

Article

Situational interest of students with autism spectrum disorder using context personalization in physical education

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Abstract: Physical education can enable students with autism spectrum disorder (ASD) to live positive experiences and adopt a healthy lifestyle. However, motivation may be a critical factor in their success. In this perspective, the context personalization approach could be valuable to support the interests and motivation of students with ASD in physical education. This qualitative interpretative research documents the Situational Interest dimensions of four high school male students with ASD (14 years old, boys) following a team sports unit conceived and personalized by their physical education teacher to meet their interest in video games. After the unit, the four students and the teacher realized a semi-structured interview. According to thematic analyses, students' situational interest was elicited. The dimensions of instant enjoyment, challenge and novelty were predominant. The emulation system, as a part of the context personalization related to video games, ends up in every dimension and sheds original light on the motivation conditions. In light of the present results, the context personalization approach, based on the interests and preferences of students, is a promising avenue to support interest in PE. However, differences between the students' and the teachers' perspectives underline the need to consider students' voices regarding their interest in physical education.

Keywords: Differentiated instruction practices; students having special educational needs; motivation; high school

Introduction

Students with autism spectrum disorder (ASD) face several and persistent difficulties in the social interaction (deficits in socio-emotional reciprocity, in developing, maintaining, and understanding relationship) and communicational areas (deficits in nonverbal communicative behaviours), across multiple contexts and affecting their daily functioning. (Reinders et al., 2019). Students with ASD could also manifest restricted, repetitive patterns, interests or activities such as stereotyped or repetitive motor movement, inflexible adherence to routines or ritualized patterns, highly fixated interests, and hyper or hyporeactivity to sensory input or sensory aspects of the environment (American Psychiatric Association [APA], 2013). The ASD severity level is based on social communication impairments and restricted, repetitive patterns of behaviours and is related to the level of needed support for the person to function (Mehling et Tassé, 2016). Level 1 is the level in which the person requires basic support up to level 3 as the person requires "very substantial support". Besides these adaptative difficulties, students with ASD could also impact the

adoption of a healthy and active lifestyle and the practice of regular physical activity (Reinders et al., 2019). Arnell and colleagues (2018) showed that adolescents with ASD do not reach recommended thresholds for physical activity and highly adopt sedentary behaviours. They also reported that for many of them, physical education (PE) is the only opportunity to engage in physical activity. However, researchers suggest that even in PE, they do not have the same learning opportunities compared to their peers. Previous studies reported that students with special needs, including ASD, are less engaged actively than their peers or undergo negative social experiences, such as isolation, discrimination, and bullying in PE (Bredahl, 2013; Fröberg, 2021; Haegele et al., 2020; Wilhelmsen & Sørensen, 2017).

Participation in physical activities, such as PE, relies on sensory, motor, cognitive, social, and emotional skills (Fröberg, 2021), which can be major barriers for the success of students with ASD. From the student perspective, the most common barriers to engagement have been linked to personal intrinsic factors such as decreased self-esteem (Obrusnikova & Miccinello, 2012), low interest (Obrusnikova & Cavalier, 2011), low enjoyment (Eversole et al., 2016; Stanish et al., 2015), fear of getting hurt (Healy et al., 2013) or low preference for physical activity or active hobbies (Russell et al., 2019) or for competitive and team sports (Stanish et al., 2015). Other barriers have been related to characteristics of ASD such as low fundamental movement skills (Gandotra et al., 2020), social adjustment difficulties, increased fatigue or physical and sensory discomfort (Blagrove, 2017; Healy et al., 2013; Obrusnikova & Miccinello, 2012).

Due to these barriers, motivation of student with ASD may be a critical factor of engagement in PE (Pan et al., 2011a). In a recent scoping review, Arnell and colleagues (2018) hypothesized that difficulties in social skills interfered with their motivation for physical activity practices. Similarly, Holland and Haegele (2021) suggested that poor stimulus control, insufficient reinforcement, and poor motivation could explain why students with ASD experienced significant challenges in physical activity contexts such as PE.

The success and motivation of students with ASD in PE rely in part on effective instructions and adapted interventions to respond to their unique learner characteristics. Pan and colleagues (2011a) mentioned that external regulation supported the success and motivation of students with ASD in PE. Specifically, Arnell and colleagues (2018) emphasized that their motivation was dependent on the learning objectives, or the goals perceived. For instance, they reported that some students with ASD referred to PE as an unimportant discipline, although they were aware of its purpose and benefits. Others participated in PE only because it was required or to receive a grade.

