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Fixed-Route Use by People with Intellectual Disabilities: Personas to identify Learning Needs

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Abstract

Public Transport supports independence and encourages social, educational and vocational inclusion. It is a sure means to gain access to the city, its services and activities. However, using *fixed-route** requires knowledge and know-how that all travelers, such as people with intellectual disabilities, do not master. While for most of us learning to travel is done through personal experience, for people with intellectual disabilities there is a need for travel-training in order to build up travel experience and confidence. Travel-training as an inclusive approach allows people with intellectual disabilities to learn the fixed-route**,** which may help them to be more autonomous and also gain self-determination skills. Research has identified, however, some constraints related to travel training such as: time cost, cost per trainee, fear related to safety or the understanding of complex concepts, etc. Our project aims to design a serious game for people with intellectual disabilities in order to support their learning of how to use the fixed-route and overcome some of the identified constraints. Therefore, in order to design a thorough product we need, among another, to determine the learning needs of people with intellectual disabilities regarding the use of Public Transport. However, it may be difficult to gather this information from people with intellectual disabilities through conventional methods such as interviews or questionnaires. Accordingly, we used a user-centered design method to withdraw their learning needs: *Persona*.

Keywords: Persona, Intellectual Disabilities, Fixed-Route and Travel-Training, Learning Needs.

Introduction

The use of Public Transport can be challenging for people with intellectual disabilities, therefore learning the use of travelling through training is essential for this clientele. Nowadays we can find a growly number of travel training which offers different training to help people with disabilities to learn how to use the fixed-route. Our work takes place in the continuity of those travel training and aim to propose new pedagogical tools which can reinforce and help the current training for people with intellectual disabilities.

The main goal of this research project is to propose guidelines which will help to build a serious game for people with intellectual disabilities to teach them the use of public transportation However, in order to develop an efficient game one of our first steps is to determine different needs such as learning needs, teaching needs, didactic needs, etc. The identification of those needs will help to conceive a product that can answer the needs of those who are concern by travel training, which is essential in the design of an efficient product. Nevertheless, when it comes to determine the needs of a clientele with intellectual disabilities it can be challenging to gather information for many reasons (e.g. expertise of the interviewer, familiarity with the interviewee, etc.). This paper discusses about the use our methodology to identify the learning needs of people with intellectual disabilities.

Literature Review

Public transport in a fixed-route

The use of Public Transport on a fixed-route required a lot of skills that can be difficult for people with intellectual disabilities to master. However public transport play a major role in the mobility of individual and its accessibility is vital (in an urban context). It allows access to health, education, employment, therefore being excluded from them can have an impact on individual social life and participation.

People with disabilities often suffer from school, social and / or professional exclusion, which induces a phenomenon of poverty (Venter, Rickert, Bogopane, Venkatesh, Camba, Milikita, Khaula, Stone and Maunder 2002). According to Statistics Canada (2011) 20.5% of people with disabilities live in poverty against 13.2% of people without disabilities. For Aubry (2012), people with disabilities remain the most heavily affected group by poverty. Therefore, it is arguable that the inaccessibility of public transport for people with disabilities will not improve their situation and reinforces social exclusion and the phenomenon of poverty. In "Enhanced Accessibility for People with Disabilities Living in Urban Areas," Venter et al. (2002) illustrate the impact and role of public transport in stopping the vicious circle of poverty and in improving the quality of life of people with disabilities. These authors have shown that public transport plays a major contribution in health access, social participation and human development, social and economic aspect. This leads to underline the importance of the accessibility of public transport in order to promote independence and social participation. Therefore, be deprived of that service does not help to improve the living conditions of people with disabilities, participate to maintain the dependencies and thereby to perpetuate the phenomenon of poverty. According to Davies, Stock, Holloway, and Wehmeyer (2010) the public transport inaccessibility has a negative impact on all aspects of personal and professional lives of individuals (work, leisure, religious activities, running, etc.) and is an obstacle to social integration. Public transport is also a central point between individuals, the city and business; together they allow economic development of a region. (Société de transport de Montréal, Kyoto Report, 2003). For all these reason, researches about Public transport and how to increase their accessibility are essential.

