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Enhancing financial literacy in children 5–12 years old using authentic learning within a school market garden programme

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ABSTRACT

This research aims to contribute to the literature on embedding financial literacies in a school market garden programme. It seeks to do this by using one school market gardening programme in an Australian primary education setting as a case study, exploring its role and perceived benefits in developing financial literacies in students. This research utilised a qualitative research design, adopting semi-structured interviews to allow for emerging ideas, focus groups involving parents, student cohorts and garden volunteers, and participant observation to enhance data collection for triangulation. The results show that students involved in the market garden programme had positive experiences relating to their learning of financial literacies. This article proposes several recommendations that may further develop the financial literacy learning outcomes of students. These recommendations are grouped into two main themes: (1) involving students more in the management of the programme, and (2) improved record keeping.

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Introduction

Each individual's financial literacy and behaviour impacts their financial success in life, or at least helps them deal with finances in a way that brings security and stability to their standard of living. Multiple definitions of financial literacy are found in the literature (Australian Securities & Investments Commission [ASIC] 2011; Lusardi and Mitchell 2014), but the following definition, taken from the Program for International Student Assessment (PISA) Financial Literacy Assessment Framework encapsulates its meaning:

> 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 wellbeing of individuals and society, and to enable participation in economic life. (Organization for Economic Cooperation and Development, 2019, 43)

There has been a developing recognition that financial literacy is a key skill for navigating modern society, with its importance only likely to increase. As stated by ASIC (2011, 4) 'knowing how to make sound money decisions is a core skill in today's world, regardless of age. It affects quality of life, opportunities we can pursue, our sense of security and the overall economic health of our society'.

Research in the area of financial literacy has increased globally in the last two decades (Worthington 2013). For example, in Australia, this has resulted in the government, corporate sector and community organisations taking a heightened interest in financial literacy, largely with the aim of

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improving financial literacy levels. Also in Australia, the Household, Income and Labour Dynamics (HILDA) survey, started by the University of Melbourne in 2001, takes a longitudinal research approach and now tracks more than 17,500 Australians in 9,500 households, exploring aspects of family life, health and economic wellbeing. Data from the 2019 HILDA survey found that young people under the age of 25 were the least financially literate of all age groups surveyed (Household, Income and Labour Dynamics, 2019). Interestingly, a Deloitte study found that the Australian Financial Consciousness Index (FCI) actually decreased from 2018 to 2019, however, it should be noted that their index is touted as measuring beyond simply financial literacy, extending to 'whether they are conscious of their ability to affect their own financial outcomes, all the way to their willingness to act, and the extent to which they are able to participate in sophisticated financial matters' (Deloitte Research 2019, ii).

Financial literacy in the education sector

Studies of the broader community have led to an attempt to ascertain the financial literacy of school aged students. The OECD Programme for International Student Assessment (PISA) now measures financial literacy along with reading, numeracy and science literacies as part of its large-scale long-term international study (OECD 2019). The results of the financial literacy education reports from this global study call for national financial literacy education (FLE) strategies directed at governments in Australia (Taylor and Wagland 2013), the United States of America (Gill and Bhattacharya 2019; Jackson 2013), and the United Kingdom (Office for Standards in Education, Children's Services and Skills, 2016). Other countries that have developed national FLE strategies in the last decade are Poland, Canada, Estonia, Indonesia, Italy, Lithuania, Peru, Portugal, Russia and Spain (OECD 2019).

As a result of this push towards financial literacy education, governments and private sectors have been proactive in encouraging the development of financial education programmes to improve financial literacy among school children (Australia and New Zealand Bank 2011). The approach to FLE varies globally. In some countries, for example Australia and Canada, FLE has been integrated across the curriculum and supported by initiatives such as the 'Moneysmart' programme in Australia (https://moneysmart.gov.au/moneysmart-in-schools) and the 'Talk With Our Kids About Money Day' in Canada (https://talkwithourkidsaboutmoney.com/). Finland has adopted a cross-curricular theme of finance and entrepreneurship, and similarly, the United Kingdom includes the concept of 'financial capability' in their key competencies. Despite this, in the United Kingdom it is still claimed that only four in 10 students are receiving any school-based financial education (Financial Capability 2020). In the United States, the approach to FLE varies from state to state with some states embedding financial literacy across the curriculum, and others implementing stand-alone courses in personal finance.

