middle school coaches that have interacted with Drew and the Solon Middle School team. I interviewed three additional coaches in the spring of 2014 using a similar conversational interview format. I interviewed Bryan in person during a local invitational competition, but was not able to meet with other coaches due to time constraints. I interviewed CeAnn and Laura using an online meeting subscription that had audio recording capabilities. Each of these interviews lasted about 60 minutes. When I interviewed these three additional coaches, I asked them to describe how they measured success on their own team and to describe their perceptions of and experiences with Drew and his team.

In addition to the formal interviews, I used my role as a middle school coach and parent to make informal observations of many of the participating teams at Science Olympiad competitions. My experience as a coach allowed me to better understand the structure of the Science Olympiad program which helped frame the interview questions and conduct data analysis.

### **Data Analysis**

The interviews were transcribed and data were analyzed using a paradigmatic-type narrative qualitative analysis which Polkinghorne (1995) describes as the “construction or discovery of concepts that give categorical identity to the particulars and items in their collected data.” This form of qualitative analysis allowed for categories to emerge from the participant narratives rather than approach the data with predefined categories. Paradigmatic reasoning also employs a second level of analysis which attempts to find links between the categories to more fully describe the overall experience. Hatch (2002) suggests beginning qualitative analysis by reading all the data for a sense of the whole story, thus I began by reading the data from Drew and Nevin and reviewing my informal observations while recording memos of my impressions. This was followed by identifying emerging initial categories, structure and relationships. While the structure of a team does follow national guidelines, the inner workings of a team vary between teams. I found that some middle school teams have one head coach with a few supporting parents while other teams have a different adult coaching each of the 23 events. Some teams practice once a week while others meet several times a week. Some teams attend one competition a year while others attend over 10 competitions a year. What coaches do while coaching an event and how they interact with their students varies. The type of relationships coaches have with their students and the inner structure of the team influences the experiences of the students when participating in Science Olympiad.

To challenge the initial emerging categories (Hatch, 2002), I wanted to include descriptions of Drew and his coaching style as perceived by other coaches. Three additional coaches volunteered to share their experiences working with Drew,

providing additional support to the initial categories and identifying another category. When I asked Bryan to explain why he thought Drew had been successful, he cited three factors;

- The importance of providing a practice schedule for the students,
- Building relationships with people, including students, parents, coaches, and community members,
- Focusing on how the students can improve their performance; focusing on the content they are learning and not on winning.

The first two statements support the emerging categories of structure and relationships. The third statement drew attention to how a coach sets expectations in order to support their students to obtain their learning and performance goals. This last category describes the expectations a coach has for the students which sets the tone of the students' overall experience of this program.

After incorporating this additional data, I shared the draft summary with Drew and the other coaches as a method of member checking (Hatch, 2002). The participants generally agreed with these three categories of successful competitive academic coaching and my interpretation of the data.

## Findings

Components of successful competitive academic coaching are described by the three categories which emerged during the data analysis process: structure, relationships, and expectations. Structure includes the organization of the team as well as providing a structure for the students to help them reach their learning and performance goals. Relationships describe interactions between the coach and the students on his/her team, as well as with parents and community members. Expectations are built around the structure of the team and encompass learning goals, organizational goals, and standards of behavior. These three categories contribute to an environment which supports a student's perceived autonomy, relatedness, and competence which leads to the desired outcomes of student intrinsic and self-determined extrinsic motivation.

### Structure

There are many ways to structure a Science Olympiad team with regard to the number of students on the team, requirements or try-out process, the frequency of practices, the number of coaches, and the number of yearly competitions attended. The structure of the Solon Middle School team has changed over the 26 years that Drew had been the head coach.

*A lot of the other successful teams have more than one coach. They have parent coaches. It took me a long while to realize I couldn't coach 23 events. It's a lot of work (Drew).*



Drew started out trying to coach all 23 events himself and admits that it took him many years to realize he could not effectively coach all the events himself. After about 15 years, Drew recruited his first assistant coach, Nevin, who coached a few events every year as well as managed the practice schedule and sorting the students into events. Drew was a science teacher and Nevin became a substitute teacher after retiring from a manufacturing job. They were the only teachers that coached the team until recently when a Spanish teacher, Bryan, joined the team as the second assistant coach. Each teacher received a small coaching stipend from the school district.

