Learning to play or playing to learn- Enhancing ice hockey tactical and social cooperation skills through video game development project

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# Abstract

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This development project was born from the need and interest to create an innovative video game-based teaching method to enhance ice hockey tactical and social skills. The implementer of this work was an assistant coach from the Pelicans U18 academy ice hockey team, who was completing his work placement in Junior Pelicans ry during the season 2022-2023.

The aim of the development work was to create an interactive video game-based teaching method to support ice hockey coaching. The method is aiming to provide motivating and inspirational learning environment for junior hockey players, where they can gain more tactical knowledge and cooperation skills.

The selected approach for this work was action research, and innovative ideation methods like bodystorming where used. The success of the project was evaluated by using a survey and through observation during the process.

The result of action research was a video game-based teaching method. The method was developed as the result of a ten-week process with group of Pelicans U18 academy players. The method is designed to support tactical and social learning of ice hockey players aged 15-20.

The method turned out to be helpful for player’s and the coach who participated the process. When evaluating the further usage and possibilities of the method the resources it requires must be considered: equipment, facilities, and orientation. Also, an individual knowledge and ability to lead learning processes of possible implementers of the method (coaches), should be taken in consideration.

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1 Introduction

Society in general is changing fast and one of the biggest factors is digitalization. Also, in schools and sports, more and more digital and virtual tools are used to facilitate learning or increase athlete’s performance. The new generation of youth have used to more virtual or game-based learning and the whole culture is changing from notebooks and drawing boards to computers and video screens. Characteristics of modern teaching and learning are moving towards more interactive, learner-centred, activity and peer collaboration-based methods.

When acting as a coach in junior sports, you need to position yourself as a teacher as well as a coach. A coach should always look for new opportunities and ways to facilitate learning, to develop as a coach and later on through experience be able to help the athletes succeed in their pathway. According to Rovio, Lintunen and Salmi (2009, p.180–181) creating an inspiring learning environment that increases motivation and emotional well-being, reduces stress, and supports feelings of safety. An inspiring learning environment can be helpful for learning and physical development, and individual needs, interests and wishes should be taken into consideration when facilitating the learning.

This development work came from the need and interest to create a video game-based teaching method to support ice hockey coaching from tactical and social perspectives. The development project was influenced by cultural change and the project aimed to create a new teaching method for coaches who could create safe, motivating, and inclusive opportunities for learning. The project was implemented at the Junior Pelicans ry organization within a U18 academy team during a season 2022–2023. The main implementers of this project were the assistant coach of the team and seven volunteer players. The club head of coaching and supervisor teachers from Haaga-Helia University helped to find the right way of implementing the project. Point out the fact that this project was made in the first place more to support the author’s coaching and learning, and to support the performance of the team and its players. On the side, there was permission from the club to complete this project and wider use of the possible result of the project inside the club was agreed to be discussed after the project.

The roster of the ice hockey team is a large number of players and other officers, and the big size of the group sets its challenges to coaching. Sometimes dividing the team into small groups and working closely within the groups can help in reaching better learning outcomes. Technical and physical skills are mostly learned on the ice or at the training gyms in ice hockey. Tactical and social skills are also developed on the ice, but a big part of them could be learned elsewhere and
from different perspectives. The outcome of the development work might provide an opportunity for the development of an individual player through a unique method.
2 Tactic and understanding of the game in team sports

Ice hockey can be classified as a team sport or as a ball game. More precisely Almond classifies games into four different categories in his book: invasion, fielding/run-scoring, net/wall and target games. (Jean-Francis Gréhaigne, Richard and Griffin, 2005, p.4) Ice hockey belongs into the category of invasion ball games together with handball and basketball for example (Jean-Francis Gréhaigne, Richard and Griffin, 2005, p.4). Tactic in team sports can be divided into team tactics and individual tactics. For an athlete to be able to execute tactics he/she needs to have a good enough base on technical, physical, and perceptual motor skills. The athlete also needs a strong will and enough intellectual performance skills. (Mero and Kalaja, 2016, p.305.) This chapter provides knowledge about team and individual tactics in theory and practice.

2.1. What is tactic?

In sports, tactic means an operation which aims to reach optimal success in competition. Tactic is cooperation between the coach and athletes, it is planned, and it takes into consideration of own and opponent's performance capabilities as well as the external factors of competition in individual or team competition. Tactic in general is separated from sport-specific tactics. Tactics can be implemented at a team level and an individual level. Overall tactic is based on rules and legalities of tactical operations. To be tactically successful in competition, it requires team, coach, and individual player's success. Tactical operations can be divided into three separate phases, analysis and planning of competition, outlining the optimal solution model and motor execution of a tactical task. The execution of these three tactical operations depends on the athlete's abilities to perceive and understand complex competition situations as fast as possible, create functional solutions and execute them. (Mero and Kalaja, 2016, p.305–306.)

2.1.1 Analysis and Competition Plan

When analyzing the competition and making the plan to prepare for competition, all the internal and external factors should be considered. Regarding competition conditions, things like the date and time of the competition, weather conditions, the conditions of the competition venue and accommodation-related factors should be taken into account. (Mero and Kalaja, 2016, p.305–306.)

2.1.2 Outlining the Optimal Solution Model

When outlining the optimal solution model for competition, it is recommended to contemplate the possible tactics of opposing teams, including the emotional and intellectual traits they are aiming
for during the competition. Available statistics and video recordings could be utilized when outlining the optimal solution for competition. (Mero and Kalaja, 2016, p.305–306.)

2.1.3 Motor execution of tactical task

When thinking about the motor execution of tactical tasks or competition in this context, the use of own technical capabilities and physical abilities optimally are the main factors for success in competition. It contains the decisions during and after the competition. In most team sports there are breaks between the playing events or periods and those breaks can be utilized for tactical analyses. Also, after the competition, it is crucial to find the right tactics for optimizing athletes’ recovery and readiness for the next competition. (Mero, Kalaja, 2016, p.305–306.)

2.2 Learning tactic

To be tactically successful in competition athlete needs several intellectual skills. All the needed skills are strongly related to various aspects of learning and cognition. Teaching tactics is a crucial part of coaching, and it should begin as early as possible. The tactic is strongly connected with technical, physical, and mental abilities. Ages between 10–15 are propitious for tactical learning, and good learning outcomes have been reached when tactical skills are connected with technical skill learning. (Mero, Kalaja, 2016, p.305–307.)

2.2.1 Learning tactic in theory

When going over to the overall tactic, the tactic can be discussed only from sports sports-specific point of view. To take advantage of sports competition an athlete needs to understand the sport’s nature and competition rules, by having that understanding an athlete can adjust tactical preparation and find optimal tactics for performance. (Mero and Kalaja, 2016, p.306.)

Sport-related thinking ability better known as sport or game sense is one of the most crucial factors of tactical skills. Game sense is the player’s ability to react independently to changing situations during the competition and the aim of developing sport-related thinking is to build logical, flexible, clever and evaluative thinking abilities for an athlete. (Mero and Kalaja, 2016, p.306.)

To execute tactics optimally an athlete needs anticipation skills and abilities to receive and analyze information during the competition and practice. Requirements of anticipation skills and perception-action coupling abilities are that an athlete can perceive relevant information that promotes success in tactical decisions in favour of his own or the team. Differentiation of essential information from immaterial information is a key factor to being tactically successful in competition. Especially
for youth athletes learning by following the competitions on TV, videotape or at the competition venue can be an effective way to learn tactics. (Mero and Kalaja, 2016, p.306–307.)