While there is widespread agreement that education is crucial to addressing low levels of financial literacy, a number of educational research studies note that a one-size-fits-all approach cannot be applied to FLE (Pinto and Coulson 2011; Pinto 2012). One reason is because learners come from a range of differing family and demographic backgrounds. For example, Pinto and Coulson (2011) identified that financial literacy programmes in Canada have tended to assume that learners come to financial life at a consistent level, while ignoring that people tend to experience financial decisions in a multitude of different scenarios. As such, there appears to be tensions relating to how FLE should be shaped, as well as what it means to be financially literate.

Within the education sector, elementary education has lagged behind high schools in addressing the issue of financial literacy (Collins and Odders-White 2015). As the benefits of financial knowledge, attitudes and behaviours are emerging, there is an increasing focus on the financial literacy of students aged 5–12 years. While there has been increased activity in this space, the researching and reporting of these initiatives is scant. What has been established are expectations for FLE in elementary schools. Young children, aged 5–7 years, are expected to recognise the currency and coins of their country and be able to use them to buy goods, compare costs and calculate change as well

as distinguish between needs and wants. This is extended for children 8–10 years old to creating simple budgets and identifying different ways of paying for goods. Students are also introduced to the value of volunteers, and safe, responsible and ethical use of money. FLE expectations for children aged 11–12 years include an understanding of interest, the ability to read and interpret accounts, and engaging in simple financial reporting (Australian Securities and Investment Commission 2011). While these descriptors are taken from an Australian context, they are indicative of global FLE expectations for children aged 5–12 years.

Life application of FLE in school garden-based programmes

A recurring concept in FLE is life application. Many programmes are custom designed for schools and create real or simulated life experiences. School garden programmes are one area where opportunities for real-life application exist. School garden and garden-based learning is not a new concept, having gained increased popularity and research attention in recent years (Cramer, Ball, and Hendrickson 2019; Hirschi 2015). To illustrate the rapid growth in school gardens, consider that in 2013 the United States Department of Agriculture Farm-to-School Census recorded 2401 school gardens in school districts, yet in 2015 this number had grown to 7101 (United States Department of Agriculture 2015). Given the myriad of research findings outlining the potential benefits for students and school communities, as outlined below, this is hardly surprising.

The pedagogical potential of school garden-based education as a way to improve academic outcomes for students is well documented globally (Cramer, Ball, and Hendrickson 2019; Graham et al. 2005; Passy 2014). Beery et al. (2014) noted during their study of a school market garden that the project began to permeate into the mainstream curriculum of the school. Additionally, research undertaken by the Food Growing in Schools Taskforce (2012) has found that children who participate in school food-growing programmes can develop a broad range of skills that include life skills (such as cooking), enterprise skills, and skills that may benefit them in a work setting (such as communication, team work, and problem solving). This UK based research reviewed UK and international literature and found evidence that growing food in schools encouraged and facilitated student learning, improved awareness of the natural environment and the importance of it to society, promoted increased health and well-being, supported school improvement and development, and strengthened community and school-community interactions. This same report identified that student motivation and behaviour is also positively influenced by growing food in schools, notably, increasing enthusiasm for school and for learning, increasing school attendance, increasing completion of homework, and observing improved student behaviour both in and out of the classroom setting, as well as enhanced environmental awareness and attitudes reflected in pro-environmental behaviours. Nelson et al. (2011) also identified that when operated effectively, school gardens can positively impact student resilience, self-esteem and confidence.

Global studies conducted in Europe, the UK, the USA and Australia have contributed to a growing body of knowledge on the benefits of school market gardens which sell produce to raise money for charity, the school, the market garden programme itself, or run as community-based events or as student entrepreneurship projects (Huys et al. 2017; Passy 2014; Selmer et al. 2014). There is, however, a dearth of studies that specifically address the development of FLE as an intentional outcome of these school market gardens. It appears that most studies emphasise literacies relating instead to other areas such as mathematics and science (Boynton 2010; Pigg, Waliczek, and Zajicek 2006; Selmer et al. 2014; Selmer et al. 2016).

Elvery (2017), who wrote 'Making literacies real in the garden', highlighted the importance of linking literacies with authentic learning opportunities. This investigation takes advantage of an authentic learning opportunity in one school's market gardening programme to explore aspects of FLE. The aims of this investigation were: (1) to discover what impact, if any, the experience of participating in a market garden programme had on the financial literacy of students; (2) to identify the

challenges of teaching financial literacy in this context; and (3) to explore possibilities for strengthening FLE outcomes through the school's market garden programme.

