



What did they have to say about money and finance? Grade 4 students' representations about financial concepts when learning mathematics

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ABSTRACT

This study presents results coming from Grade 4 students discussing financial concepts that emerged while learning about probability. Six mathematical learning situations on probability were implemented in an elementary classroom situated in Québec, Canada. These learning situations presented gambling activities as sociocultural contexts to be studied in order to develop probabilistic knowledge and reasoning. This process also involves the use of critical thinking, which supports the development of citizenship competencies. The sociocultural context created an opportunity for students to talk about financial concepts broadly, not just those related to gambling activities. The teaching experiment involved the participation of 27 students. Results showed that students have many representations about financial concepts, more specifically on money, means to have money, consumption, risk, and global economy. Those concepts were conceptualised in the citizenship context, where three kinds of citizens emerged: the personally responsible citizen, the participatory citizen, and the justice-oriented citizen. The results of this study suggest that students need to be financially educated in order to develop citizenship.

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1. Financial literacy for youth

Financial literacy education is growing around the world. The financial crash in 2008 and subsequent global recession signalled a need to enhance the financial literacy of our youth. While some have argued that the 2008 financial crisis was more a result of a lax regulatory environment and predatory lending practices than a financially illiterate citizenry (Willis 2008; Pinto 2009, 2012), there is general agreement that financial literacy education deserves a place in today's schools (Suiter and Meszaros 2005; Lusardi and Mitchell 2014). Individual responsibilities in regard to pension plan, health insurance and unemployment are increasing (Atkinson et al. 2007), while the consumption practices are changing (Amazon, PayPal). The need for financial literacy education has been made increasingly apparent with the proliferation of various innovations that are rapidly changing both local and international economies. For instance, start-up companies have given rise to a very different business model and digital currencies (e.g. Bitcoin) to alter the entire banking system, as we currently know it.

Since 2012, the Organisation for Economic Cooperation and Development (OECD) has administered a financial literacy assessment via their triennial Program for International Student Assessment (PISA). Results of PISA's 2012 financial literacy assessment, which examined the financial knowledge of 15-year-olds from 13-member countries of the OECD, revealed that many young people lack an

understanding of basic financial concepts (OECD 2014). On the other hand, the results of PISA's 2015 financial literacy assessment revealed that personal experience with finance is still the most relevant factor to impact students' financial literacy (OECD 2017).

Financial education is increasingly provided in schools and a dedicated finance curriculum in high school may soon be commonplace in many countries, including Canada. At the present time, financial literacy is integrated into multiple areas of the curriculum in most Canadian provinces. What does it mean to be integrated? The following example illustrates a financial literacy concept currently found in the mathematics curriculum:

Zoe is looking at buying school furniture. Pencil cost \$1.25, ruler cost \$2.15, and notebook \$3.55 How much does she need before taxes to buy one of each item?

Is this really financial literacy? This mathematical word problem uses money as a context for students to work out decimal numbers and addition. This example is not unique in mathematics textbooks; contexts using financial concepts are very common for all grade levels. It is true that the mathematical aspect of some financial concepts might be studied (Sawatzki 2015). It is also possible that the financial concepts are solely used as contextual elements and not thoroughly developed for themselves. For example, one may find a solution to the problem above without explicitly talking about the importance, characteristics and functions of money (Hill 2010). Teachers might focus only on the mathematical concepts present in the task. The context of consumption might be considered as cosmetic, and thus could be replaced by another context, using the same numbers, the same operation and, therefore, the same mathematical structure (Savard and Polotskaia 2017): *Zoe is measuring trees in her garden. The cedar is 1.25-meter-long, the lilac is 2.15-meter-long, and the elm is 3.55-meter long. What is the total combined length of the trees?* Not addressing the financial concepts for themselves means that students will not learn about them. In this case, we cannot pretend that financial concepts were taught. Which is quite odd, because children are consumers and they make choices about their own money (Johnson and Sherraden 2007). At the same time, they acquire information about finance and economy from different sources, which might be incomplete or incorrect (Suiter and Meszaros 2005). In addition, students might have different conceptions about money (Schug 1987), such as the value of a coin is proportional to its size. As Schug (1987) pointed it out, it is important to address the confusion about financial ideas in an appropriate manner to cover the needs of children. In order to provide adequate information about finance, let us take a look on what financial literacy is.