Pan and colleagues (2011b) recalled that PE should be stimulating and motivating for students with ASD, to increase their learning opportunities and to support the development of motor and social skills. Recent studies in PE suggested that instructional models such as tutoring and cooperative learning were effective to promote the success of students having special educational needs (Metzler, 2017). In this line, it is important to understand how differentiation of curriculum and instructional models support these students, especially those having ASD. From this perspective, the adoption of differentiated instructions such as the context personalization approach, based on the interests and preferences of students, is a promising avenue to support motivation and success in PE.

Motivate Students with ASD With Context Personalization

Contemporary approaches recognize interest as a powerful motivational variable that directs students' attention to specific objects and stimuli and guides their engagement toward specific activities (Renninger & Hidi, 2016). According to the Interest theory,

researchers differentiate between individual interest and situational interest. While individual interest is related to an enduring predisposition to reengage with a particular content over time, situational interest (SI) is characterized by increased attention, concentration and affect experienced in a particular moment (Hidi & Renninger, 2006; Renninger, 2009). Individual interest is considered as a stable trait whereas SI corresponds to a psychological state.

Capitalizing on the positive effects of individual interest on the regulation of person-in-context experiences, researchers have used teaching strategies based on a fit between the content taught and the learners' individual interests (Høgheim & Reber, 2015). These teaching strategies which facilitate connections between learners and content, referred to the concept of context personalization (Walkington & Bernacki, 2014). The context personalization refers to matching educational content with characters, objects, and themes of students' out-of-school interests (Walkington & Bernacki, 2014). The aim of such intervention is to connect the learning tasks with what students are familiar with or interested in, to elicit their interests. Previous studies have demonstrated the effects of context personalization on students' SI, particularly in mathematics (e.g., Ku et al., 2007; Høgheim & Reber, 2015, 2017; Walkington, 2013). Based on the assumption that students out of school interests can elicit their SI when using context personalization, prior research has observed positive attitudes from students toward customized material (e.g., Høgheim & Reber, 2015, 2017).

Despite the results associated with context personalization, this strategy has never been used to elicit students' SI in PE. SI is conceptualized in PE as a multidimensional construct including five dimensions: instant enjoyment, exploration intention, attention demand, novelty, and challenge. According to Roure and Pasco (2018a), these dimensions are defined as the following. Novelty relates to the difference between information known and unknown. Challenge refers to the difficulty of the task, as perceived by students, in relation to their ability. Attention demand corresponds to a student's cognitive involvement within a learning task. Exploration intention represents the characteristics of the learning tasks that encourage a student to discover and explore his environment. Finally, instant enjoyment is defined as a positive feeling experienced by a student when participating in a learning task. To date, researchers in PE have investigated different variables to elicit students' SI including (a) video feedback (Roure, Méard et al., 2019), learning task design (e.g., Roure & Pasco, 2018b) and PE contexts (e.g. Lentillon-Kaestner & Roure, 2019). Therefore, there is a need to investigate the effects of context personalization on students' SI. Furthermore, no study has been conducted specifically on ASD students in relation to their SI.

The purpose of this study was to document the SI dimensions of four high school students with ASD involved in a differentiated volleyball unit based on context personalization. It also aimed to contrast students' perceptions with those of the teacher.

Materials and Methods

The qualitative design of this study was based on a phenomenological interpretative approach. It allows to understand the reality perceived by individuals from a systemic, interactive and ecological perspective (Korstjens & Moser, 2017). The study received approval from the principal investigator's university ethics committee and from the school board.

Participants

A paper consent form was sent to the parents of the students with ASD included in the group targeted for this study. Four high school boys having ASD (14 years old) agreed to participate (Max, Lucas, Will, and Alex). ASD diagnosis was made by a medical professional,

but the research team did not have access to the students' medical file. All four ASD students were in a special group for academic subject in mathematics, French, geography, etc. They were integrated into a regular group for PE and did not need support from a paraeducator. According to the PE teacher, they all demonstrated good narratives abilities, but they sometimes presented minor difficulties in affective and social domains during PE (for instance, refuse to be paired or to engage in activities they don't like). The complete PE group included 28 students. Their PE teacher, Mr. Mike also participated in the research. He had 31 years of experience, including 15 years teaching student with ASD. The students, their parents, and the PE teacher signed a consent form before participation.