Methodology

The market garden programme

This investigation was part of a larger qualitative case study (Lichtman 2013) and based on the gardening programme of one primary school in New South Wales, Australia. Although this school market garden programme was not specifically designed to improve financial literacy, elements of financial literacy were embedded. At this small semi-rural school, 36 children aged 5–12 years old work in mixed age groups once per week for 45 minutes operating a market garden. Parents and friends pre-order seasonal vegetables and place both orders and money into a specially provided, secure box. Students are responsible for collecting and checking these orders, tallying the produce amounts required, harvesting, weighing and bundling the vegetables, checking money, calculating change, and bagging orders. Daily garden-based activities are documented in an A1 sized journal, and sales are recorded digitally and graphed. This faith-based school follows the ancient principal of tithing, or 'charitable' giving, so 10% of sales are given to the on-campus church, and the remainder is reinvested into the school garden to purchase items such as fencing, raised garden beds and tools. Five community volunteers support the programme with their expertise.

Data collection

A qualitative approach facilitated a deep understanding of the perceptions of four discrete cohorts (Yin 2009; Minichiello and Kottler 2009): students aged 5–12 years, teachers, volunteer helpers, and parents. Researchers collected data from teachers through semi-structured interviews to allow for emerging ideas (Charmaz 2014), through participant observation to enhance data collection for triangulation (Musante and DeWalt 2010), and through recorded conversations during gardening sessions (Cowie and Hipkins 2014). Students and volunteer helpers provided data through focus groups and also through observation as they participated in their weekly garden sessions. Parents participated in focus groups only. All interviews, focus groups and garden session observations were audio recorded. Data were also collected from a garden journal (Lichtman 2013), which offered a visual record of learning during the weekly gardening sessions through the provision of photographs and the documenting of total sales, tithe calculated, pricing of vegetables by weight (e.g. pumpkins and watermelon), and most popular vegetables. Triangulation is an important aspect of qualitative research (Creswell and Plano Clark 2018) and was provided using a combination of research instruments (interviews, focus groups, observation, documents) across the various cohorts.

All audio-recorded data were transcribed and a process of matrix analysis applied to this and the garden journal (Groenland 2014). This enabled data relevant to the theme of financial literacy to be identified. Further data reduction ensured that tangential data were removed, leaving only that which was pertinent to addressing the aims of this study (Musante and DeWalt 2010).

Findings

The market garden shop and its role in developing financial literacy

The market garden shop plays a key role in the school's gardening programme and it is here that most activities related to financial literacy are easily observed. One teacher's perception of what the students are learning about financial literacy, is outlined as follows:

> What's happening in the garden is we're taking the orders so they're having to read the order sheets, figure out how much money they have to tick off to say 'Yes, we've received that much money' and they need to check it

> first of all. They put a tick mark to say 'Yes, we've got the money'. Then, if they've got to work out change, they've got to figure that out, then write on this the amount of change that's coming back.

This demonstrates student knowledge and understanding as well as developing confidence in applying financial concepts. This teacher also highlighted that 'Sometimes people are really good and they put in all different kinds of coins. The children are not just getting a $5 note every time'. A volunteer in the market shop also recognised the students' need to make informed financial judgements, noting that 'Some people write the wrong amount on purpose so the kids have to double-check that the money is correct, that they're not being short-changed and that … they're giving the right amount'.

There is a clear development in the children's understanding of financial concepts as revealed in the responses of students from different age groups. Students aged 5–6 years understood the process in simple terms. When asked 'Who does the ordering?' they responded that the orders ' … come from people because they wanted to buy our vegetables from the garden' and that it is known what vegetables people want to buy 'Because we have a ticket … They sign up what they want, and then we give them that, and then they return it back here, and then that's how we know … they just give it in a bag with the money'. When asked about the meaning of tally marks, students aged 5–6 years responded

> It tells us how much they want in the order. We copy it, and we put them in the bag, how much it says. We put them in the bag, and we hang them on the bag hangers, and then the kids bring them home for their moms and dads. Just in case they need to cook something.

At least one student aged 5–6 years understood the need to weigh some of the produce, such as potatoes, to ensure ' … that they can put them in bags evenly … so that the people get the same amount'. And why would people want to buy produce from this garden? One student aged 5–6 years, reflecting on their involvement in economic life, commented 'You don't have to go to the shop [supermarket] for anything. They just give it [the order] to your kid, and then they take it [the order] home'.