Learning or executing tactics is not only about cognitive capabilities or physical abilities. Emotional and will factors also play a role in tactics. Self-control, grit, and decision-making might have a major impact on tactical success. To optimize tactical capabilities an athlete needs to work with these skills. (Mero and Kalaja, 2016, p.306.)

2.2.2 Learning tactic in practice

Like all practicing also practicing tactics need to be systematic. The tactic in practice in the first place means absorbing tactical operating models and acquirements. The aim of repeated and systematic practicing of tactics is the automation of components of conscious action. When automation occurs, an athlete can focus on other areas of multifaced activity. (Mero and Kalaja, 2016, p.307.)

To develop tactical skills an athlete needs to learn to evaluate oneself correctly. An athlete can optimize his/her resources when he/she learns to recognize own athletic possibilities and boundaries. A positive learning environment and encouragement for independent practice have a significant effect on tactical learning. Most optimal tactic learning happens when an athlete is in a well-recovered and alert state of mind and body. It is still recommended that the tactic should also be practiced in a tired state now and then to reach better learning outcomes. When an athlete needs to make decisions based on his/her perceptions during practice, it promotes learning how to implement tactics on various occasions. (Mero and Kalaja, 2016, p.307.)

Technical, physical, and mental skills affect tactical possibilities, and it is essential to practice these skills simultaneously. Tight interaction between theory and practice in tactical learning promotes tactical learning. Progression in practicing tactics should be present, tactical capability should be developed and strengthened in increasingly difficult conditions. Learning some specific tactic can be started in conditions without an opponent, with a slower tempo or with fewer performance options available. Practicing tactics should always lead to better tactical performance levels from practice-to-practice competition to the actual competition, so it is important to try to simulate real competition conditions in field practice or learn tactics from analyzing competitions. Creating statistics out of competition videotape might help deepen the tactical understanding. When the tactical plan is completed in externally and internally challenging conditions, the top tactical performance level is reached. (Mero and Kalaja, 2016, p.307–309.)
3 Tactic in ice hockey

Ice hockey is a sport played on an ice rink, where two teams compete to score goals by shooting a puck to the opponent’s net. The game is played with a high degree of intensity, and it is known for its physicality, speed, and quick transitions. Ice hockey requires an elevated level of skill, strategy, tactics, and teamwork. This chapter opens the basic nature of ice hockey and the tactical elements at the individual and team levels.

3.1 Individual playing skills

Playing skills are the most essential things when analyzing individual player performance. A player’s ability to perceive game environment and events together with his/her technical abilities consist of playing skills. Player can react and make decisions in favor of his/her team, when having a good playing skill. Physical abilities (e.g., speed, strength, endurance), mental capabilities (e.g., creativity, courage, determination) and social cooperation skills effect also on players playing skills. (Savolainen, 2016, p.565.)

The main offensive skills are goal scoring, winning a space and keeping the puck. Vice versa main defensive skills are the ones that try to prevent the opponent from scoring, winning space or keeping the puck. The skills are illustrated in the Figure 1. The game situations in ice hockey are changing fast and the player needs to be able to react quickly between offensive play and defensive play. Readiness to transition between defense and offence is also considered an essential playing skill in ice hockey. Good readiness to react provides an opportunity to attack against unorganized defense in offensive play, and in defensive play fast defensive organization gives opponent less opportunities to accomplish their offensive play. (Savolainen, 2016, p.565.)
### 3.2 Game situation roles

According to Savolainen (2016, 565), a player's tactical skill is structured from the ability to utilize playing skills in different game situation roles. There are four game situation roles in ice hockey. The roles are divided into offensive or defensive roles, two roles each. Player needs to recognize different game situations to be able to operate in different game situation roles. When understanding game situation roles, players can complete game situation tasks by using their strengths. In offense player is either a puck carrier or a non-puck carrier. In defensive play, the player is either a defender of a puck carrier or a defender of a non-puck carrier. (Ahvenjärvi, 2016, p.309.) The objectives and possibilities to change between each game situation role are illustrated in Figure 2.

![Figure 1. Playing skills in offence and defence simplified (adapted from Savolainen, 2016, p.566)](image)
3.3 Individual tactic in ice hockey

According to Savolainen (2016, p.568.), a player's tactical readiness can be defined by the player's ability to observe ongoing events during the play. The player needs to percept directions of movement, distances, velocities and rhythm changes of the puck and players. Player's previous experiences of similar situations are leading the overall game situation performance. The performance is completed by utilizing technical, physical, mental, and social capabilities. The tactically aware player can be in the right place at the right time. Being in the right place at the right time is not enough to be successful, the player also needs the ability to choose the optimal playing skill required by the situation.

3.4 Team tactic in ice hockey

"A strategic cooperation agreement is called a team's game tactic" (Savolainen, 2016, 566). To be tactically successful, cooperation and skill are required in ice hockey. Offensive play is about scoring, and defensive play is about preventing opponents from scoring. The ability to attack and
defend together is an essential element when analyzing the game. (Savolainen, 2016, p.565–566.)

3.4.1 Selected playstyle

The way an individual player can bring up personal strengths in favour of the team is defined by the team’s selected playstyle. Playstyle gives frames, principles and requirements to players who get selected for the team. Players should be able to perform with high quality in different tasks and game situation roles. The selected tactic or playstyle should be in line with the game structure. (Ahvenjärvi, 2016, p.309.) According to Saarinen, teams might have multiple variations of offensive and defensive tactics that they match up with depending on the game situation, current game score or playing schedule of the tournament or series (Ahvenjärvi, 2016, 309). The team’s selected playstyle can be strict or flexible depending on the tactical awareness of the players. Flexibility in playstyle brings up an individual’s tactical and technical skills to support winning. Selected playstyle is part of team identity. Separation in playstyles can be identified in different offensive and defensive strategies. Team selection between fast or slow defensive and offensive rhythms can give a team a certain identity. (Ahvenjärvi, 2016, p.310.)

3.4.2 Tactic concerning the opponent

When playing against different opponents, teams use different tactics to reach a competitive advantage over the opponent. By tactical selections team can utilize its strengths or prevent the opponent from exploiting its strengths. Tactics can be changed during the game and that may lead to gaining an advantage. Advantage can be reached in many ways. The coach can select who goes on the ice next, and selections can be based on who the opponent has on the ice next, who might have played well in previous shifts, who might have a special ability in certain situations (e.g., faceoff, powerplay, penalty kill or shootout). In ice hockey, each team has an opportunity to take a timeout during the stoppage of the play. The timeout can be tactically utilized in many ways (e.g., giving players extra time to rest after an icing, reminding players about something before an important faceoff, or cutting the opponent's strong momentum of the game), calling a timeout is a difficult situation for a coach in ice hockey, because each team has permission to take only one timeout during the game, but it can be a decisive choice for the outcome of the game. (Ahvenjärvi, 2016, p.310–311.)