During 2013, over 100 students attended the try-outs for the middle school team. Drew used a combination of a written exam and a mechanical building exam to evaluate the students and select 34 students. “The way I run my try-outs, I think it’s fair, but I still miss the one factor of who is genuine in how they want to approach Science Olympiad... It’s that one invisible factor you wish you could evaluate” (Drew). Students that were members of the team the previous year had to try-out for the team each year and were not guaranteed a place on the team based on previous team membership. The balance between “female and male is pretty important to me as well. Looking across the diversity of the team, as far as culture, is very important to me” (Drew). These 34 students would fill two teams of 15 students with 4 alternates. These 34 students would then select their top five event preferences and the coaches would fill the event roster openings based on a student’s past experience and event preference. After students were assigned to events, the coaches would create a practice schedule based on a two week rotation. Practice sessions were scheduled at the school for two hours one night a week. During each practice session, several events would meet simultaneously for about 30 minutes before rotating to a new event for the next 30 minute time slot. Students in an event would meet with their coach for about 30 minutes every two weeks. “Some coaches work with their kids every night. That’s not my type of coaching. I think it burns the kids out” (Drew). Separate building times were scheduled in the school work shop for events that required pre-building of a device. A community member also allowed students to use his private work shop to build devices. Drew would coach two events, Nevin would coach two events, Bryan would coach one event, and parents or past team members coached the remaining events.

The team would begin meeting every week starting in October. The first local invitational competition was usually held the following January. The Solon Middle School teams would attend a local invitational almost every weekend in January and February and travel across Ohio and neighboring states to attend these competitions. Near the end of February, the team would attend their regional competition. If a team competing in the regional competition finished in the top quarter of the attending teams, they would advance to the state competition, usually held in April.

If both of the Solon teams qualified for the state competition, only one of the two Solon teams would be permitted to advance and the coaches would have to select 17 of the 34 students to continue to the next level of competition. If the team attending the state competition finished in the top two out of forty teams, the team would advance to the national competition, usually held in May. In order to pay for the team expenses, students sold candy bars to raise money and corporate sponsors donated money to the team. The school supported the team by providing buses and school classroom use for team practices.

Drew, as head coach, would average 20 hours per week organizing the team and making travel arrangements to the competitions. Additionally, he averaged another 10 hours per week working directly with students. When the team attended a competition further than two hours away, he would spend two days traveling with the team and attending the competition. The number of hours per week increased between January and May when the team was attending competitions. The assistant coaches each spent a similar number of hours each week working for the team.

In addition to the organization of the team, a coach needs to provide structure to help their students learn. A good coaches will provide a variety of learning experiences but they also need to teach the students skills to help them learn and to help them learn how to learn. At the middle school level, students need help learning how to manage their time and how to set goals. These students need to learn how to create a list of tasks that need to be accomplished and how to create a schedule to complete these tasks before the competition. Additionally, the students are held responsible for completing the tasks and doing the necessary work each week. Teaching these skills helps the students learn how to do research, how to incorporate what they are learning with what they already know, and how to manage their time efficiently. These skills will help them not only in preparing for Science Olympiad but in all areas of their life.

### **Relationships**

The importance of team work and team bonding was mentioned by all the coaches. “We try to instill a culture that we are a family. Teamwork is the most important thing” (Drew). The team will not be as successful if all the team members are not supporting one another and working together. Many teams consist of students in different grades, and they may not have opportunities to interact with one another outside of school. All the coaches mentioned the importance of team bonding through social experiences that provide time for friendships to form. Drew maintained a tradition of taking extra time to travel to competitions that were more than two hours away and spending the night in a hotel. Drew felt that this positively impacted the relationships between the students on the team and provided them with an opportunity to develop independence and leadership skills. During Bryan’s first

year as head coach, the administration did not want the students to miss school for travel. Bryan saw a decrease in performance and in the strength of the relationships between the students which convinced the administration to continue to allow time for the students to travel during the school day. These bus trips allowed the coaches to build strong relationships with the students, as illustrated in Nevin's comment that "talking to them on the bus, I get to know them a lot better."

Drew sets an example for his students as he builds relationships with parents, community members, and other coaches. While Drew enjoyed working with the students, he greatly valued the relationships he built with adults as well.