A deeper understanding of financial concepts emerges from students in later grades, including the concept of applying such knowledge in order to make informed judgements relating to use and management of money. For example, students aged 6–8 years provide insight into an understanding that change is required for many orders and that positive consumer relationships are important. For example, one student stated

> I think that in the market shop, what they do is they go and they chop all the veggies and get them ready. Then they put them in the orders, and they get the money out, and give the people change if they need change. They write on the back of the order … "Thank you." and draw a heart or smiley faces in it.

Unlike 5–6 year-old students, those aged 6–8 years also recognised that those placing orders were not just 'people' but 'Anyone who's in the school; like their parents, or aunties, or anyone … '. Children aged 8–10 years showed greater insight into the ordering process, with these students stating ' … we send out these garden orders that they put … how many they want on it and then we pick the ones that are ripe and pick the ones that are all nice and fresh' and that

> we give out the little order forms and they put on like if they want six cucumbers let's say, they send it in with some money and how much it was and then we sort it out and we tally it on a board and then we go and pick the vegetables.

Other insights from 8–10 year-old students included ' … we collect all the money and if we have like $10 change we will give the change back to the person', and the change 'goes in the bag with all their vegetables'. One of these students also outlined a simple understanding of debt by stating ' … what we sometimes do is if they don't have enough money at the time, they can get the things and then they have to pay it back later'.

The responses of students aged 10–12 years focused on the need to plan, including the timing of when to distribute order forms and making sure not to pick more produce than is ordered. For example, '… the day before we send orders out to parents who can buy the stuff and then on the day, we do the gardening. We harvest the garden, put it in bags and we sell it to them' and

… we know how much produce to pick because we send out order forms the day before and sometimes we send it the day before the day before and so people write down what they want … how much quantities and they put their money in there and we read all the order forms and pick as much produce as is needed'.

Record keeping of sales

Teachers indicated that some sale records, including the total income, are kept and stored in written format, graphed and inputted into an iPad. One teacher noted that the record keeping was not necessarily always accurate as '… it's a bit messy and it's not always consistently going in here because sometimes it just gets incredibly busy and we're trying to juggle so many things'. This comment was supported by researcher observation.

One 10–12 year-old student stated, '… we write everything that was on order down on a whiteboard and would tally how much is needed and then we get that much and we also record it in our book [*journal*]' and in this journal they

> … have all of our days, all of our terms, the weather, the temperature, the soil temperature, the air temperature, how much produce we picked, how much money we made and we record literally everything about what we do in the garden. And we also have like a digital copy just in case we lose the book'

Our investigation of the content written in the journal, which is used as a written record of daily activities, revealed little emphasis on financial aspects of the market garden shop. Very few entries could be found which stated weekly totals of produce ordered, profits and/or tithe. There was also no consistency of reporting within the journal, with no use of templates, no mention of cumulative totals (i.e. of produce sold, profits or tithe), evidence of financial decision-making by students, or goal-setting.

'Tithe' and its understanding by students

One teacher provided a good background into their reasoning for introducing the concept of 10% tithe to the students. The foundations of understanding tithe has been developed in other class activities but the reasoning is transferable to any profits made by the market garden. According to this teacher:

> I've talked with them about the verse in Malachi about 'bring to me what is mine and the store houses of heaven will be opened'. I've told the children that I pay tithe and I believe that it's a good thing to do. I've also told them that I believe that in paying tithe God has a special blessing for us in whatever way that might be.

One volunteer in the market shop also highlighted the importance of tithe and stated that when dealing with students they '… also teach them about tithe and so they've collected an amount and then we always remind them about tithe 10%. What does that mean? What do we do with 10% to God? They understand tithe and about putting money away and saving money'. Another volunteer, a helper in the garden, also saw the importance of tithe as they were '… delighted to see the teachers are also getting them to work out the tithe on what the garden has earned'.

Did the students understand what tithe is, what it is used for and how to calculate it? Although students aged 5–8 years did not mention the concept of tithe, older students had a clear concept of what tithe is and its purpose, with one 8–10 year-old student stating '… we also do tithe, which is 10% of the money', and another stating that tithe '… goes to Jesus'. One teacher indicated that students worked out tithe quite simply by moving the decimal point one place to the left. Students

aged 10–12 years-old also recognised the concept of tithe by stating they ' … also learn how to add money with the decimals and how to take the tithe and take the 10% and use that for the tithe'.