2. A quick glance of financial literacy education

Financial literacy has been defined over time as a portfolio of financial knowledge and the behavioural use of it (Johnson and Sherraden 2007; Huston 2010). Even if there is no consensus about the meaning of it, many researchers belonging to different fields tried to define the content of being financially literate. Thus, to refer to financial literacy, different terms, such as financial education and financial capability, are often used interchangeably (Huston 2010). Financial literacy education (FLE) addresses different audiences: youth and adults. At this end, there are definitions of FLE for youth and adults. The OECD, via their international assessment programme PISA 2015 (OECD Programme for International Student Assessment 2016), proposes a definition that applies for youth:

Financial literacy is knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life. (85)

Being financially literate is thus a competency to be developed. At this end, four areas of knowledge and understanding are defined as content to be learned in school: money and transaction (everyday payments, spending, value of money, bank cards, cheques, bank accounts and currencies), planning and managing finances (monitor income and expenses, other resources to enhance financial well-

being), risk and reward (managing, balancing and covering risks: insurance, saving products, investments), and financial landscape (financial world, economic conditions and public policies). Four processes and four contexts are also defined. Thus, identify financial information; analyse information in a financial context; evaluate financial issues; apply financial knowledge and understanding are processes to be presented in situations where financial knowledge, skills and understanding have to be used from personal to global contexts: education and work; home and family; individual; and societal.

3. Mathematics modelling to support citizenship

Financial knowledge is like any other knowledge: it has to be used according to the situation. This kind of knowledge is called representation, which is a conceptualisation of the ‘real world’ in order to take action (Brun and Conne 1990). A representation is what is understood of the situation and the knowledge mobilised according to the situation. Representations are also constructed through social interactions and influenced by language, culture and historical context. Explicative models to explain the world are a specific kind of representation and they are named conceptions (Vosniadou and Verschaffel 2004). Those explicative models propose simple and personal explanations in order to understand phenomena arising from the environment. Therefore, they are valid in certain situations or contexts. I call them alternative conceptions, because they are not generalisable in all contexts, but they are also, by definition, not misconceptions. Thus, when constructing a representation about a particular concept, such as probability, some alternative conceptions based on beliefs could emerge (Savard 2014).

Learning situations presented in a classroom are often complex tasks presented in different contexts. In the first place, an object or phenomenon coming from a sociocultural context has to be studied. This study should lead to make a mathematical model of the object or phenomenon, which is situated in a mathematical context. The model allows to make sense of the object or the phenomenon studied in the sociocultural context (Savard 2015). A financial context overlaps with the sociocultural and the mathematics contexts. Thus, a financial concept might be introduced and discussed in the sociocultural context. A mathematical modelling practice can be made in the mathematical context. The implications of the modelling practice can be interpreted in the financial context and then in the sociocultural context. The mathematical context is a subset of the sociocultural context, which is itself a subset of the citizenship context. In this context, socio-political aspects are present. They allow individuals to make a higher interpretation of the study by looking at the nature of the process of modelling, which depends on the goals and the resources available (Mukhopadhyay and Greer 2001).

Citizenship context is also the place where critical thinking and decision-making, two citizenship competencies, are articulated in the capacity to act as a citizen (ten Dam and Volman 2004). A democratic participation in debates and social issues involves that members of the society to contribute to it by making personal and collective choices (ten Dam and Volman 2004). Specifically, it is about making choices using critical thinking: why this choice was made between all alternatives generated and evaluated by the citizen (Paul and Elder 2001; Halpern 2003). It also takes the context into consideration, as well as the issue and outcomes of the decision (Lipman 2003). For example, it is possible to present a learning situation involving spending money on different objects. Thus, the objects to be bought could be discussed in a sociocultural context, where the context of spending money to have goods and services or the values of them could be discussed in the financial context. Finding the price of goods and services could be done in the mathematical context. Looking at the prices and the values of the items bought could be done in the financial context and then extended to the sociocultural context, where the price of the object sheds light on its use and value. Thinking critically about if it is worth spending this amount of money and the implications of the money available, as well as the production and the impacts on the economy or the environment, are possible topics to be discussed in the citizenship context. The citizenship context might support three kinds of citizens:

the personally responsible citizen, the participatory citizen, and the justice-oriented citizen (Westheimer and Kahne 2004). While the personally responsible citizen acts in a responsible manner in his/her community, the participatory citizen acts actively in the community at the local, state, or national level. The justice-oriented citizen analyses and questions issues about social justice. In this paper, I am interested to know what do Grade 4 students have to say about financial concepts when talking about gambling activities.