When developing teams' tactical and overall play during and after matches, available match statistics and video recordings can be utilized. Video recordings can be used to scout opponents' play or analyze their own game. Statistics give information about game events and teams playing
concerning opponents' play. Examples of typically used statistics are scoring changes, different game events like odd-man rush or counter-attacks and how those situations emerged in the first place and from what playing area (e.g., counterattack from stealing the puck in the neutral zone). Needed tactical adjustments can be made during the match or in the longer term to develop team play, the aim of all tactical decisions is winning the game. (Ahvenjärvi, 2016, p.311.)
4 Social cooperation skills

Team sports are unique due to social aspects. Performance and daily operations in team sports require continuous social interaction. According to Lahikainen and Pirttilä-Backman (2001, p.11) the relationship between humans which progresses over time as a process is described as a concept of social interaction. Communication is the base of all social interactions, humans behave differently when they are alone compared to when they are with someone, an individual has an effect on others and others have an effect on an individual. Reactions of other people to an individual’s behaviour are an important factor that directs the activity. Reactions of other people are better known as feedback. (Rovio, Lintunen and Salmi, p.22-23.)

This chapter discusses theories behind social cooperation in groups and the context is ice hockey. The main point of view of this chapter is cooperation and dynamics of small units of players and communication between two players, instead of focusing too much on social dynamics and cooperation of a team.

4.1 Self-determination theory

Self-determination theory proposes that people have innate psychological needs that influence their motivation and well-being. Developers of this theory Richard M. Ryan and Edward L. Deci found that conditions supportive of autonomy, competence and relatedness foster intrinsic motivation which is associated with greater persistence, creativity, and overall well-being. (Ryan and Deci, 2000, p.76.)

Coach plays a key role in individual player social development and one of the important things is to help a player to experience individual basic needs in everyday operations. Based on the self-determination theory, to develop players who are committed to team goals and take responsibility for their development the basic needs of an individual should be fulfilled. One of the challenges in team sports coaching is combining team needs and goals with the basic needs of all individuals. Individual basic needs are fulfilled when an athlete feels proficient in his role, can influence the team’s common affairs and is an important part of the team who is taken care of as a player and as a person. (Arvaja and Mustonen, 2016, p.573.)

4.2 Team cohesion

Every competitive sports team aims to create a good learning environment where the cohesion between all the members is high. In a good learning environment, all the participants learn new from each other, giving others constructive feedback, sharing knowledge and having the enthusiasm to
develop the team by working hard to achieve team goals. Cohesion can be divided into two categories, task cohesion and social cohesion. Task cohesion is related to the team's common goals, and the higher the task cohesion is more committed the players are to give effort for reaching them. Social cohesion is related to relationships between the players, and the higher the social cohesion is the better players come along and enjoy the company of each other's. If both task cohesion and social cohesion are strongly present, the team has a deeper meaning and purpose for an individual. (Arvaja, Mustonen, 2016, p.573-574.)

4.3 The effect of group size in the group process

Group processes need continuous cooperation, decision making and problem-solving. When working in a group goal setting is one of the basic methods to proceed in work. Overall goal setting is a simple method, but when taken in a group setting it becomes more challenging and complex. A group’s ability to make decisions, complete given tasks and accomplish a shared goal, is an example of a social psychological phenomenon, that is dependent on the size of the group.

When the size of a group gets bigger the potential performance level decreases, because the group’s common performance is lower than the sum of individual performances. (Rovio, Lintunen and Salmi, 2009, p.24.)

In team sports sizes of the playing groups are different. Group sizes can be divided into small groups (8-10 players) and large groups (more than 8-10 players). Ice hockey is categorized as a large-group sport. Even though the size of the team is relatively big, only six players are at the same time on the ice, and five of them are changing with each other during the match when the goaltender stays in the net the whole time. (Rovio, Lintunen and Salmi, 2009, p.32.) The fact that the majority of the team is observing the game from the bench in ice hockey, allows players and the coach to communicate and share ideas between the changes.

4.3.1 The advantages of a small group

There are several advantages when working in small groups compared to large ones. Working in small groups provides a chance to participate to every group member. A challenge in bigger groups is that not everybody gets involved, and there is a bigger threshold to express one’s opinion. In small groups, everybody can interact with each other and that leads to more perspectives and more honest opinions. (Rovio, Lintunen and Salmi, 2009, p.32.) According to Himberg and Jauhiainen (1998, p.117-118), small groups most likely have better commitment, consensus, solidarity, satisfaction, and motivation.
4.3.2 Utilization of small groups in teaching

Competitive team sports are goal-oriented, and it is recommended to use small groups in practising. For example, in ice hockey, players or units who play together often can help each other to succeed in personal goals if they are aware of them. Performance goals can be set within a unit or with the players who play in the same playing position, goaltenders, defenders, or offensive players. Utilizing small group practice is justified from a point of view of time usage. It is more efficient to deal with things in small groups than having a one-on-one discussion with all the players separately. Players also most likely feel more fulfilment of their personal basic needs when working in small groups. (Rovio, Lintunen and Salmi, 2009, p.38-39.)

4.4 Teaching emotional and communicational skills

In the school- and sports world more emphasis should be given to creating learning environments and methods that are interesting for learners and they support communal social interactions, which enhance learning and well-being. When planning the teaching process learners should be involved and their needs, interests, and desires should be heard and taken into consideration. In practice, teaching should provide actions, human encounters and opportunities for cooperation that can be used to learn socioemotional skills. (Rovio, Lintunen and Salmi, 2009, p.180.)

To use communication skills effectively, an individual needs to have good enough control over emotional competencies. Individual needs to be able to recognize and express their own emotions, use emotions to help their thinking process, analyze their own emotions and control them. (Rovio, Lintunen and Salmi, 2009, p.185.)

4.4.1 Types of Communication

The basic communication process can be divided into five steps. The first step is when one person decides to send a message to another, followed by the second step where one’s thoughts are encoded to a message. As the third step, the message is channelled to the receiver by using spoken words or in some cases by nonverbal means (e.g., sign language). Next, the receiver decodes the message and finally after that receiver makes a conclusion about the received message and responds internally. (Weinberg and Gould, 2019, p.307-308.)

Two basic ways communication can occur are interpersonally and interpersonally. Interpersonal communication involves at least two people and a meaningful exchange. The sent message can be received by the person for whom it was intended, by persons for whom it was not intended, or both. Nonverbal communication can be considered as important as verbal communication for the
sender and the receiver. Nonverbal communication can involve body language, facial impressions, or the tone or the speed of one’s voice. (Weinberg and Gould, 2019, p.308.)

When we communicate with ourselves it is called intrapersonal communication (self-talk). How we act and perform is usually shaped and predicted by what we say to ourselves. Interpersonal communication affects intrapersonal communication, for example, coaches positive or negative feedback from performance affects receivers’ intrapersonal communication in both ways. (Weinberg and Gould, 2019, p.309–310.)

4.4.2 Sending messages

When sending a message, it is easier to control and be clear in verbal versus nonverbal communication. Nonverbal messages are harder to hide because they are less likely under conscious control. Nonverbal messages can give away our unconscious feelings and attitudes. Many nonverbal ways of communication affect the message we are sending. (Weinberg and Gould, 2019, p.310-312.)

Physical appearance is one of the ways of nonverbal communication. It usually gives a first impression of a person. Also, the way we carry ourselves with our gait and posture sends a certain message. Athletes can recognize frustrated or discouraged opponents by how they move around, and they can utilize the situation in favour of them in competition. Other ways of nonverbal communication are gestures (e.g., Folding arms across one’s chest is expressing that the person is not open.), body position (e.g., refers to the personal space between you and others), touching (e.g., used to calm someone, to express affection or other feelings), facial expression (e.g., an eye contact, a smile), and voice characteristics (e.g., pitch, tempo, volume, rhythm, articulation). (Weinberg and Gould, 2019, p.312–314.)