The Challenges of Interviewing

When it comes to collecting data from a clientele who has intellectual disabilities it can be difficult to use traditional techniques, such as questionnaires or interviews. Indeed, people who have intellectual disabilities may have difficulties understanding abstract concepts and they are also seeking approval from others and to satisfy them (D'Eath, McCormack, Blitz, Fay, Kelly, McCarthy, Magliocco, Morris, Swinburne, Tierney & Walls 2005). Therefore, in order to avoid biased data, it is important that the interviewer has perfect control of the interview. He must be flexible, sensitive and also able to adapt his speech, his language to the clientele without impacting the study (Baxter, 2005). Beyond the mastery of managing the interview this may be a help to the interviewer if he is familiar with the interviewee to facilitate their interaction. Regarding questionnaires, the issues are the same with the fact that many people with intellectual disabilities are not readers; therefore the interviewer has to reword questions, which can be a dangerous exercise because it can affect the study due of possible reinterpretations. Consequently, the use of these techniques requires a high degree of expertise that all interviewers do not possess. All these reasons led to use of another methodology to collect our data. Indeed, the literature is quite rich in terms of defining the characteristics of people who have intellectual disabilities; therefore, it is possible to use this type of methodology.

Method

The situation observed was the use of Public Transport on a single journey (home to school) using only one mode of transport, the bus. We did an analysis of the activity for the purpose to report the real activity during a single trip. This analysis has been performed as part of this work in order to understand the use of Public Transport during a single journey, identify the specific skills needed for this scenario and to identify possible difficulties that people with intellectual disabilities could meet in a similar scenario. The data gathered during this analysis focuses on the situation (context and event), behaviors adopted by the individual and the emotional components related to this activity. Due to security constraints and fears of environments, the person under observation during the trip had no intellectual disabilities and also was not familiar to Montreal Transport. However, this person had knowledge of other transport systems; therefore, he seemed able to implement strategies that will help him reach his goal (going to school). It was asked to the person to verbalize everything that happens during his journey even the events that seemed the most ordinary. Once the data was collected we associated the different steps identified by the user with one or many cognitive functions in order to withdraw the skills necessary in that specific scenario. Subsequently we submitted the identified skills to two public transport users in the aim to confirm or refute our data. Below is presented a summary diagram of the analysis of the activity carried out as part of this work.