Context Personalization of the Teaching Units

The teaching unit included four periods (75 minutes) of volleyball. The goal was to master the basic technical skills (set, forearm pass, serve) and to play a modified game in the last period. Teams were built by the teacher by grouping four students with the aim of supporting social positive interdependence within members. Students with ASD were included in different teams. The PE teacher personalized the context to match the goal and the learning tasks with characters, objects, and themes of ASD students' out-of-school interests (Walkington & Bernacki, 2014). He first asked all the students of the group about their major interests outside the schools. According to their interests, he planned a team sport teaching unit inspired by video games features (e.g., Clash of Clan). All activities took place in the gymnasium. The teacher presented learning tasks as "missions" corresponding to features involved in their preferred video games. In each mission, the students had specific roles to complete according to their interest and abilities. To do this, they had to choose an avatar corresponding to the different roles that could be held in the missions (ninja, builder, creator, etc.). They had to complete individual (learning technical skills) and team missions (succeeding in several ball exchanges) while avoiding traps imagined by the teacher (having to do a specific exercise). Completed missions allowed to earn individual and team points, called experience points as in video game platforms. At the end of the unit, the teams competed against each other in a 4 vs 4 volleyball game on a badminton court. The victories also allowed teams to cumulate more experience points. During volleyball units, points could be redeemed to choose different tasks, to select which teams to play against or to get some privileges (more time, etc.). The team which has cumulated the most experience points during all units was invited to participate in a special event organized during lunchtime which consisted of an inter-group tournament with other groups of their grade. The winner of the tournament participated in a special out-of-school event during a school day. All the team sports units were based on that model throughout the school year.

Procedures

At the beginning of the year, the principal investigator was invited by the teachers to observe the PE class, and to present herself and the study. Throughout the year, she supported the PE teacher in the implementation of the context personalization approach. In a period of two weeks after the volleyball unit, the point of view of the students and the PE teacher were collected from semi-structured interviews. Interviews are widely used in education (Creswell & Clark, 2017) as well as in adapted PE and with students with ASD (Holland & Haegle, 2021).

All the interviews were conducted by the principal investigator. She has more than 20 years of experience in teaching PE and more than 12 years as a research principal investigator in adapted physical education. To promote discussion and to reduce stress during interviews, students were paired by the teachers based on their friendship and personal affinities. Interviews took place at the school, in a quiet room, during lunchtime

and last about 45 minutes. Lunches were provided to students. The teacher participated in an individual interview for 90 minutes. Recalls of the consent were made for the participation and the video recording before the interviews.

Data Collection

The interview template consisted of three sections including nine open-ended questions. The first two questions were icebreakers allowing students with ASD to present their hobbies and their general appreciation of PE. The second section included two questions about the experiences and perceived learning in the targeted research unit. The third section aimed to document motivation according to five SI dimensions (*“How challenging was this task for you (or for your student)? How did the task make you (or your students) want to do more, to know more about it? What was fun about the activity? What was new about the activity? What was the required focus and attention?”*). The same template was used both for students and the teacher.

Data Analysis

Interviews were transcribed and anonymized. The teacher read a copy of his verbatim and didn't make corrections. A thematic analysis (Braun & Clarke, 2012) was performed on anonymized verbatim using NVivo12 software. The corpus analysis was initially based on the SI theoretical framework. It was enriched with the relevant information emerging from the interviews.

A thematic analysis was run by one member of the research team. The thematic analysis took place in four stages: 1) the first cycle of coding consisted of reading the verbatim to select data chunks; 2) the second round of analysis was carried out by two members of the research team to organise relevant codes according to the theoretical framework or as an emerging category; 3) to ensure reliability, consensus meeting consisting of peer debriefing and checks, were held with three members of the research team throughout the third round of coding; 4) summaries of each category were realized to synthesize in themes and to identify the main quotes that best represent each category.

Results

The thematic analysis based on SI dimensions was carried out on the 171 statements included in the corpus. Pseudonyms were used for all participants in the study.

Instant Enjoyment

Instant enjoyment was the most reported SI dimension in the corpus. The four students linked enjoyment to their progress and their improvement. Max reported, “never having had so much fun in PE”. They also highly enjoyed the elements related to the context personalization approach, particularly the experience points and traps. These experience points gave them access to individual and group success and supported their personal achievements. Three students reported losing a lot of motivation when the teacher forgot to give experience points or forgot to hand them out.

For the teacher, Mr Mike, the enjoyment was illustrated by the high rate of engagement of students with ASD in the tasks. “If the student is in action, it is already a sign that he is stimulated, that he is having fun. If he wasn't having fun, he would only be sitting on the bench.” Globally, Mr Mike observed the same level of pleasure for all students in the group including the students with ASD.