4. Methodology

A teaching experiment was conducted in a Grade 4 classroom (9 and 10 years old) in a public school of a francophone suburb, Quebec, Canada. Therefore, all discussions happened in French. The school was a mixed-income environment: the school received students coming from low- to high-income environment. The researcher was also the teacher of this class of 27 students (15 boys and 12 girls). All parents gave permission to their child to participate in this teaching experiment. The initial goals of the study were to identify how teaching probability enhances critical thinking and might influence decision-making processes in a gambling activity. Specifically, to study how the understanding of probabilistic structures might develop; how alternative conceptions might have complexities; how learning probability might develop critical thinking; and which arguments students used when making decision to participate in a gambling activity. A teaching experiment was conducted, based on complex tasks and classroom discussions. Six learning situations and three vignettes were constructed and implemented by me (Savard 2018). The contexts presented referred to lucky charms, horoscope, lottery, card games, *Heads or Tails*, spinners, and dice.

The learning situations and the vignettes would highlight gambling situations, a development of mathematical competencies, and citizenship development (Savard 2015). The learning situations provided contexts where a gambling activity was presented and studied. Students did not gamble: they made mathematical models of the gambling activities using probabilities. For example, students were asked to experiment throwing a coin in order to modelise *Heads or Tails*. They recorded their results and with the guidance of the teacher, they studied the frequencies of their experiment. Then, they compared them with the theoretical probability to get one of the coins' side. They were asked if they will bet money or something else using *Heads or Tails* and why. Of course, some financial concepts were discussed, but only if they were about understanding gambling and its implications. The other concepts mentioned by students were acknowledged, but the teacher did not press on the ideas shared by students. All discussions were audio- and video-recorded and the content was then transcribed in text format. For this paper, I was curious to shed light on what they have said about financial literacy not only about gambling activities. I wanted to answer this question: What do Grade 4 students say about financial literacy when talking about gambling activities? I reviewed all the transcripts of the discussions and interviews, as well as the written material collected. I found interesting data about four learning situations involving the study of horoscope, *Heads or Tails*, lucky charms and dice, and the three vignettes. One individual interview was conducted at the end of the teaching experiment. A mixed coding system of determined and emerging codes was used. The determined codes were coming from the content of the areas of knowledge from the OECD framework. The emerging coding system did refer to students' representation of financial concepts. I categorised those representations into four themes, which highlight the meaning of the representations. Each theme was associated with the areas of knowledge from the OECD framework.

5. Results

What students had to say about finances is presented using themes and emerging sub-themes.

5.1. Money and transactions

Students were very vocal about money itself. Thus, the value of money and the distinction between real and fake were the topics they discussed. However, when discussing about money, they showed alternative conceptions about the physical aspect of money.

5.1.1. Value and importance of money

In discussions, the students' representations were oriented towards the relative value they gave the price for participating in a gambling activity and the importance of having money. The value of money was often mentioned as an estimation of what it is worth to them, i.e. if it is a small or a large amount of money. Thus, \$1 is perceived as a small amount of money and \$100 a big amount, because '\$100, it's difficult to raise' (82). The context of gambling was used to compare amounts that can be won, versus how much money is spent when participating in a gambling activity: 'It was just \$1, it was not much' (32). The context of gambling also gave the opportunity to discuss if the activity has to be performed using real money. There was a very strong need to define what a gambling activity entails, given the fact that gambling is translated into French as '*jeux de hasard et d'argent*', literally meaning 'games of chance and money'. Thus, board games were confused as gambling activities. In order to define a gambling activity, students needed to make a distinction between real and fake money. Real money was defined as money you can use in a store, while fake money is used to play a board game such as Monopoly or a virtual game online: 'You can't buy something with it' (9). The importance given to the money was thus attributed to the fact that you can buy things to cover your needs: 'In the end, it is important [to have money], because if you don't have any, you will be ... you will be frozen first of all, you won't have clothes and you won't have food, thus you will be hungry' (63). Their representation of the importance given to money is strongly associated with meeting their fundamental needs instead of being wealthy or buy everything they want.