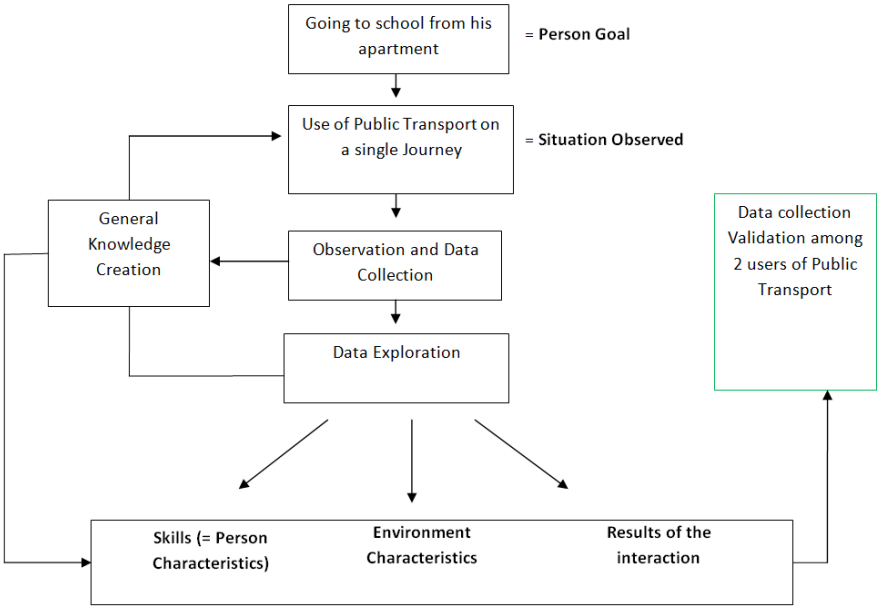

Figure 1: Activity analysis process

The results of this activity analysis were then crossed to the characteristics of people with intellectual disabilities in order to create a persona that will identify their possible difficulties and at the same time their needs. We define Personas as "the representation of typical users in order to define functions, needs, expectations that future users could use" (Bornet and Brangier, 2013). They are based on a realistic portrait of the population targeted and they help to understand users and the emergence of the different usages by future users. In this study, the use of persona was to identify the learning needs of people with intellectual disabilities in the use of Public Transport on a simple journey. Finally the persona also helped to withdrawing the skills necessary to use Public Transport and different sources of instability.

Results

The analysis of activity gave us three major results. The first one was about the identification of the necessary skills when using Public Transport in this kind of scenario. The second one was about the identification of learning needs of people with intellectual disabilities when using public transportation in fixed-route. The third one was in regard to the result of the interaction Person/Environment.

Public Transport Specific Skills

From the analysis different skills emerged when using Public Transport. They were validated by two other public transport users who were asked to identify the different skills they bring into play during their bus ride. Following the discussion, these skills were presented to them to see the alignment and whether they were consistent with what has been identified by the analysis of activity. On the next page are presented the skills that emerged

Table 1: Identification of Personal and Environmental Characteristics

<table>
<tr><th colspan="2">Personal Characteristics – Skills</th></tr>
<tr><td>Gross Motor Skills

• Head Movement
o Flexibility
• Upper and Lower Body Movement
o Muscular Tone
o Strength
o Coordination
• Balance
o Static Position (the bus is not moving)
o Active Position (the bus is moving)</td><td>Cognitive Skills
• Memory
o Research and process comparable events/situation (use of past knowledge)
o Retrieve and process information from an object or a situation
o Assign to an object a specific meaning
o Problem solving
• Selective Attention
o Exploration
o Capacity for abstraction/Focussing
o Processing relevant information at a given time
• Spatial Representation
o Knowing how to find the proper direction when leaving your apartment
o Knowing how to find the proper direction in the neighborhood
o Knowing how to find the proper bus direction
• Reading (numbers and text)
o Read maps
o Give a meaning to words
o General Understanding (what is the general idea to understand)
o Recognize a series of numbers from 0 to 9
• Anticipation et planning
o Time management
o Plan a trip
o Plan the unexpected</td></tr>
<tr><td>Social Skills
• Follow systems rules (Public Transport)
o Validate the ticket
o Follow social rules in the bus
• Follow sociocultural rules
o To the line while waiting for the bus
o Courtesy
o Knowing the common civilities
o Knowing and Understanding the cardinal points
• Interaction and Communication with others in an acceptable manner
o Provide clear and consistent information
o Provide explanation
o Ask questions
o Listening
• Appropriate behaviour according of the context</td><td>Emotional
• Self Confidence/Self-esteem
o Develop knowledge and experiences
o Develop attitudes related to a situation
o Weakness and Strength Awareness
o Accepting the gaze of others on oneself</td></tr>
</table>