One parent in particular mentioned how tithe is important at home and that their children are applying their understanding of financial concepts to confidently transfer knowledge learned from calculating tithe at school to the home. This parent mentions:

> We do tithe at home. But it was always kind of just like, 'Oh, yeah, that's what we do'. But when they came to school and they're doing it at school it suddenly adds more weight and more relevance. And they're like, 'Oh, yeah' and so their ability to work out 10% as it comes so quickly now. So if I give them money at home for doing some chores, or whatever it might be, and I say, 'Take the tithe of that'. Oh, that'll be … and it comes so quickly, which is really good.

Understanding of what happens to the market garden profits and 'tithe' monies

It would appear there is little understanding by the students as to what profits from the market garden are actually used for and what happens to the tithe. With regard to profits, students aged 5–6 years stated that they are ' … making it for the school. It gets right into the school' and a 6–8-year-old student simply stated that 'We use the garden order to raise the school money', with another adding 'The money we use, we use it to buy things for our garden'. Little more detail was provided by the 10–12 year-old students who simply stated the market garden ' … gets us lots of money for our school'.

A limited understanding of what is happening to profits and tithe is shared by teachers, with one stating that after the students have received the orders they

> … calculate the tithe, it gets taken down to [*the receptionist*] in the office … and the other money [the profits] goes and gets banked. Where it goes to from there and what it is being put into they [the students] don't really have any knowledge of that at this point.

This teacher provided an example of what they thought some of the profits had been used to purchase for the garden but they ' … only kind of picked up on that … ', so they could not be sure. Another teacher believed profits went back into the market garden for use in ' … buying what's needed, the tools and seeds and things for the next year'. However, this teacher also expressed confusion whether there were actually profits by stating 'I think they would love to make a profit, but it's not at that point in time. This teacher was also unsure whether the students knew what happened with the money from the market shop although they assumed other teachers had discussed this with the students. When asked whether they knew what happened to money collected for tithe, this teacher stated 'I haven't been told specifically. I would assume that that would be going into some sort of E-giving system'. A volunteer in the market garden was also unclear of what happened to the profits and tithe collected. They noted that the money ' … all comes back down to the office and we've got a tithe collection … I'm not sure if our tithe goes to supporting a sponsor child or if it goes to the church down here … I'm not sure'.

Only one teacher confidently expressed that tithe is provided to the on-campus church offerings and profits are ' … all going back into the garden'. They then provided detail into how these profits have been used to purchase fencing and garden beds, and is currently being saved to finance an automated watering system. This teacher expressed the importance of informing others of what happens to the market shop profits, although this is appears to have only been done when the market garden was first established.

> … at the beginning we basically had advertised to parents in a newsletter. I said, alright, this money is going back into the garden project. Thank you for supporting our garden project … I wanted the parents to know when you do buy from our garden, it's not money that's just going to go into the black hole somewhere in our budget. It is actually money that's going to take the development further.

One student aged 10–12 years appeared to have clarity in how profits and tithe were used. They stated:

> So with the profit we make we give it to *[the receptionist]* and she keeps it safe for us. And so, when we need to make an update on our gardens, like a fence is broken and it needs repairing, we use the garden market money or if you want to buy another raised garden bed. They cost a certain amount of money so we can go and use the garden money. And with the tithe money, we give it to the church as tithe.

Perceived benefits of the market garden programme for developing financial literacy in students

When asked whether students' understanding of money is improving as a result of the market garden activities one teacher stated 'I just think the whole idea of having to put together orders, having to work out things like change and all of those sorts of things have been hugely beneficial'. This teacher added that the school does not have an operational canteen so the market garden shop provides a unique opportunity for students at this school to be exposed to budgeting, wise spending, calculating change etc. in a different way as, in the processing of orders, the students know ' … this is somebody's order and we've got to get this right' as ' … nobody wants to get the wrong change or nor get their order'. In the words of another teacher, 'I would say so because as we've got through to the end of the year, they're more confident with working out the change and working out how much money is there and ticking off on the order sheets whether they've got the right money in the first place'. This teacher also saw the importance of framing discussions around their focus question which was 'How are we able to increase market garden sales'. To them, the recording and graphing of financial data was key to increasing motivation and redirecting discussion toward answering the focus question:

> They're always wanting to get a high amount on there. You know, let's try and beat the last highest score … They are always wanting to get that nice high figure in. I mean, I guess what this graph here has done and keeping that, especially this visual representation is to say, well, hang on, we've got low sales. That's a bit disappointing. All right, what can we do to fix that? Whereas if it was just writing down, it'd be like, oh well it's here today, gone tomorrow. Here we can see very clearly what's happened.