5.1.2. Alternative conceptions about money

Through the discussion on buying a lottery ticket to win \$25, some students expressed an alternative conception towards money. Thus, if they give \$1 to buy a lottery ticket and they win, they will not receive their \$1 bill back, the same physical bill: 'It is not necessarily your \$1 that you win, what you win it is not necessarily your dollar. It could be another dollar' (30). The representation behind this conception is about concrete and abstract money. For instance, having the amount included in the total should matter, but the concrete dollar it is what they were paying attention to: 'If you are old enough to go to the casino and then gamble on a machine, then I put \$1 into it and there are \$2 coins coming out, I will not have my dollar that I put there' (36). The teacher made it explicit that the amount counts more than the physical object, and the students gave another example to make the point:

T – The point is not to have the same coin, but to have the same amount of money in our pocket. S-Well, it is true that we can have it back, the \$1, we will have \$24, but if someone bought 25 lottery tickets and me, I bought 1 and I win, he will give me \$25, a bill of 20 and a bill of 5. I won't have my dollar that I used when I bought the ticket. I will have it back in the 20 or in the 5, they are all together. (36)

This student recognised the fact that the amount matters more than the physical bill.

When explaining his drawing of gambling activities, a student expressed another form of the alternative conception about physical money. Thus, a big money prize has to be given using bills and not a cheque:

Teacher – 'Thus, on TV, they give cheques, that's it?'

Student – 'No, they give money you won on the spinner'. (108).

It seems here that the physical bills have a greater impact on students' thinking than having a cheque, even if the amount is the same. This case raised an interesting point regarding students' thinking on using cash money, debit or credit cards.

5.2. Planning and managing money

Means to have money and consumption were important topics discussed by students. Students' representations were oriented to means to have money, purchasing power and needs and wants.

5.2.1. Means to have money

The students' representations were oriented towards the means to get money. Some students mentioned having money and the means to get some. Seven different ways for getting money were identified: winning money from gambling, working and employment, saving, investment and profit, fraud, gifts and finding money on the ground. Some means to get money are easier than others.

Through many discussions, it appears that winning money or objects when gambling is a way to get more. Thus, it is possible to win the big prize in the 6/49 lottery, winning from a scratch ticket, or at a raffle, or at bingo, or gambling at a slot machines, at poker, winning at the casino, betting on a horse race, playing pool, betting on a race and on playing dice. It is also possible to wager objects. It seems like an easy way to have more money, where it is just a question of luck or fate: 'In the lottery, you win more money than [playing at] bingo' (87). One way to get a lot of money is thus easy and depends on luck.

On the other hand, some representations of money show that it can also be hard to get it. Working and employment are regular ways to get it. They referred to their parents working to get money: 'You know, parents they work' (59). One student mentioned that her mother was studying and thus did not bring in money but spent money on her studies: 'My father works but not my mother. My mother, she pays instead because she goes to school' (59). Even if it was not said, going back to school as an adult means returning to the workplace with a better job and thus earning a better salary. Students knew that being educated means improved chances of having a better salary. This was previously discussed, but this discussion was not recorded as part of the data. They also spoke about themselves working to get some money: '... like me, I deliver newspapers' (56). But it seems hard for them to have a lot of money when working as a child. Some of them did mention having pocket money, but they did not mention where it came from and if they had to work in the household to have it.

Having pocket money was also associated with saving money for later on. Many students used the familiar French word *ramasser*, which means accumulating or gathering money, in other words, saving: 'I try to gather money for [buying] various things (50).' It appears difficult for some of them to gather a certain amount of money. For instance, two students were very explicit about how hard it is and how long it takes to save \$100: '\$100, it is hard to gather, except if our birthday is close and we can ask for money' (82). It seems that students know about saving and some of them have saved their money to have enough to buy expensive objects in the future.

Investment was also part of some discussions. Some students realised that in order to win a prize when gambling, you have to spend money first. In one case, uncertainty about the money that can be made is considered: 'Me, I say no [to buying a lottery ticket] because it is not worth it to spend \$1 when you don't know if you will win a big amount. Me, I say this is useless' (141). The amount won is important to consider. Another example of this is when the prize won is not the amount of money that was announced, because you have to subtract the amount paid to participate: 'You won \$24. It is like a trap, because you spent \$1 and you won \$25. In the end, you won \$24' (27). Thus, one student considered paying to participate in a raffle as an investment: 'You will still win \$25, it's as if you invested your \$1. They'll give you \$25 and thus it will reimburse you' (29). In some cases, the amount spent to participate has to be greater because the prize is larger. The return on investment

has to be significant enough, otherwise it is not worth participating in some gambling activities: 'It is useless to buy a [\$1 lottery] ticket for winning \$25, because it is not a big enough amount of money; but if she wants to win more money, the lottery ticket will be more expensive' (32). Some students realised that buying too many lottery tickets is not worth it to make money:

But how could you spend more money than what you would win: this is stupid, to buy 99 [lottery] tickets. We would end up buying more than the prize is worth, like if you buy 8 million tickets and the prize is 2 million. (38)

Looking at the return on their investment led some students to consider the profit made by the lottery organisation: 'The one who keeps the \$75 and gives the \$25 [to the winner], he wins' (31). The profit is bigger than the amount given; this is why it pays to hold raffles. This might be considered as fraud. For instance, in the case of the people kept the money raised by selling lottery tickets instead of giving it to charity:

you don't know which charity organisation, you don't know if it is *Enfant-Soleil* or another one. They say that it is for a charity organisation, but maybe they think we will say charity, but not which one. They created [this story] to keep the money [for themselves]. (21)

Another means to have money is receiving it as a gift or finding money on the ground. For example, some students mentioned that their parents could give them money for their birthday or just give them some: '\$2, our parents can give it to us. This is not a big sum of money' (58). The teacher did not press that idea, so it would be interesting to know in which circumstances parents give money to their children. Money can be found on the ground: '\$2 coins, you can have them in many ways: you can bet, you can find them on the ground' (64).

5.2.2. Purchasing power

Purchasing power was an important topic of the discussions. Students have things to say about using money in ways other than saving, about not having money, about wealth, about their perspective of being a child having money, and finally about budgeting.

Buying and spending money on lottery tickets, on betting, and on slot machines or at a casino was part of the discussion. Of course, students talked about this because the learning situation proposed to study different gambling activities. But they also mentioned buying 'different things', buying 'what they need', paying 'for studying' and buying 'luxury houses'. They did refer to spending on 'useless things'. Buying and spending did not resonate the same way: buying was seen positively, and spending was seen negatively. Spending, *dépenser* in French, referred to not buying wisely. In this case, when students used the word *dépenser*, it was to say spending too much and throwing money away: 'Then, the more you buy, the more you spend, the more you are going to be addict' (142). Furthermore, it was associated with the word *gaspiller*, which means wasting. It is interesting to note that for this group of students, putting money into gambling activities means buying and wasting money. A student mentioned a strategy to not spend too much when buying lottery tickets: buying them one by one to spend less: 'When we buy them one by one, this is better because it is easier and then we will spend less' (145). In two cases, spending on lottery tickets was associated with peer pressure: if they buy lottery tickets together and they win, you have to buy with them. Donating to someone or to charity (the profit of the lottery goes to a charity group) was also mentioned: 'No matter if I lose or win, that money will still go to charity' (41). Donation to charity was seen as a way of helping others and thus a valuable way to use money. Paying someone to do a job is another way to use money. It is possible to give an amount of money to someone in order to have this person perform a task. Students did not mention employment salaries, although some mentioned that their parents and adults work to have money.

Students were very concerned about not having money. According to them, not having money anymore is a result of spending too much or losing money in gambling activities:

Me, I drew a woman who gambles often at the casino, and because she spends all her money there, she doesn't have any more. Here, I drew a man who did not gamble at the casino, who works and does other things, and he

has money. Me, what I want to say is that when we gamble too much at the casino, we can destroy ourselves, because if you spend big amounts (119)

Not having money might result in having debt. When explaining her drawing to the teacher, a student said that her grandmother likes to go to the casino and has debts: 'She owes money to almost everyone' (99). Of course, the teacher did not press further, but it reveals that some students know about credit and debts. They also know about the fact that being poor means losing their purchasing power to cover their needs: 'If you are poor, it can hurt you, you can't buy clothes' (97).

On the other hand, being wealthy is being able to buy a lot of things, including luxury houses and sports cars. But for one student, being middle class seems to be enough: 'You don't need to be wealthy, like having 1 million dollars. You can live with \$2,00,000 and you will be fine. You just need to have enough money to buy food' (64). We can see here that it seems to be difficult for students to have a representation of living costs and how much money they need.