<table>
<tr>
<td>Safety Awareness Skills
• Follow systems rules (road safety regulation)
o Identify crossing emplacements
o Knowing and undertanding road signage (e.g. straffic lights)
• Crossing roads safely
o Recognize potential dangers
o Identify relevant information
o Process information
• Distinguish road from pavement
o Identify relevant information
o Process information
• Wait for the bus at the indicate and appropriate location</td>
<td>Technological Skills (Complementary skills)
• Using STM application on a smartphone or a computer
o Know how to enter the application/website
o Know how to navigate through the different
o Research/Identify relevant information
o Understanding the information presented in the website
o Manage the differences between the information presented in the smartphone vs the computer
• Using the self-service monitor
o Know how to use touch interface
o Identify relevant category
o Follow instructions
o Know how to pay with debit/credit card
o Know how to pay with cash</td>
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<tr>
<td colspan="2">Environment Characteristics – Signage</td>
</tr>
<tr>
<td>Instability related to signage road information
• Some crossings have traffic lights others do not.
• Traffic light durations are different from one crossing to another
• Some crossings are controlled by a timer and others are not.
• Time delay between the appearance of the waiting signage (the hands) and the actual possibility to cross</td>
<td>Instability of material representation

Bus stops are materalized either by a bus shelter or a road sign. One being more prominent than the other.</td>
</tr>
<tr>
<td>Procedures Instability
• 2 procedures to call the stop
o Pull the yellow cord
o Press the stop button (grey and red button)
• 3 procedures to get off the bus
o Pressurize the back doors
o Exercise a movement in front the green lights of the back doors
o Get off the bus from the front doors</td>
<td>Permanence of information

• At the bus station there is a map of the bus route but there is no recall of this map inside the bus</td>
</tr>
<tr>
<td>Presentation of information
• The spatial representation of the map is different from what individuals live (difference from represented space vs lived space)
• No recall of the individual position on the map (e.g. you are here)
• Poor readability</td>
<td>Accessibility
• No audio voice to announce the next stop
• No visual representation of the different stop in the bus (e.g. a map like we find in the train)</td>
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• No audio voice to announce the next stop
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The analysis of activity helps to provide a detailed description of what it means to use Public Transport. As seen most of these skills are from the cognitive domains or coping behaviors that are areas in which people with intellectual disabilities have an important deficit. Therefore knowing the characteristics of these individuals and what it implies to take Public Transport in a

fixed-route, it's obvious that providing adjustment and/or implement alternative strategies is necessary to circumvent potential difficulties that people with intellectual disabilities could meet given the complexity of the task. The identification of these skills was essential to better understand the challenges of this type of task. These skills were then used to create the persona to identify the possible learning needs of students with intellectual disabilities. A passage of the persona is presented below. It presents assumptions about the possible difficulties that could meet people with intellectual disabilities in such a journey. We only presented the one, which involve cognitive skills.

Portrait		Nicolas Desjardins is 15 and has mild intellectual disabilities. He lives in Montreal with his parents and sister. He is invested in different activities and appreciated by many. He never used Public Transport in a fixed-route. His parents are worried at the idea that Nicolas only uses this service. A family friend who works for an association spoke to them about a travel training program that trains people with intellectual disabilities to use Public Transport independently and safely. Personal characteristics of people with intellectual disabilities/skills associated.
Characteristic	**Transition**: School / Employment **Activities**: Soccer, Swimming **Strengths:** uses a smartphone and often connects on Facebook **Weaknesses**: little confidence in his abilities, **Why training**: to get to its activities and at school with his friends using Public Transport	**Slow developmental delay / Cognitive Skills (Reading, Spatial Representation):** Due to this characteristic, the student may have conflicts between lived space and represented space (Langevin, 2007), which can be observed more when reading information and maps. Indeed, information as shown in plans (subway and / or bus) is different from student reality. There are chances that the student is disrupted in its progress because of this conflict. **Slow and premature discontinuation of development:** o **Slave to his own perceptions / Cognitive Skills (Assigning objects a specific meaning)**: Numerous instabilities present as a result of Public Transport signaling, particularly semantic meaning (e.g. meaning of the arrows, Langevin, 2007), can disrupt students in their understanding of the situation. The same arrow can mean "up" or "straight ahead". Therefore, such students may experience some difficulty to understand the significance of arrows in a given context. o **Difficulty with anticipation / Cognitive Skills (Anticipation and Planning)**: The swimming lessons start at 5pm and Nicolas coach accepts no delay. Therefore, the student must anticipate his time of preparation, the time to walk from his house to the bus station, the time when the bus arrives, the time he will spend on the bus and then the walking time between the bus station and the pool. Arriving on time to the lesson requires to ability to anticipate the time needed for these activities. This may result in difficulty to grasp the logical relationships between events and to make anticipatory evidence.