4.4.3 Receiving messages

Receiving a message is a lot about one’s ability to listen. The best way to listen better is by listening actively. Active listener shows concern for the content and the intent of the message and for the feelings of the sender. Active listening occurs as supporting ideas, acknowledging, and responding, giving feedback and paying attention to the speaker’s total communication. To reach successful communication listener also needs to be a supportive and aware listener. By being supportive you give the other person a feeling that you are “with” the speaker and value the person’s message. Aware listening means that you can be flexible and alert for possible barriers and breakdowns in communication. Different situations require different listening strategies, and some
communication can be disturbed by external noise when you are trying to listen to someone. (Weinberg and Gould, 2019, p.318–321.)

4.4.4 Asking questions versus telling

Asking a question is a critical component of effective communication besides listening and sending a message. Open-ended questions are recommended to ask while communicating, especially in coaching. (Weinberg and Gould, 2019, p.314.) According to Sir Jon Withmore using open-ended questions instead of just telling people what to do causes people to engage in greater reflections and depth of thinking. When the responsibility changes from coach to a listener, awareness or understanding of the topic or situation is increased, the listener remembers the answer and is more motivated to act appropriately. In addition, Withmore suggests avoiding leading questions because often leading questions lead to an answer we want to hear. (Weinberg and Gould, 2019, p.314-315.)
5 Video game-based learning

5.1 The educational potential of videogames

Video games, traditionally associated with entertainment, have increasingly demonstrated their potential as effective educational tools. This potential can be attributed to several key factors:

5.1.1 Engagement and motivation

It is evident that video games are profoundly motivating for players. Often players focus intensely on the game for hours straight solving problems all along. Such a focus and motivation are essential for learning. Some specific features can explain both the motivation they recruit and the learning they enable. Often in games, the price of failure is reduced, if a player fails, it is okay, for example, they can start over from their last saved game. Furthermore, failure to beat a main opponent in a game, for example, is seen as an opportunity to gain experience in a certain underlying pattern and eventually win. These features allow players to take more risks and try out hypotheses that might cost more in some other environments. Competition is the second thing that often motivates people to play video games. Competition can happen either one-on-one or team-based. It is interesting how many young gamers are motivated and pleased by competition in games, but not in school. It seems evident that competition in video games is seen as social and it is often organized in a way that allows people to compete with people at their skill level or as a part of social relationships. Collaboration and competition often are linked and integrated in gaming, though not in school. (Gee, 2006, p.180.)

5.1.2 Experiential Learning and Pleasant Frustration

Usually, problems in games are ordered well. Early problems are designed to lead players to form good guesses about how to proceed when they face harder problems later on in the game (Gee, 2006,p.182). According to Elman, research suggests that such ordering is crucial for effective learning in complex domains (Gee, 2006,p.182). Feedback and challenge adjustment are elements that good games can provide to make different sorts of players feel the game is challenging but doable, and that their determination is paying off. Even though you might fail or lose the game provides you feedback that tells if and how you are moving in the right direction towards success. Hard challenges and losing might cause frustration, but DiSessa’s concept of “pleasant frustration” has argued that such pleasant frustration is an optimal state for learning things like science (Gee, 2006, p.182).
5.1.3 Customization and Adaptability

To have different types of learning styles available and have multiple routes to success that everyone can find best for themselves is one of the most important learning principles in many different areas. Most video games provide opportunities to customize gameplay to fit their learning and playing styles, for example having the option to adjust the difficulty level choose between different in-game characters or even create a character of your own. (Gee, 2006, p.181.)

5.1.4 Strong identities

Games provide identities for players and players can experience a deep connection to some specific in-game character or community (e.g., civilization). There are often two ways how player feels a strong identity while playing. One is when a player plays some intriguing character they can fulfil their fantasies, desires, and pleasures onto the character. The second way to feel a strong identity is when the game offers you a relatively empty character whose traits and behaviours the player must determine to thrive during the ongoing life of the in-game character. The identity of the character is associated with the sorts of functions, skills, and goals one has to carry out in the virtual game world. (Gee, 2006, p.181.)

5.2 The social learning and social cognition in video games

According to a study by Bluemink (2011, p.59.), multiplayer games can be used to support group collaboration and build shared understanding among participants in a meaningful way. The study also identified a third level of interaction, which is related to the use of avatars in the game. Players must move and act in the environment through their avatars while simultaneously discussing and solving problems with others. Avatars increase the activity by allowing players to follow the actions and movements of other participants, and help others find the right place to perform tasks among other things.
6 Aims of the development project

This development project aimed to create a videogame-based teaching method to support the learning of ice hockey's tactical, and social skills. This project and its result were made for developing coaching and coaching methods in the Junior Pelicans organization and the club will consider further needs and development of this method in the future.

The focus of this project was to build up a learning environment that provides new learning possibilities for a unit of players and the coach in a way that leaves room for innovation. In this method, learning would be happening through visual observations, feedback, reflection, bodystorming and teamwork.

Ice hockey is a teamwork-based game and a big theme behind this project was social cooperation skills. By building a safe and motivating learning environment, there was room for open discussions and innovative ideas inside the project group.

The implementer of this project was an assistant coach from the 2022–2023 season Pelicans Lahti U18 Academy junior ice hockey team, who was responsible for planning, implementing, and evaluating the process together with other coaches in cooperation with the club’s head of coaching. The implementation of this development project happened on January 2023-Marc 2023 during the second phase of teams 2022–2023 season. All the players from the team did not participate in this project, due to schedule issues, there were a total of seven players participating in this project.
7 Approach and methods of the development project

The chosen approach for this project was action research. A key aspect of this project was enhancing group learning in ice hockey’s tactical and social skills. In the development project, participants were involved in implementation.

Interactive methods like bodystorming, questioning, and observation were used in this project. The benchmarking method was also used to research if there were similar projects or research made before. For the evaluation of this project questionaries, feedback from the peer coach and the club’s head of coaching, written notes and video recordings from practical sessions were used.

7.1 Action research as an approach

Action research is participatory research, research aims to achieve change and solve practical problems. Action research is practical, and it highlights the active participation of people. It provides an opportunity to achieve change and make attitudes, power structures and operational cultures visible. Action research fits well in developing working methods because the research object is always tied to the situation. In this approach, the researcher has an active role and cooperation of the researcher, and the research subjects are characteristic. (Ojasalo, Moilanen and Ritalahti, 2015, p.58-59.)

Action research is actively looking for new angles and ways of doing things and solving problems. The action research process can be described as a spiral because the different phases of the work are repeated in cycles. Separate phases are planning, action and evaluation (Figure 3). (Ojasalo Moilanen and Ritalahti, 2015, p.60–61.)
7.2 Utilization of interactive ideation methods

Development requires creativity, and innovation needs skill and courage to look at things from a new perspective. It is possible to produce new angles, ideas, and solutions for different development projects by utilizing interactive ideation methods. Innovative problem-solving requires an interactive way of leading an open, positive, and confidential working environment. Creative problem-solving requires group-leading skills and management of creative problem-solving methods from the leader of the project. Group members require teamwork skills and a cheerful outlook. During the process idealization and evaluation should be separated from each other. In the innovating process, quantity creates quality and the idea of the idealization phase of the project is creating as many ideas as possible. (Ojasalo, Moilanen & Ritalahti, 2015, p.158–159.)

7.2.1 Google Forms

In this development project opinions, ideas and reflections of participants were collected by using the Google Forms online platform. Google Forms is a platform where you can easily create and share online forms and surveys, and analyze responses in real-time (Google Forms, 2023).