Challenge

The challenge was also a frequent dimension in the corpus. However, the teacher's and students' points of view were different for this dimension. For Mr Mike: “The challenge is

the key to success with his students.” He gave great importance to proposing challenges that were adjusted to the abilities and interests of the students. The comments of the four students with ASD were less specific. Although Lucas noticed that the challenge wasn’t different in the learning tasks, the other three were rating the challenge as “medium or easy” and did not experience much difficulty.

However, participants mentioned that the challenge related to several other dimensions of the conceptual framework. Thus, the students reported that the pleasure associated with traps and experience points induced more stimulation. Also, Mr Mike mentioned that the challenge was “intrinsically linked to the novelty due to context personalization and the different implementation compared to traditional course.” According to him, this helped to avoid redundancy and boredom for the students.

Novelty

Besides its relation to challenge, students associated novelty mainly to the context personalization rather than to the volleyball unit planned. According to them, they never had previously thematic courses, or emulation systems allowing them to accumulate points in PE. For Alex, his interest in participating in new tasks was facilitated by the teacher’s instructions, so that he knew what was expected. For Will, the novelty was an aspect that arouses his curiosity. For Mr Mike, the innovative organizational modalities led all the students in the groups to develop and apply new team strategies.

Exploration Intention

This dimension was hardly represented in the corpus and the results were ambiguous. For instance, Max mentioned that the points system based on themes encouraged him to participate: “(...) the experience points made me want to get involved.” However, for Will “that didn’t make a difference.” According to the teacher, the students with ASD would like to go further with themes and the group contingency systems.

Attention Demand

This dimension was not addressed by the students except for Lucas who reported difficulties to understand all the experience points. “Well, there were too many, there were games, I don’t understand how to win, how to lose.” In the same way, Mr Mike mentioned that many elements related to context personalization were cognitively challenging for all students because they constantly had to adapt to new tasks and learning modalities. Nevertheless, he reported that students with ASD understood the group contingency and the positive emulation system more when compared to the others.

Discussion

The purpose of this qualitative interpretative study was to document the SI dimensions of four high school students with ASD involved in a differentiated volleyball unit based on context personalization, in an integrated PE setting. It also aimed to contrast students’ perceptions with those of the teacher.

According to the participants, SI was elicited by the context personalization approach. The results clearly highlight the following three SI dimensions: instant enjoyment, challenge, and novelty, whereas exploration intention and attention demand were less reported. The influence of the group contingencies and positive emulation system, as part of the context personalization, were important topics ending up in every dimension.

Context Personalization and Situation Interest Dimensions

The context personalization was based on students’ out-of-school videogame interests (for instance Clash of Clans) to customize the learning tasks. In line with Walkington and

Bernacki (2014), this intervention can be classified according to the three dimensions of depth, grain size and ownership. Concerning the depth, which refers to the quality of the connections to students' existing interests, we could consider that the intervention reached a deep level since the learning tasks were embedded in students' interests. First, students had to get a personalized avatar corresponding to their capacities and interests in the tasks (for example, ninja, constructor, or creator). Second, the teacher established a positive behavioural supporting system based on group contingency and a positive emulation system allowing students to collect individual, team, and group points to support their engagement and socialization. The grain size, which corresponds to the reference group targeted, was set to the group of ASD students. However, the ASD students were integrated into a regular PE group. Finally, ownership was not really used in this intervention since the personalization of the context was done by the teacher.

This study using context personalization confirms the positive effects of such interventions on students' SI (e.g., Høgheim & Reber, 2017). However, by using the multidimensional construct of SI (with five dimensions), it extends current knowledge by distinguishing the effects on each specific dimension for students with ASD. In line with previous results based on teenagers having affective and cognitive needs (Ouellet, 2020), the results clearly reveal that the positive effects of context personalization on students' SI are related to instant enjoyment, challenge, and novelty.

Generally defined in PE, as a positive affect, feelings of pleasure, fun, and enjoyment can also be conceptualized as a multidimensional construct. These included six dimensions from which pleasure can be generated, self-referent competency, other-referent competency, teacher-generated excitement, activity-generated excitement, peer interaction and parental encouragement (Hashim et al., 2008). Among these dimensions, it can be hypothesized that the context personalization approach used in this study emphasized particularly the teacher-generated excitement, the activity-generated excitement, and the peer interaction. By covering these three dimensions, the context personalization approach generates a strong enjoyment from the students. In that sense, this study confirms that enjoyment is seen as the most important SI dimension to motivate students (Roure, Lentillon-Kaestner et al., 2019).