Volunteers also saw the financial literacy of the students improving in response to their involvement with the market garden, particularly the concepts of providing real-life meaning to commerce, appreciating the value of consumer products and of having a good work ethic. According to one volunteer gardener, the market garden:

> … puts value on the work that's being done. They are not just growing stuff to let it rot on the ground or throw it out and put it in the compost or something like that … I know some places they grow stuff and just give it away. Here, I think that can give a false sense of worth the products have … The product's worth something. People have to eat. People had to go and buy food. Why not buy it here? The price is good - competitive or less than what is in the supermarket … It is teaching the children that this stuff has value what they're doing. We're not just growing it to throw it out … What we do is worth something. It's valued. It's got a value on it. I think that helps the children to understand the value of life.

This volunteer saw evidence that the older students felt value in what they were doing when

> … our local parliamentarian came and made comments about the vegetables, amongst other things about the school, but the older children were quite impressed. When they gave him a gift for the night, it happened to be a watering can packed full of veggies that they helped grow.

For many parents, their children's involvement in the market garden programme has provided opportunities to engage their children in financial discussions within the home. One parent stated they ' … have a piggy bank where they put in coins. So they're always counting that and there was, 'Oh look, this is what we did at gardening today, you know, we helped with money'. Another parent highlighted their children were applying financial concepts and vocabulary, becoming quicker at financial calculations and were thinking more about financial decision-making. In speaking about their children they stated:

> 'And we are making more profit on that.' So it's those words that are coming out, the profit, the costs, and they're starting to be aware that things are not free in life, and that there is a difference between what you make and what you need in order to be a provision. So they're starting to see that and understand where that's coming from, and they just love working with the money. Their ability to calculate change is happening quicker. I mean it's still not rapid or instant but because it is real life that they're working with, it's not just a figure on the page that means nothing to them. It's 'I'm calculating somebody's change, I have to give it to them. I'm responsible'. There's that ownership of it and they are really loving that.

When asked if their children's awareness of money has improved, another parent responded with 'Yes. They certainly are interested in all the money … the market garden aspect of it' and that one of their children, who is particularly interested in mathematics,

> … hears all about these garden beds cost this much and he's been thinking in his mind. *O*h, you know, we almost paid for one of those today. … he loves to think about the totals that we got. He's quite a mathematician and loves to graph things and data is his thing. That's the thing that he enjoys.

Another parent involves their children in financial decision-making in the home by talking ' … about how much we want to spend each week, and how much the groceries are, so we have a look on the list and say okay, how much can we afford, can we afford cucumbers today or … '. Informed judgements about shopping purchases was highlighted by another parent in the following example:

> Another way that I've seen it is when we go shopping, I always get the kids to help with the shopping but now they're looking at, you know a bunch of kale. Not that we bought it from the shop, but they will look at it and compare and they'll say, 'That's got six leaves in it, and it costs this much and we sell it for this much.

One parent involves their children in all aspects of the purchasing of goods from the market shop including decisions on what to buy, how to complete the order form, calculating costs and change, and forward planning, enabling greater participation in economic life. They state:

> We talk about it every Wednesday in the lead up to it; the kids will look at what we might want to buy. And so I don't actually fill in the form for what we want to buy, I get them to fill in the form. And then they look through my wallet and they say, 'Well, we've got $10.' I'm like, 'Excellent. So how much change are you going to get and is there value for money?' … So, they're thinking in advance of what we're going to need and how it's going to last …

Examples of students demonstrating an understanding of financial literacy were provided mostly by older students. Students aged 10–12 years mentioned the importance of keeping records, including the generation of graphs, and the advantages of technology for data storage and display. According to one student 'Technology is amazing nowadays. You can just press compare and it would say we earned this much more money than last week'. Other students clearly understood the concept of marketing and promoting of a bargain as one group, when making a speech to market garden visitors, stated with enthusiastic voices 'Usually the silverbeet is $3.50 a bunch, but today it's on special for $3 … And kale is usually $3-$3.50 a bunch. Today it's on special for only $2. I hope you can buy some at the shop'.