Google Forms helped to collect ideas, reflections and feedback every week from each participant. Every week new form was created, and it helped to follow up the process and keep track of what happened during each week. Participants filled out forms by using their mobile devices and all
replies showed up on the project leader's laptop screen.

7.2.2 Bodystorming

Many different methods can be called by name bodystorming. The rallying point is to aim to get close to action and users by doing something concrete or physical. Instead of sitting and brainstorming at the office the location of idealization is some real or close to the real environment that simulates the object of development. Collected data is formulated to concrete design issues and the answers and solutions for those are searched in a simulated environment. The method fits the best for situations where the participants are not too familiar with the environment. The results of idealization can be recorded by video camera to collect material from idealization sessions. (Ojasalo, Moilanen & Ritalahti, 2015, 170.)

7.2.3 Questionary

Questionary is one way to collect data and information. Questionary as a method is quite fast and effective. Questionaries can be utilized in many different ways and research many kinds of topics or phenomena. One of the basic requirements of using a questionnaire is that there is enough knowledge about the phenomena to be researched. If there is not enough knowledge about the phenomena it is almost impossible to create the question form and then the answer will turn out to be unreliable. (Ojasalo, Moilanen & Ritalahti, 2015, 121–122.) In a development project questionnaire can be utilized best by using it to sort out the starting point or to evaluate the results achieved at the end phase of the project (Ojasalo, Moilanen & Ritalahti, 2015, 40).

7.2.4 Observation

Observation is a strongly recommended method to use in every development project. To find reliable information is better to be present during the process than only relying on questionnaires or interviews. When observations are done systematically during the process by using an observation diary, for example, it becomes one of the main methods of the development project. (Ojasalo, Moilanen & Ritalahti 2015, 42.)

7.2.5 Benchmarking

A benchmarking method is based on learning from other projects and questioning your own. When looking for the best practices from other projects or organizations you need to suit them for your
project, and it always means creating something new. There are many ways to find out how others are doing things, like articles, books, and web pages. Possible online sources are news, company web pages and patent pages. If you visit a company you would like to use as a benchmark the reasons for the visit, question- and observation list should be made carefully before the visit to get the maximum benefit of the visit. (Ojasalo, Moilanen & Ritalahti 2015, 43–44.)
8 Stages of the development project

The original idea for this project came in February 2022, when I started thinking about my topic for the thesis. My interest in ice hockey coaching and video games provoked the idea of connecting them to my thesis. During the year 2022, I started to look for possibilities of connecting them and I searched many diverse sources that could give me the right direction with my thesis work. Other influences for the thesis were the growing popularity of e-sports all over the world and the club where I was completing my work placement had connections to the E-sports world by having a collaboration together with one of the biggest E-sports organizations in Finland. Finally, after tens of discussions with teachers, supervisors, colleagues, and persons who work daily on ice hockey or inside the E-sports industry, I found a possible way of completing my thesis in a way that could benefit my learning and the community where I was working in late 2022.

8.1 A starting point

I started my work placement at the Junior Pelicans U18 academy team as a coach in May 2022, and the idea was to start the developing project in September 2022, when the team's regular season would start. The original form of the project was to compare the traditional video recording-based tactical coaching method with the innovative video game-based coaching method and find out the benefits and limitations for players learning in each form of tactical coaching, but the evaluation of the process turned out to be too difficult to measure both subjectively and objectively, so the project needed to find a new point of view.

Finally, by the end of the year 2022 in December, after multiple discussions with supervisors, other coaches and the head of coaching of Pelicans Juniors the final form of the project was selected to be a development project for a video game-based tactical coaching method. For the implementation, I needed to find volunteer players from the team who could participate in the project as a target group and also as developers.

I found seven volunteer offensive players from the team who would participate in the project and the project topic was narrowed down from five-player unit tactical development and cooperation to three offensive player tactical, social and mental development by utilizing the video game-based coaching method.
8.2 Planning and Ideation

As mentioned in earlier chapters, the planning started at the beginning of the year 2022 before the project found its final form at the end of the year 2022. In the ideation of the project previous literature, studies and articles were utilized alongside discussions with teachers, supervisors, peer coaches and other professionals from the ice hockey and E-sports industry.

The main objectives of the planning and ideation phase were to find out the best way to bring the idea of utilizing video games in coaching and find the best implementation model for the development project.

The first phase of the planning and ideation was to find out if there were similar projects, products, studies, or services available by using a benchmarking method. I was able to find a couple of similar studies, but from different industries where video games were utilized in teaching. Also, one product was found which idea was like mine, but there was not enough data or information about it available to make proper benchmarking about it.

The second phase of planning and ideation was to find out what could be the best platform to fit our purpose to enhance the tactical and social skills of junior ice hockey players. There were many virtual platforms or devices designed for ice hockey player development, but their main intended use was often more focused on technical skill learning or purely on mental skill development. Factors that affected selection were visual similarity to real ice hockey, customization, and manipulation potential of in-game actions, accessibility, and the possibility of a multiplayer game.

The end of the preliminary planning and ideation phase was in December 2022, when the first version of the video game-based learning method was created. The selections of the playing platform, duration, schedule of the intensive period and style of teaching sessions of the project were made.

8.3 Intensive period of the development project January 2023-March 2023

The aim of the intensive period of the development project was to implement the methods’ contemporary version and develop it together with the participating players. The intensive period started in January 2023 when the participant group was selected. The ten-week intensive period happened during the competition season for players, and it was included in the team’s normal practice schedule. The actual implementation of the method happened for seven weeks once a week with sixty-minute sessions including a coach and group of players.

The intensive period started with a meeting between the participant group and the coach. The aims
of the intensive period were made clear, players filled up a self-evaluation form of their ice hockey-related skills (Appendix 1). The coach made his evaluation of the players and created player characters inside the Nhl23 video game used in the playing sessions. Players also filled up a starting survey about their previous experience playing ice hockey and ice hockey-related video games.

The intensive period continued for ten weeks, and the method was modified during the whole process. Every session that concluded the actual playing of the video game can be considered as bodystorming, because different settings and setups were modified all the time and the development was focused on finding questions and answers to in-game simulation problems. Participant players were included strongly in the process by letting them give new development ideas for the method and by filling learning diary after each practical playing session (Appendix 2). The main themes of each playing session were influenced by the theme that the team was currently focusing on the ice practices. The aim of using the same topics was to support on-ice learning by using the virtual learning method.

Structures of the whole ten-week intensive period were 1) Self-evaluation, process goals and baseline mapping 2) Playing session one 3) Playing session two 4) Playing session three 5) Playing session four and halfway reflection 6) Playing session five 7) Playing session six 8) Playing session seven 9) End questionary and reflection 10) Checking up on results and collected material

The themes of intensive period playing sessions were focused on offensive play, to have narrow enough topics for more effective and precise learning. The themes of the intensive period playing sessions were 1) Offensive zone offensive game 2) Scoring and its supportive actions 3) Offensive zone offensive play and recognizing the open space 4) Defensive zone offensive play and role changes during the play 5) Defensive zone offensive play and timing without the puck 6) Defensive zone offensive play and recognizing the game rhythm 7) Offensive zone offensive game and staying on the puck. Each session included cooperation, reflection on what happened during the play and reflection on what could be done better for the next session.

8.4 Evaluation and Reflection Phase

Evaluation of this process was executed during the process and after it. The evaluation was done by the developer himself and the participant athletes.