Furthermore, the group contingency and positive emulation system allowing students to collect individual, team and group points are clearly involved in the activity-generated enjoyment. This is consistent with previous work showing that students with ASD were motivated to participate in physical activity when they benefited from external reinforcements (Holland et al., 2019). According to Pan et al. (2011a), an external motivation source, comparable to that implemented in the present study, can lead to a higher engagement during physical education classes since this is more controlled than an autonomous motivation for students with ASD.

Given that the practice of context personalization offers the opportunity to differentiate learning tasks and to adapt them to students' interests, this kind of intervention strengthens SI and facilitates interest internalization by eliciting students' instant enjoyment. Moreover, results support the importance of promoting enjoyment specifically for the student with ASD in PE. Indeed, Case et al. (2019) recommended using a special thematic to link learning tasks and the environment with the individual interests of students with ASD to sustain their motivation in PE. Thus, context personalization is an interesting answer to their lack of interest in the context of physical activity.

However, even if instant enjoyment is clearly a key dimension reported by ASD students, this dimension is often associated with the challenge perceived by the students. Since the challenge is defined as the level of difficulty relative to one's ability (Roure & Pasco, 2018a), students' perception of ability can explain the relationship between challenge and

instant enjoyment. Students experience enjoyment and motivation when the tasks are aligned to their level of perceived ability (Fairclough, 2003). This relationship can be interpreted as the need to find an optimal challenge in learning tasks. Students report such an optimal challenge during their interviews, which can explain why they have also experienced instant enjoyment when practising the learning tasks. The combination of instant enjoyment and challenge seems well-founded according to a previous study in PE (Roure & Pasco, 2018b). In their study, these authors found that challenge was negatively correlated to instant enjoyment. In this sense, the results of our study further confirm the need to find a balance between the promotion of these two SI dimensions to promote students' motivation. This can lead to generating positive experiences and motivating them in PE (Pan et al., 2011; Wang, 2019). PE teachers might personalize the context to students' interests by using learning tasks that are optimally challenging to maintain students' perceived ability and increase their instant enjoyment. This is particularly important given that the perceived challenge seems to be a key dimension to elicit the other SI dimensions, according to students with ASD.

Besides its relation to the challenge, students associate novelty mainly with context personalization, confirming that this intervention was totally new for them. The relationship between novelty and challenge seems logical in so far as the novelty component of the context personalization could lead students to perceive the learning tasks as more challenging. However, the results show that the students rather perceived the challenge as being optimal. In this line, the emphasis on novelty is founded to promote students' SI. Indeed, Shen et al. (2010) revealed that students demonstrate a lack of interest when learning tasks are repetitive in nature. The advantage of the group contingency and positive emulation system and more generally of the context personalization is to offer new and stimulating content to students. In that sense, novelty leads students to be curious, which in turn reinforces students' instant enjoyment. This result is consistent with previous studies (e.g., Ainley & Ainley, 2011) which demonstrated positive relationships between interest, the desire to find out more about a specific topic and feelings of enjoyment in science.

Conclusions

In conclusion, the results of this study using context personalization in PE confirms the positive effects on students' SI, particularly on their instant enjoyment, challenge and novelty dimensions. Considering that these effects were observed for students with ASD, it should be considered that this study endorses the pattern found in previous studies which shows that context personalization increases interest in learners who had a low initial interest or low-performance expectations (Reber et al., 2018).

Perspectives

This study calls for considerations regarding the educational practices to be implemented in adapted PE. First, the results indicate that contingency systems support pleasure, modulate challenges, and arouse curiosity in students with ASD. A positive emulation system is a tool usually proposed in PE to support students' positive behaviours and overcome difficulties (Block, 2016). Those systems are useful for decreasing off-task or increasing positive behaviours from students in general as well as in adapted PE (Block, 2016). The repercussions on the SI dimensions open a new perspective of intervention and therefore encourage further work on this question.

Moreover, the differences between the students and the teacher support the need to consider specifically the students' voices to plan stimulating and motivating learning (Coates & Vickerman, 2008). Grenier and Lieberman (2018) underline that students with ASD may have a restricted repertoire of interest in PE. Indeed, capitalizing on their interests can

contribute to the generalization and transfer of learning in various educational settings. Therefore, teachers might consider and listen to the students' voices whenever it is possible.

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