Table 2 : Persona

Assumptions

The difficulties that Nicolas may face can have an effect on his intention of using Public Transport in a fixed-route and also impacting his affective abilities.

Taking into account the cognitive characteristics (e.g. problems with transfer and generalization, difficulty understanding abstract concepts, etc.) and emotional characteristics (e.g. low self-esteem, fear to fail, etc.) of people with intellectual disabilities, the skills required when using the fixed-route and the different sources of instability in the environment; it's normal to assume that in such conditions these type of clientele will always fail to take the bus. Therefore, the developments of these skills are essential because of interaction with the environment and the lack of these skills will highly influence the intention of using the fixed-route by people with intellectual disabilities. Also it is likely that the task complexity, dependencies retention, society beliefs and perceptions towards intellectual disabilities may influence the social acceptability by people without disabilities in the use of the fixed-route by this clientele. Consequently in order to propose the best adaptations and answer adequately to universal accessibility principle, it's

important to consider those aspects while training people with intellectual disabilities to use fixed-route. Below is a graphic synthesis of our results.

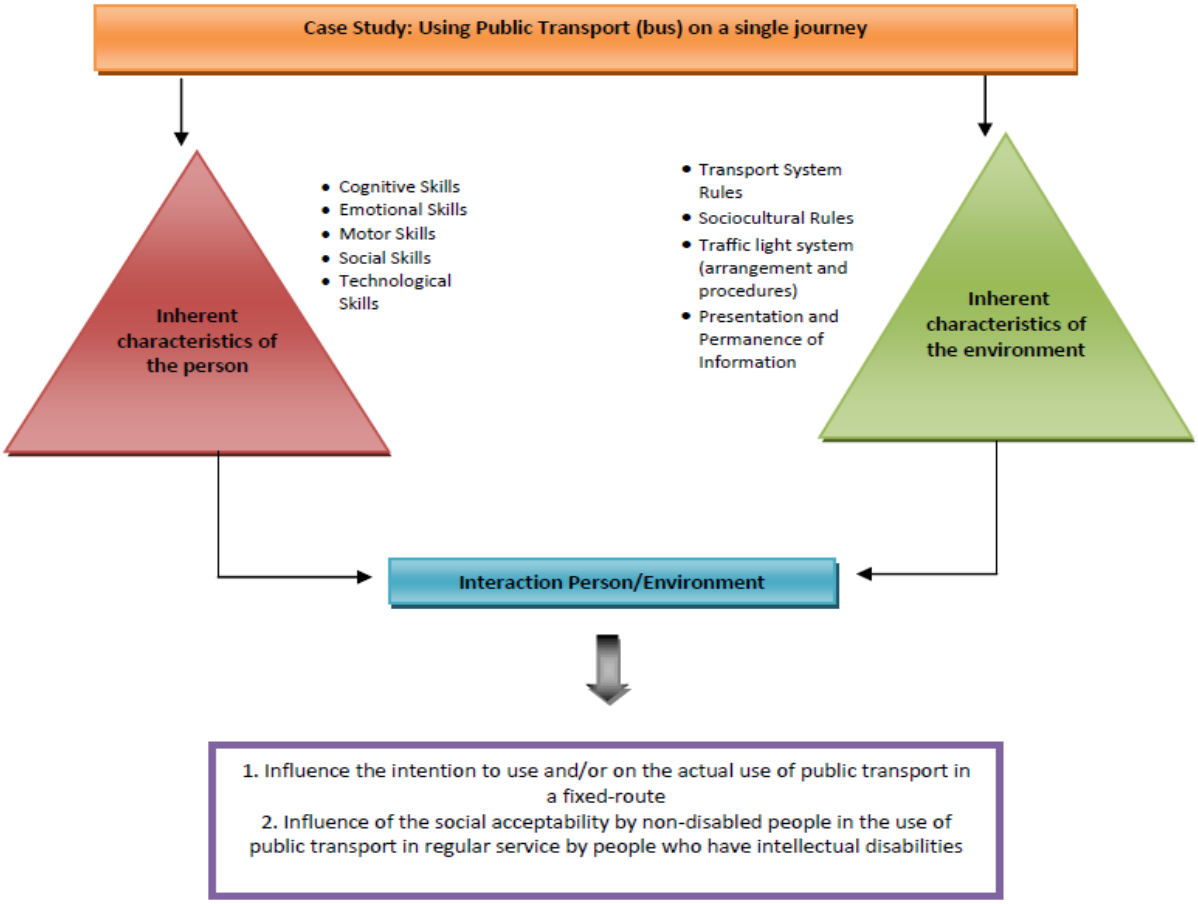

Figure 2: Results synthesis

In light of these study results, it appears to be essential to withdraw the learning needs of people with intellectual disabilities in order to propose adjustment which may help to overcome their difficulties during their journey and also help to give some guidelines for the serious game design.

Learning Needs

From the finding skills and the characteristics of people with intellectual disabilities we were able to identify three major needs. The first need was related to skills development, the second need it's about value and semantic aspect while the third need it's in regard of tools and strategies development. The table 3 presents the details of these requirements

Table 3: People with intellectual disabilities Learning Needs

Need related to the development of the necessary skills for the use of public transport • Develop literate skills using a standard strategy or an alternative strategy[1] • Develop social skills using a standard strategy or an alternative strategy • Develop cognitive skills using a standard or an alternative strategy • Develop emotional skills using a standard strategy or an alternative strategy • Develop safety awareness skills using a standard or an alternative strategy • Develop technological skills using a standard strategy or an alternative strategy	Skills Development