*What I think is also important is the friendships I get from the parents and community volunteers. I made some deep friendships with them through coaching, and working with the kids, and it's a great thing. (Drew)*

Over his 26 years as a coach, Drew interacted with many parents and coaches from other schools. While he did acknowledge that he didn't get along with every coach he met, he did form many long lasting friendships. CeAnn reflects, "I've enjoyed all the years I've known him, he's a really nice guy".

### **Expectations**

When coaches are working with students to prepare for an event, they set expectations for the students which are supported by the structure of the overall team as well as the structure during the practice sessions. During an event practice session, a coach would work with at least four students that were learning that specific event. The coach would provide materials or information to help the students learn the content or process specific to the event parameters. Coaches would frequently assign work or research for the students to complete before the next practice session. Students were expected to come prepared to each practice session and to complete the assignments. Coaches also provided opportunities for additional learning experiences in the form of field trips or visits to or from professionals in that field.

*The event coach will meet with the students, and it seems to be working pretty well. They get a lot of good material in there. We're not really spoon feeding them, but giving them more opportunities to gain more knowledge, or tests. The kids do all the work, the coach just gives them a little bit of a challenge (Drew).*

For events that required pre-building of a device, students were expected to design their device and create a building schedule with the coach. Students in building events would meet in the wood shop each week at a scheduled time to work on building their device. It was noted by all the coaches that a significant amount of time was spent teaching the students organizational and time management skills in addition to teaching the students the science content. Students on a high school

Science Olympiad team are generally expected to manage their own time and there was not generally a dedicated coach for each event as seemed to be needed for a middle school team.

Drew, as the head coach, also established expectations as to behavior and attitude during team meetings, practice sessions, and during competitions.

*About 12 years ago, one of my friends, a Science Olympiad coach, he kept saying that when your kids walk up to the stage at States, if they don't get first place, they frown. So as a result, I've implemented, almost every week, we talk about how you receive yourself, how people perceive you. When you walk up on stage, we don't want any chins dragging, we want to have smiles on our faces no matter how we do. I always point out examples at tournaments where one of the younger kids will jump up and get excited over a 7<sup>th</sup> place ribbon and I think that is something that is really precious to see that happen. We also try to install sportsmanship. Never laugh at someone if they don't perform well, whether from your school or another school. If another school were to leave a set of goggles at home, we would be the first ones to offer it to them. It's all about meeting people, and becoming friends, and not about cut-throat competition (Drew).*

Drew recognizes that to some students a 7<sup>th</sup> place ribbon is a measure of success which has just as much importance as a first place finish. Drew also talks about the importance of sportsmanship, how the students react when receiving their awards, and how to handle both excitement and disappointment in front of others. Drew and his coaches created behavioral expectations during both the competitions and the award ceremony. Bryan commented on continuing Drew's expectation that their team be "known as the team that is kind, not just the team that wins" (Bryan). Bryan and Drew also talked with the students about how to handle negative comments from other teams and that they should not confront them or fight back, but should support other teams.

All the coaches mentioned many times that winning is not the most important aspect of the competition, but it is about striving to meet individual goals.

*If you make mistakes, that's fine, but just try your hardest and do your best. If we come in last in the tournaments, we're not going to get on anyone's backs, but we will just ask what we didn't know that we should have known (Nevin).*

This orientation toward learning from mistakes is a reflection of the coach's personal approach toward competition which drives their autonomy supportive practices and non-controlling feedback. These coaches focus on learning and improving rather than on winning and their interactions with the students stems from their personal orientation. Their feedback guides the students to reflect on

their own learning promoting autonomy and responsibility for their own success. Drew also maintained an expectation of responsibility for preparing for their events.

*There is also the responsibility that beyond the practices, they spend some time studying on their own. Each event meets every other week for a half an hour. The kids have to figure out what they need to learn, and spend the time to learn it (Drew).*

Another coach reflected that she tries to model Drew's integrity and emphasizes the importance of integrity and responsibility with her students. "If we can teach them this, we are successful" (CeAnn).

Drew recognizes the importance of providing learning experiences for the students beyond what they can learn from a book.

*A good coach gives the kids the opportunity to learn. I coach Rocks and Minerals and we went to Carnegie Museum to see more samples of rocks and minerals, and last weekend we went to Cleveland Museum of Natural History to see their displays and we ran into the curator and got to go back on an additional day and ask questions. Well-coached teams look for that little edge where you get a little bit more information. Give the kids opportunities to learn more and build better devices (Drew).*

Drew holds that good coaching includes providing the students opportunities to outside a school context. There are many organizations and professionals that welcome the chance to share their expertise with interested students.