The students were aware of their purchasing power and their limited means. Some students expressed their thoughts on not having a lot of money because they are children: 'we are only children, we don't have [\$50], we won't spend all our money on that [betting on a race]' (75). Like previously said, saving takes a long time for them because of their limited means to having money. That thus influences their idea of relative cost. For instance, \$5 is a significant amount of money for this student: 'If it was a bigger amount [of money], like, I don't know, \$5' (60). Even if their purchasing power seems limited, they are aware that they have one. One student expressed her way of getting something that she really wanted: 'My father did not want to buy it, but I begged him then he bought it for me' (146).

The students talked about ideas of budgeting, referring more to how to manage their money and get assistance from someone else rather than making a budget. Thus, not knowing what to do with money was considered to be spending unwisely: '[if a child wins money], he won't know what to do with it, so he will buy useless things' (14). In order to avoid spending without thinking, another person or a parent might help to guide by questioning 'your mother might ask [when shopping]: what are you doing?' (84) or by managing the money for someone else: 'He [a guy in our building] gave money to my father. My father gave him [some] money for visiting his mother [guy]' (16).

5.3. Risk and reward

Many students talked about some risks associated with money. Their representations about risks were: cheating, being a victim of fraud, overspending, losing money and losing one's life. Needs and wants referred to addiction and advertising.

Some students were concerned about the possibility of cheating when participating in a gambling activity. The cheater wants to win, so he does unfair things for winning. But when this happens in a TV show, they seemed unclear about it. But they were very vocal if the person cheated when gambling against them. For instance, it is not for sure that the loser will pay the winner when betting money: 'If we assume that you win when you bet \$5 instead of \$2, you know he might not give it to you. Maybe he will try to lie, it is not guaranteed [that he will give you the money]' (65). Another case of fraud is if the sellers of the lottery tickets kept the money for themselves instead of giving to charity. Many students think that it was misleading for them to buy lottery tickets: 'Well, I would say no [to buying lottery tickets to support charity], because, with the money coming from the sale of lottery tickets, we don't know what they will do with that. They might buy useless things' (23). Giving to charity was important, so the money should go to charity. It was the reason for buying a lottery ticket: 'No matter if I lose or win, that money will still go to charity' (41). On the other hand, it didn't seem to be a problem if the sellers kept money of a small amount: 'You know, it is not a big deal if they kept it in their pockets, but you know, if it is \$5, this is more serious, it is not \$1, it is still just \$1' (20). It seems that for some students,

it doesn't matter where money goes when it is a small amount. If the amount is more significant, then the fault seems to be greater.

The students were vocal about losing money. Most of the students concluded at the end of the experiment that 'You have more chance to lose than to win' (119) when participating at a gambling activity. For many of them, gambling is a way to lose money, smaller or bigger amounts, depending on the bet and the frequency of gambling: 'Well, each time you put 25 cents, well I don't know how much it costs, but each time you bet money for gambling, and you can bet it, bet it again and lose your money' (112). In this case, gambling is associated with high risks of losing money. But over-spending also becomes a risk: 'Me, what I want to say is that when you gamble too much at the casino, you can destroy yourself' (119). Losing money is associated with ruining one's life: 'he wasted his life because he lost a lot of money' (95). Losing money was associated with poverty.

5.3.1. Needs and wants

The students talked in both general and specific terms about their needs. Sometimes, they referred to needs in general, such as 'buying things they don't need'. Other times, they mentioned their fundamental needs: food, clothes and, implicitly, having a roof over their head. Wants were presented as a strong desire to buy things in a store or participating in a gambling activity as an entertainment. The wants are so strong that the person becomes addicted to gambling. Even if this person loses his money, the want to chase his loss is too strong to be ignored: 'If you bet \$100 and if you lose, then you will want to bet another time. Then re-bet, re-bet, re-bet. Teacher: Why do want to bet again if you are losing? To win the money lost' (76). Addiction was perceived as spending a lot of money in gambling activities:

Yes, but it is also perhaps that children then teens become addicted, but adults are also addicted to gambling, so I do not see why adults would have more right. I admit that maybe children are a little worse because they spend all their pocket money, but if they have it. But, while adults, they can really spend a lot of money. (146)

One student mentioned getting to know a gambling activity, because he had seen advertising on television. Although there was no discussion about the influence of the media and advertising, this is a topic that students are aware of. In Quebec, there is legislation about not advertising to children, so they are less under direct influence. But they are still affected by advertising products for adults. For instance, they mentioned the shows they watched that are associated with lottery tickets. Affectivity towards the outcomes of gambling activities was also mentioned. Some students mentioned that winning is associated with happiness and losing with sadness. Therefore, wanting to win was mentioned as important: 'When we bet, we always want to win' (47).