8.4.1 Coach notes and player feedback

During each practical session where the method was used and developed, the coach’s role was to observe the session and facilitate the learning by asking questions or making a corrective point on
the player’s actions. During each session notes were made about how players can succeed on a given task (e.g., keeping the same rhythm while attacking), how players can cooperate and communicate during the sessions (e.g., type of feedback and communication), how well the chosen way of implementation is serving the aims of the session (e.g., the difficulty level of the game or amount of active players), how well are the actions on video game correlated on real-life performance (e.g., game speed or quality of passing) and how players are behaving in different game situations (e.g., leading the game with high numbers or having an even score at the end of the regular playing time).

Players also gave verbal feedback after each session on how it felt for them and what could be developed for the next session regarding the actual playing or the method used for teaching and learning. The longer the process went the players started to understand more and more things that could be developed for the next time. Players also filled out a learning diary which gave them a chance to reflect even more on what happened during the session and what they may have learned or enjoyed about the session.

8.4.2 Ending questionary for Players

When the development project was nearing its end players filled up an ending questionnaire (appendix 3). Seven participants answered the ending questionnaire. The questionnaire was filled out anonymously. The questions were selected to touch on the development project, and the different themes and aspects of the project were noticed. The main themes of the questionnaire were understanding the game of ice hockey, tactical skill learning, self-evaluation skill learning, social skill learning, mental skill learning and feeling of togetherness. The themes of the questionnaire were based on the fulfilment of the aims and development of the project. Also, questions about previous experiences, enjoyment, feelings and new ideas were presented. In the questionnaire, there were both open questions and scaled questions. On the scaled question there were options between 1 and 5, where one meant bad success and five meant success.

Questions related to player’s learning provided positive results. The average of questions related to players’ social skill learning was one of the highest 4,29. The second highest average of answers was on questions about players’ tactical learning which was 3,71, so we can say that the main goals of the project were well fulfilled according to the player’s subjective feelings.

According to the questionnaire players felt the process enjoyable and also, they felt that the process was developing all the time during the intensive period. The average of the answers on the enjoyability of the project was 4,71 and the average on questions related to the project's clarity,
fluency and development was 4.1.

The lowest numbers on the questionnaire were on questions related to the challenge of the process and the relation between the process and the player's development of self-assessment abilities. The average of answers related to players' feelings about the challenge was 1.71 and the average of answers related to players' development of self-assessment abilities where 2.71.

On the given open questions the readiness of different individuals' ability to evaluate their own and group's development during the process. Some of the answers brought up good reflection on what happened during the process and what could be done differently, but some answers remained compendious.

The average of single answers given on scaled questions varied between 1.71-4.71, so the overall scale was quite large, but the total average of answers was 3.66. We can say that the majority of the answers were positioned on the positive side of the given scale. The questionnaire and its answers have been collected in (Appendix 3). All the questions and answers to the questionnaire are available. Figures 4, 5 and 6 show the most important questions and answers in connection with the objectives of the work.

Figure 4. How well did the method support your tactical learning?
Figure 5. How well did the method support your understanding of the game of ice hockey?

Figure 6. How well did the method support your social skill learning?
9 Videogame-based teaching method as a result of the development project

The result of this development project was a videogame-based teaching method, that supports players’ development of tactical and social cooperation skills in ice hockey. The method was built as a result of the process which had four different parts. The process has two different parts on top of the initial mapping at the start of the process and the ending evaluation of the process. The method is planned to go through in chronological order step by step to gain the best outcome. Information gained from the previous phase is utilized when moving to the next phase. The teaching method is designed to fit especially for 15–20-year-old athletes.

The usage of the method is based on the usage of the commercial ice hockey video game on the PlayStation 4 platform. Besides with PlayStation a Google Forms page was used for players to fill out learning diaries and share ideas related to the development of the method. The leader of the project works in a coach’s role and is responsible for creating a positive learning environment, providing constructive feedback, and helping players to reflect on what happened by using open-ended questions.

9.1 Starting point and planning

When starting a video game-based teaching process in an ice hockey team, qualities of the target group like the size of the group, age structure, level of competition, previous experience with video games and ice hockey, and objectives of the development stage should be taken into consideration. The process is recommended to last during the whole season in cycles to enhance learning. The process can also be targeted to some specific period (e.g., pre-competition season) when groups’ tactical understanding and cooperation between playing units might be the biggest development targets. The process should be included in the season plan, to connect specified tactical and social learning with other learning.

9.2 Part 1 Initial mapping and selection of the working groups

The first part of utilising the teaching method is to do initial mapping to find how interested players are to participate in specific tactical and social learning, and what is the base level of understanding on various topics related to video games and ice hockey. Questions related to players’ overall understanding of the possible learning objectives, previous knowledge and experience with video games, expectations about teaching and basic understanding of tactical and social elements of ice hockey are recommended to find out.
After initial mapping working groups for the process need to be created. With this specific method utilization of current offensive or defensive units is recommended for use as working groups. The used platform (PlayStation 4) sets up a limit where only a maximum of four players can play the game at the same time locally, so it is recommended to use groups of three to four players at the same time.

9.3 Part 2 self-evaluation and creating player characters

The second part of the process is creating a player character inside the video game (Nhl23), which is done by giving the virtual avatar personated qualities and features as close as possible to the player himself. The game provides a comprehensive opportunity to build a character to simulate the real player. To achieve an optimal learning experience the exterior factors are not considered as important as features related to playing skills.

The idea behind creating personalized characters inside the game is to create as realistic playing experience as possible. The main thing in creating a player character is the player's self-evaluation together with the coach (see Appendix 1) of his own ice hockey-related skills (e.g., skating, passing, offensive awareness…etc). The final values of each skill are combined from the mean of the coach’s and player’s skill evaluation. The factors have a quite accurate effect on the actual gameplay and that is the main reason for making personalized player characters. The gameplay can also reveal some factors that might have been evaluated over or under the real performance level, for example, if the player character is way faster skater than everybody else in the video game and it is not the case on real on-ice performance, the video game as a mirror of self-evaluation can bring up questions or answers on players self-evaluation skills. The other benefit of using personalized player characters is that, if the evaluation has been done accurately, the player might start recognizing his possibilities and limitations related to playing during the virtual training process.

If the video game-based training process lasts throughout the whole season, it is recommended to do the self-evaluation at certain intervals due to possible development of playing or self-awareness skills.

9.4 Part 3 Playing to learn

The third part can be considered as the main part of the process, where the actual video game-based training is taking place. The training requires a quiet room or space with a TV or monitor and enough space for groups of two to five people. Other requirements for playing are of course the playing platform (PlayStation or other gaming console), controllers and the video game (NHL 23).
The phases of the training session are, defining learning outcomes and the topic of the session, playing a virtual ice hockey game with three periods with reflections between periods, and a summary including a game recap and reflection after the played game.

Every player and the coach have their role during the playing session. Players play in their own selected playing position, and they only control their player character during the game simulation. The opposing team is controlled by the coach or the Artificial Intelligence (AI), based on the coaches’ selection. A coach can have full control of the opponent’s players, or he can manipulate AI’s performance by changing their in-game tactics manually (e.g., forecheck, defensive system, offensive zone primary targets). The coach can also let the AI have full control of its own decisions and just focus on observing the game from the side. Coaches’ participation selections are recommended based on the current learning objective. For example, the current topic of the playing session might be breakout tactics from the own defensive zone, then the coach can manipulate the pressure that the opposing team is giving and by that coach can set players to variable decision-making situations.