### **Personal Experiences**

Bryan remembers the first time he met Drew, the summer before Bryan started his first year teaching at the school. Drew introduced himself as the Science Olympiad coach, never mentioning his other job as a science teacher. To Bryan, this demonstrated Drew's prominent identity as a Science Olympiad coach over his identity as a science teacher. When I asked Drew why he spent so much time and effort coaching his Science Olympiad team, he said "I've fallen in love with it. It's kind of an addiction for me. I just love being around the kids". Laura reflected on how generous and helpful Drew was when she asked for his help with organizing a new Science Olympiad tournament at her school. She benefitted from his passion for the Science Olympiad program and his willingness to help expand the program to other schools. Later when Drew talked about the friendships he developed over the years, he reflected:

*We all eat, breathe, and drink Science Olympiad. We believe in it that much. Even more important than winning is what the kids get out of Science Olympiad (Drew).*

During my last interview with Drew, I asked him what keeps coaching fresh and exciting after so much time, and he remarked:

*You never know what to expect with the new group of kids. It keeps it live. After the first competition you see the excitement in their eyes, and I see how they support their team. That's what it's all about (Drew).*

When I asked him of what he was most proud, he talked about how successful many of his Science Olympiad students had become.

*I have a former student that just finished up his degree at John Hopkins...getting ready for medical school. Another student went to medical school and is now working at the Museum of Natural History. One of my first students works at the University of California Berkeley...he's an astronomer. I have a couple of NASA engineers and some go to MIT. It is a big [source of] pride (Drew).*

Drew's focus on the students and their successes reflects his humble nature and motivation to coach for so many years. While his role as a successful Science Olympiad coach was one of Drew's identities, he did not want any personal recognition separate from the team.

## **Discussion**

Components of a quality relationship between a coach and athlete which leads to intrinsic and self-determined extrinsic motivation through autonomy supportive practices (Mageau & Vallerand, 2003) has been applied to the context of an academic competition. Through examining the coaching practices of a highly successful Science Olympiad coach and team, three components of successful coaching in an academic competitive context have emerged: structure, relationships, and expectations. Drew created a supportive team structure and provided experiences to guide the students toward achieving their learning and performance goals. Drew built relationships with his students, parents, and community members, and easily related to and sought out friendships with other coaches. Drew's coaching orientation focused on the needs of the students as he perceived their desire and motivation to learn and succeed. Drew's students enjoyed competing and learning through the Science Olympiad program and they chose to follow the structure put in place by Drew, supporting their autonomy in this program. When Drew and his coaches worked with their students, they provided them with rules and expectations for their learning as well as behavior. The students were encouraged to work independently and to be responsible for their own learning. The coaches provided feedback after a competition and helped the students find ways to improve their performance before the next competition. Drew provided a structure for learning, was involved with the students, and expected them to be responsible. According to

the coach-athlete model (Mageau & Vallerand, 2003), this should lead to student perceptions of autonomy, competence, and relatedness which lead to an increase in the student's intrinsic and self-determined extrinsic motivation. This is evidenced by the team's continued performance and attainment of the highest level of success in the Science Olympiad program.

### **Implications**

The use of the coach-athlete model (Mageau & Vallerand, 2003) in the context of an academic extracurricular competition helped to elicit those components that contribute to successful coaching. In the Science Olympiad context, it was shown that a successful coach provided the necessary structure for team and student organization, built positive and long-lasting relationships with his students and supporting adults, and provided expectations for learning and behavior around his team structure. This team environment provided the necessary conditions for the student's perceptions of autonomy, competence, and relatedness which lead to the desired outcomes of student intrinsic and self-determined extrinsic motivation. These motivations drove the students to achieve their performance goals and contribute to a successful result. While there is no one right way to structure and coach a competitive academic team, Drew's coaching philosophy provides an example of one formula for successfully coaching an academic competition team to reach the highest levels of success. This academic coaching model could influence other coaches of competitive academic teams to provide a structure and environment that builds positive relationships with students and sets expectations that are perceived by the students as providing them with choice and control over their own learning and success. To further explore these ideas, additional research is needed to study other competitive academic contexts as well as other successful coaches within Science Olympiad.

### **Biodata of the Author**



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