5.4. Financial landscape

The global economy was also a topic raised by some students. For instance, one student mentioned the fact that we pay taxes when participating in governmental gambling activities such as the lottery and the casino: 'My father said to me that he didn't like his mother buying [lottery tickets 6/49], because my father said that it goes to the government' (6). Another student replied that the government uses this money to pay services to support people:

When you buy lottery tickets, usually at least a quarter of the money they earn with that, not people but the government, they will use it to build things for children like schools, houses for elderly people, a lot of things that will be useful for us. (7)

This student informed his classmates about the role of the government. He also added that the government is making money selling lottery tickets, but it was fine because the money was used to support children, old people and sick people: 'Well, yes they are making money. They are making money for sure, but at the same time, that supports children, elderly people, hospitals and sick people ... a lot of things, schools' (7). It appears that making money is a negative thing, unless if it is given back to people in need.

6. Discussion

This study shows that students had specific opinions to say about finances. As Johnson and Sherraden (2007) pointed out, they are consumers and they make decisions about their own money. Their representations about money, means to have money, consumption, risk and economy are mainly rooted in their personal experiences, along with some exposure to financial literacy in school coming from the research project: the gambling contexts. Their information about finance was coming from different sources, like Suiter and Meszaros (2005) underlined. One important point is that those students not only expressed their point of view on the four areas of knowledge and understanding defined by PISA 2015 (OECD Programme for International Student Assessment 2016); but also they raised questions and concerns about personal finances and global economy. Thus, they shed light on their needs for being financially educated.

In this study, the objects introduced into the sociocultural context were associated with gambling activities. Thus, lottery tickets, horoscope, dice, Heads & Tails are examples of the gambling activities used in this study. According to PISA's framework of contexts, these contexts might be seen from a personal to a global perspective.

Because the discussions started on understanding some gambling activities, individual participation was a topic that emerged from students and thus leads to societal outcomes about this participation. Figure 1 shows the relationships between the financial context and the sociocultural, mathematical and the citizenship contexts.

Gambling activities contain implicit financial concepts, such as consumption, risks and donation. These concepts were discussed in the financial context. In many cases, students used mathematical models that come from a mathematical context, to build representations of financial concepts and thus make sense of gambling activities. The alternative conceptions might be seen as financial concepts that were interpreted into a sociocultural context instead of a financial context. Thus, this is the physical world coming from the sociocultural context that comes when discussing issues not framed in a financial context, such as getting a specific bill back or having bills instead of a cheque. In this case, personal experience might facilitate or become an obstacle when learning financial concepts. As a matter of fact, it seems that understand of gambling activities cannot be done without financial concepts. Because these activities involve betting money, making decision about participating or not should be done using different knowledge about financial concepts and processes to address the

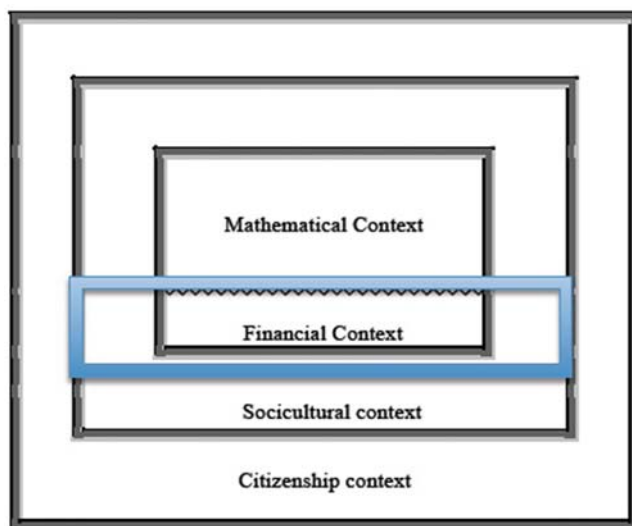


Figure 1. The financial context in relation to the other contexts.

Table 1. Domains of the citizenship context: emerging content from this study.