Need to give a value to an action, object (value in the sense of meaning) • Knowledge of different value systems (cultural, social, etc.) • Understand different value systems • Identification of the environmental code (e.g. green = ok, red=not ok, ringing sound in the bus means that somebody has requested a stop, etc.)	Value and Semantic
Need related to tools and strategies development that promotes confidence/self-esteem • Deal with people reaction • Self-awareness • Express limits • Express Strengths • Develop strategy to help the process of decision making	Tools and Strategies Development

Identifying these needs are necessary because it will allow adaptation of issues that should be addressed in the serious game so that it best meets our clientele. Finally, the study has identified a general result of the interaction.

Conclusion

The methodology used in this study identified challenges associated with the use of Public Transport in a fixed-route and associated skills. We also helped to identify needs to be considered to adapt the design (in terms of pedagogical approaches and scenario) and of our serious game when working with people with intellectual disabilities. Results obtained in this study can help anyone wanting to design a product or service for people with intellectual disabilities, since it offers a synthetic and simplified representation of the problem. Nevertheless, although it's an

[1] It is a strategy that is developed for a specific individual taking into accounts his characteristics/abilities because he cannot perform the task using the common strategy that the majority uses.

interesting method, it's important to specify that it may be demanding in time and that it can fluctuate depending of whom conducts it.

Moreover, the data collection has been made without the intervention of people with intellectual disabilities. Indeed, although we recognize that participation in this type of study by people with intellectual disabilities is extremely important and their involvement in the research process is essential, it was difficult to use directly this clientele for all the reasons mentioned in the section *"The challenge of interview."* We recommend in future work to include in the data collection process people with intellectual disabilities and also to vary the scenarios. Indeed our methodology is based solely on a simple bus ride. Therefore it could be possible to find different conclusions if we introduce other variables (complexity of the path, subway, etc.).

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