The objective of an individual player is to perform virtually like he would perform in a real game performance in his role by completing in-game tasks during the play. Every in-game action by an individual should aim to help the team win.

Players need to cooperate during the play to be successful. The group of three offensive players need to work as a unit and communicate all the time for a common understanding of the objectives in each playing situation. Since only three out of the five players on the virtual ice are controlled by the human players, the remaining three (a goaltender and defenders in this case) are controlled by the AI. Players can manipulate the behaviours of the AI players manually based on their selected tactics and strategy. Players can make agreements for different playing situations (e.g., faceoffs) based on how they recognize the opposing team playing. Constant feedback and shared knowledge about own perceptions play key roles in learning.

During the play coach plays the role of facilitator of learning more than a coach in this method. The coach is focused on manipulating the game and observing how players are playing the game based on their actions and behaviours. During the intermissions between the periods, the coach helps players reflect with leading or open-ended questions. After players have made their reflections on what happened during the period of play coach can give his opinion based on his observations.

After the virtual game is time for reflection and feedback. Players reflect on how they felt and what they observed during the playing session regarding their in-game performance, tactical
observations, and ways of communicating. The reflection and feedback phase should lead to a discussion between the players and the coach about the learning objectives of the session and how would they be implemented in upcoming physical training sessions and competitions.

To increase deeper learning after the video game-based training session has ended players will fill up a short learning diary with their mobile devices including short questions related to the playing session. The learning diary makes players create their thinking related to the topic and it provides them an opportunity to give feedback about the teaching session to the coach. By having the option to give feedback player also feels that he is an important part of the process and that he can influence what is happening.

9.5 Evaluation and Feedback

At the end of the project, it is necessary to evaluate if the set goals were accomplished or not. The accomplishment of the project can be evaluated by a survey for players or doing a subjective evaluation of player’s development on set goals. To benefit the most from the completed process, the group could consider how the results of the project can be utilised in upcoming events or phases of development.
10 Discussion

This development project aimed to develop a video game-based teaching method and use it as a part of tactical and social skill coaching. The developed method can be utilised for developing players in age categories from 15-20 years. When using this method main targets of player development are increasing tactical understanding outlining the continuums of the game of ice hockey and cooperating with fellow players. After the process ended players felt the training to be useful and enjoyable for their development. Players also underlined their beliefs towards the future development potential of the method. The coach felt the process pleasant to go through and it supported his development as a coach and learning facilitator. The project was relatively easy to execute, and it brought up new thought patterns and increased the cohesion inside the working group.

Action research was the selected way of research and the working group stuck with the decision until the end of the project. Finding functional and purposeful methods of operation, as well as finding the maximum potential of a commercial video game by trying different options and possibilities during the process took time, but it created a clear picture of the method's strengths and limitations. Made notes, video recordings and a learning diary helped in the development of the project. The benchmarking method was used to support the process and see if similar projects have been implemented before. Many sources of using video games as a facilitator of learning were found, but none of them had ice hockey as a topic. Also, one video game-based product that focuses on ice hockey's tactical teaching was found, but there was not enough information about the method available to make a proper benchmark out of it.

A player's tactical readiness can be defined by the player's ability to observe ongoing events during the play. The player needs to perceive directions of movement, distances, velocities and rhythm changes of the puck and players. Player's previous experiences of similar situations are leading the overall game situation performance. (Savolainen, 2016, p.568.) With this video game-based teaching method, players are exposed to repeated tactical problems all the time. The strength and the weakness of this method is the perspective where the game is played. The game is viewed from a bird's eye perspective, and it allows the players to gain a better understanding of the causes and consequences of every action during the play, which helps players understand the flow and continuums of the game of ice hockey. The first-person view would be optimal for tactical learning because the player could visualize the distances of other objects more realistically and that could promote the learning and decision-making process even more. The only possibility to access the first-person view on ice level in the video game is replays, where the situations can be repeated from the perspective of an individual player to understand his possibilities better. For example, the passing lane can look different from a bird's eye perspective compared to an ice-level perspective.
During the process players' development in tactical and social skills was visible. By looking back to made notes and video recordings from the first and last playing sessions the difference was considerable. The first playing sessions were confusing, players were excited to play, but they were not able to recall or reflect on what happened during the play and the quality of gameplay and communication was poor. During the play the players were not able to follow team structure on play, the only offensive game rhythm was fast, and the level of communication and reflection was ("e.g., let's try some face of play") or ("e.g., we need to score more goals"). During the last playing sessions, players were able to stick with the team structure of the play, they understood offensive play rhythms better, and they were able to communicate better and more relevant things. The level of communication at the end was ("e.g., let's try to win this face-off to the left wing, from there we can create scoring change if the centerman and right-wing are blocking the opponents approaching players") or ("e.g., we need to have the puck in our possession for longer periods in the offensive zone play, so we can make the opponent tired and gain more scoring changes for our selves").

During each session, players were emotionally involved in the playing and the will to win was evident. The cohesion between the players was good and everybody was able to express their opinions and observations openly during and after the sessions. Players communicated in verbal and nonverbal ways all the time, and social support was present. Players gave mostly positive or constructive feedback to each other, the only time when negative emotions or opinions were expressed was when players commented on their own mistakes out loud (e.g., “I am so bad, I did not see that open passing lane”).

The length of the process was relatively short because it was implemented in the last part of the season 2022-2023 and the group broke up after the season ended. It would be interesting to see if the method is used throughout a full season, and with a bigger group of players.

The further usage of the method has not been discussed yet after the project ended, but there is an intention to find out if the method could be used on a larger scale. When evaluating the further usage and possibilities of the method the resources it requires must be considered: equipment, facilities, and orientation. Also, an individual knowledge and ability to lead learning processes of possible implementers of the method (coaches), should be taken into consideration. The usage of this method is based on coaches’ ability and creativity to utilise video game-based teaching to bring up themes and key points that are relevant for tactical and social skill learning. To use this method a coach needs to familiarize himself with the topic and have a certain degree of technological know-how. Coach orientation could be a necessary support for group instructors who are going to use the method.
According to Nikander and Rovio (2009, p.232), the coach should promote an environment that is favourable for motivation. Motivation affects on selection and achievement of goals, efficiency and quality of performance, and persistence. In this development project, a method that aims to create a motivational learning environment was created. The way of implementation of this method is learner-centred and the skills of an individual related to playing ice hockey and video games should be taken into consideration when planning the process. The previous experience from playing ice hockey video games affects some on the usage of the method, but the idea of the method is not to be great in video games, the method focuses more on pointing out how different decisions made affect the outcome of the play. The method provides an opportunity to learn by experimenting together and sharing thoughts with teammates in an open and safe environment. The adaptability and attractiveness of video games provide an exclusive opportunity to facilitate learning in a meaningful context. In the more and more digitised world, sports coaching should be able to keep up with the needs and interests of future age groups and find innovative ways to get them engaged with the possibilities of sports.
Sources