Personally responsible citizen	Participatory citizen	Justice-oriented citizen
Financial landscape	Planning and managing finances	Risk and reward
Government: taxes and spending	Donating	Addiction
'When you buy lottery tickets, usually at least a quarter of the money they earn with that, not people but the government, they will use it to build things for children like schools, houses for elderly people, a lot of things that will be useful for us'. (7)	'No matter if I lose or win, that money will still go to charity'. (41)	'Yes, but it is also perhaps that children then teens become addicted, but adults are also addicted to gambling, so I do not see why adults would have more right. I admit that maybe children are a little worse because they spend all their pocket money, but if they have it. But, while adults, they can really spend a lot of money'. (146)

context. Implications of the interpretations of the financial concepts lead students into a citizenship context, where their representations take different orientations regarding citizenship. Thus, I was able to associate some students' representations to the three kinds of citizens identified by Westheimer and Kahne (2004). Table 1 shows the kind of citizen associated with the area of knowledge.

7. Concluding remarks

7.1. Limitations of the study

This article sheds light to what we can learn by looking at what was ignored initially by the teacher. Many students' contributions were ignored in order to reach the initial goals of the study. Therefore, it sheds light on the possibility of teaching financial literacy when students talk about financial concepts. Of course, it is not always possible to do this all the time in class, as pointed out by this study: even if gambling was discussed in the six learning situations, financial concepts emerged only in three of them.

7.2. Implications for teaching

It might be challenging for a teacher to manage discussions on financial concepts. Students might express confidential situations coming from their own experiences or those of their family, friends, or relatives. Thus, in this study, a student talked about the alcohol addiction of his neighbour and how this led him to spending all his money other than on his needs. Another student talked about the gambling addiction of her grandmother and how she is in debts. There are a lot of examples where students mentioned parents' values (lottery tickets profit going to government, religious beliefs), means to have money (working, winning at gambling activities), consumption habits (betting on horse race, going to the casino). Students used their personal experiences and revealed a lot about their life. How to respond without being judgemental is one of the biggest challenges for teachers. This question should be raised in teachers' preparation programmes.

Another challenge is about knowing when it is appropriate to discuss financial literacy. Even if it is supposed to be taught across the curriculum, extra time is not allocated for it. This study shows that a teacher might want to support students to achieve the identified learning goals of a mathematical lesson, but not pay attention to other learning opportunities that are not associated with them.

As concrete suggestions for teaching Financial Literacy, I recommend teachers to propose contexts into mathematical learning situations where financial concepts might be explored for themselves with students before focusing on the mathematical modelling. Mathematics competencies help to make sense of financial competencies, as well as the financial competencies help to make sense of mathematics competencies. The contexts proposed and discussed might create an opportunity for students to express alternative conceptions about financial economic ideas. If students express personal values or confidential situations, I suggest that the teacher should listen to the

students and decide if it is worth pressing on sensitive topics. In any cases, the teachers should listen and express an open mind in order to orient the discussion on general cases rather than personal issues. Those personal issues might be discussed with the concerned students only, preferably with individual.

7.3. Implications for research

This study raised important points to consider. First of all, conducting a research project with elementary school students might raise ethical concerns. Students might reveal more than necessary about their parents' financial situation. For instance, students coming from low-income environment might have little experience with having money. Or they can come from a wealthy family and they are not prepared to deal with ideas such as deprivation and risk. It is important to avoid making prejudice about students and their family. We have to keep in mind that what was discussed in the classroom might be also discussed at home.

Second, it might be difficult to conduct a research project in a classroom when there is no official time for teaching financial concepts. For instance, if the only times where financial concepts are taught are when students mention them, it would take too much time to collect enough and relevant data. On the other hand, research projects on financial literacy are needed, especially in regard to mathematics education. From a teaching point of view, so much needs to be done to identify how students think about financial ideas, i.e. the facilitator, the obstacles and alternative conceptions, the best teaching practices and the challenge to implement the curriculum in classrooms. So far, very few researchers in education have studied this field. Teachers have been asked to teach financial literacy without being prepared. As researchers and educators, it is time to commit and support them.

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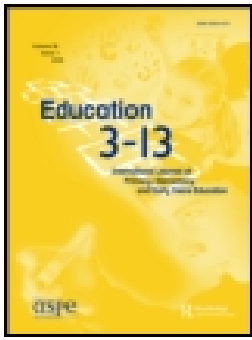
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