Appendices

Appendix 1. Self-evaluation form for players

<table>
<thead>
<tr>
<th>Nimi:</th>
<th>Arviointitaulukko oikeassa elämässä</th>
<th>NHL 23 tarkoittaa</th>
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<td>1= Rajoittava helkkous</td>
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<tr>
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<td>2= Vaikuttava Helkkous</td>
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<td>Kunto</td>
<td>3= Keskierto</td>
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<td>4= Henkilökohtainen vahvuus</td>
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<td>Svetläminen</td>
<td>5= Vahvuus jolla erotun</td>
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<td>Lämärin voima</td>
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<td>Lämärink tarkkuus</td>
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<tr>
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<td>Rannelaukausen tarkkuus</td>
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<td>Ketteryys</td>
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<td>Ominaisuus 1-5</td>
<td>Voimakkous</td>
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<td>Ominaisuus 1-5</td>
<td>Kiihtyvyys</td>
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<td>Ominaisuus 1-5</td>
<td>Palmeensietokyky</td>
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<td>Ominaisuus 1-5</td>
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<tr>
<td>Ominaisuus 1-5</td>
<td>Kestävyys</td>
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</tbody>
</table>
Appendix 2. Learning diary

### Oppimispäiväkirja W10
Tavoitteena kerrata pelisession sisältöä oppimisen ja ymmärtymisen vahvistamiseksi.

<table>
<thead>
<tr>
<th>Nimesi</th>
<th>Lyhyt vasteuteksti</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Session päätteensä</th>
<th>Lyhyt vasteuteksti</th>
</tr>
</thead>
</table>

"Löysitkö asioita joita ottaa huomioon ensi järjestyksessä/pelissä? Jos kyllä niin mitä?
Lyhyt vasteuteksti

"Kuninka haastavaksi koht session kokonaisuudessaan?

<table>
<thead>
<tr>
<th>Todella helppoa</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Todella haastavaa</th>
</tr>
</thead>
</table>
Kuinka miellyttäväksi koit session kokonaisuudessaan? *

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Hyvin miellyttävä</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Missä koit onnistuneesi henkilökohtaisesti tänään pelissä/sessiossa? Esim. (pelisuo ritus, perillisten asioiden tunnistaminen, kommunikaatio, yhteistyö, ilmapiirin luonti) *

Pitkä vastausteksti


Missä koit henkilökohtaisesti parannettavaa ensikerralle? Esim. (pelisuo ritus, perillisten asioiden tunnistaminen, kommunikaatio, yhteistyö, ilmapiirin luonti) *

Pitkä vastausteksti


Missä koit joukkueen onnistuneen tänään pelissä/sessiossa? Esim. (pelisuo ritus, perillisten asioiden tunnistaminen, kommunikaatio, yhteistyö, ilmapiirin) *

Pitkä vastausteksti


Missä asiolissa koet joukkueen pystytän parantamaan ensikerralla? Esim. (pelisuo ritus, perillisten asioiden tunnistaminen, kommunikaatio, yhteistyö, ilmapiirin) *

Pitkä vastausteksti


Appendix 3. Project-ending survey and answers

Kuinka monta vuotta olet harrastanut jääkiekkoa?
7 vastausta

Ikäsi
7 vastausta
Aikaisempi videopeli kokemuksesi (muut pelit, kuin NHL)
7 vastausta

Aikaisempi videopeli kokemuksesi (NHL videopelit)
7 vastausta
Kokemukset harjoittelusta

Kuinka hyvin harjoittelu menetelmä tuki oppimistasi, pelin yleisen ymmärtämisen kannalta? (Pelin rytmit, taktiset valinnat, pelitilan valinnat tms)

7 vastausta

Kuinka haastavaksi koit harjoittelujakson kokonaisuudessaan?

7 vastausta
Kuinka hyvin harjoittelun menetelmän tuki oppimistasi, pelin taktisen oppimisen kannalta? (Pelin/joukkueiden rakenteet, sijoittuminen tms)

7 vastausta

---

Kuinka hyvin harjoittelun menetelmän tuki oppimistasi, omien ominaisuuksien arvioinnin kannalta? (Itsearviointi omista taidoista)

7 vastausta
Kuinka hyvin harjoittelun menetelmä tuki oppimistasi, *henkisten taitojesi kannalta*? (Voitontahto, kilpailullisuus, tunteiden hallinta, paineensietokyky, tms)

7 vastausta

Kuinka hyvin harjoittelun menetelmä tuki oppimistasi, *yhteenkuuluvuuden tunteen kannalta*? (Tunne olevasi osa jotain ryhmää, autonomia, itsensä tärkeäksi kokeminen)

7 vastausta
Toleutuksen onnistuminen

Kuinka miellyttäväksi koit harjoittelujakson kokonaisuudessaan?

7 vastausta

Kuinka selkeää harjoitteluksen totutus oli? (tavoitteet, ydinkohdat, yhteys oikeaan pelisuorituukseen)

7 vastausta
Kuinka sujuvea harjoittelut oli mielestäsi (aikataulutus, välineistö, sijainti, tms)
7 vastausta

Kuinka paljon kot mahdollisuksia vaikuttaa harjoittelun totukseen ja projektit kehitykseen? (Mielipiteet, ideat, tms)
7 vastausta
Kuinka pajon koit prosessin kehittyneen harjoitus jakson aikana? Ensimmäinen kerta vs viimeiset kerrat (Sujuvuus, hyödyllisyys, selkeys, hauskuus, tms)

7 vastausta

Kuinka pajon uskont menetelmällä olevan kehityspotentiaalia tulevaisuudessa?

7 vastausta
Koetko (oikean jäljellä tapahtunut) pelisuurituksesi parantuneen harjoitusjakson aikana?

7 vastausta

Kuinka hyvin harjoittelun menetelmä tuki oppimistasi, sosiaalisten taitojesi kannalta?

(Ketjun yhteistyö, kommunikaatio, havainnointi, ryhmässä toimiminen & palautteen anto)

7 vastausta
Mitä teksit toisina, jos osallistuisit projektiin uudestaan?

7 vastausta

Viimeisiltä kerroilta ei tule mitään mieleen mitä teksin toisina koska ne toimi melko hyvin kun olimme pienemmässä ryhmissä. Etkä kertoja olisi ollut kiva saada myös vähän enemmän koska se oli todella hauskaa.

En mitään

Jatkaisin alusta asti kolmen porukalla, eli ettei joudu kesken pelin vaihtelevaan ohjaimia. Voisi myös lisätä projektiin puolustajia.

Yksi kenttä kerrallaan ja vähän paremin selityt miten pelata sitä itse peliä.

Enkä joitakin sensoreita, jotka tutkii aivojen liikendintä pelin aikana voisi olla mieriinkintoista kokeilla.

Miettivän valmiaksi tarkemmin mikä on projektiin idea ja mitä sillä haetaan.

En osaa sanoa, koska mielestäni projekti oli hyvin suunniteltu ja toteutettu ja se kehittyi kokoaka.

Vapaa sana.
Projektin jälkeen syntyneitä ajatuksia/ideoita tai terveisiiä?

6 vastausta

Jos sitä lähteesi kehittelemään niin VR-hasit olisivat hyvät ja tietysti jos olisit loputtomasti rehkea ja voisi tehdä ihan mitä vaan niin esim luutelumatto vir loistaa ja maila johon olisi yhdistetty jotain sensoreita olisivat hyvä kombo.

Toteutus oli hyvä ja muutenkin ideana hyvä kehittää tietämystä mitä pitäisi tehdä jääliä.

Lopuus analyyttinen osa projektista ma tuli esiin ja aloin oikeasti pohtia peliä siitä kannalta mikä auttoi minua paljon jos on samanlaisia pelaaja kuin minä niin tama auttaa heitä merkittävästi. Kiitos että oain osallistun Aku.

Hyvää duunia!

Kiitos, että oin olle mopana ja auttamaan koulutuksessa. Projektiin olin mukava ja helppo osallistua.

Oli hauskaa projekti.