For one 6–8-year-old student, learning financial literacy was more about how they can better help others as according to them 'I have learned to give and help those people that don't have any money'. This awareness of the need to improve the financial wellbeing of other individuals and society is likely to be related to the concept of tithe.

Teachers' thoughts on ways the market garden programme can further develop financial literacy in students

The teachers recognised that far more could be done in engaging students with the fiscal aspects of the market garden and learning new financial literacy skills. One volunteer in the kitchen mentioned 'The students are not dealing with money with us, so they're not looking at the costing of the food

… '. Others saw more could be done around the actual focus question. For example, one teacher mentioned the goal of the market garden is simply to increase sales, but there is no actual sales figure that the students are aiming to achieve.

Students could also be more involved in financial decision-making, and as one teacher mentioned, they would

> … love to see the kids actually going down to [*the local hardware store*] and buying, you know what we need or calculate have we got enough money or maybe somehow holding onto the money. They actually feel like it's their money then, and having more say in where it goes at the moment

This teacher mentioned the students really don't have much idea of what happens to the profits from the market garden as 'Where it goes to from there [the school office] and what it is being put into [the students] don't really have any knowledge of that at this point'. Another teacher supported this view by stating:

> I think it'd be good for them *[the students]* to know where the money's going to next and to have some plans for it themselves and have some input into where it goes and actually be a part of that decision-making process somehow …. just brainstorm and get some good ideas. Maybe do some reading on it and then start to implement them.

Introducing the concept of 'credit' into the market garden programme was seen by one teacher as an opportunity to expose students to other financial concepts. Parents can deposit an amount of money, for example $50, into an account and the students will subtract purchases from this until the balance is zero. It will also provide flexibility for those who do not want to provide cash each week.

According to one teacher, the evaluation of the market garden programme in meeting its goal of increasing sales also has a great scope for improvement, including a more intentional focus on financial literacy, financial decision-making and promoting critical thought about how to increase profits with the resources that are available. This teacher also felt that the current evaluation of the programme is not sufficient with students simply completing evaluation sheets at the end of the term

> … and it's like, you know, what did you enjoy doing this term and what could you see that we could do better? That kind of thing. I'll often read things like we want to see another field of pumpkins planted so we can get more sales. They do have that aspiration, but that's all dependent upon what we can manage with our resources, there are human resources as well.

Discussion

In order to evaluate the efficacy of this school's market garden programme in supporting FLE, the various aspects of the programme have been contextualised within the OECD (2020) financial literacy definition and the relevant literature. One strength is in the area of money and transactions, which is one of PISA's four content areas for financial literacy (OECD 2020). As students assume responsibility for tallying and filling orders, collecting money, calculating and giving the correct change using a variety of coins, they are being prepared at a foundational level for 'participation in economic life' (OECD 2020, 43). Students experienced a basic understanding of debt when orders are submitted without money, and some parents reported their children making cost comparisons while shopping. Further knowledge and skills related to setting prices of particular fruit and vegetables by weight (e.g. for watermelons, sweet potato and pumpkins) and students also learnt the skill of working out percentages, a concept that is often closely linked to finances in areas of interest, discounts and sales, for example. Each week, students graphed their total sales, but it appears that these records were not used effectively to inform students or help them with decision-making. Little evidence of decision making on financial matters was observed and is an area of the programme that could be strengthened.

Not all children worked in the market garden shop every week. One group worked in the garden composting, weeding or watering garden beds and planting seedlings. These activities contribute to FLE by helping students appreciate the value of consumer products and developing a good work ethic. There is also potential to develop student appreciation in the area of the contribution volunteers make to economic enterprise (ASIC 2011) as the garden programme uses community volunteers. Closely linked to volunteerism is charitable giving, a practice that was overt in this investigation through 'tithing' of total sales, although understanding of the 'tithing' process by various cohorts participating in this study was varied. Charitable giving is a concept explored in some modules of the Australian Moneysmart Program (Moneysmart.gov.au), where it fits into ethics and responsibility for those in financial need (ASIC 2011). Thomson and De Bortoli (2017) also suggest that financial literacy involves management that enhances the financial wellbeing of individuals and society.

One goal of FLE is to build positive attitudes that will increase motivation and confidence in regards to financial literacy (OECD 2020). As the market garden shop runs throughout the school year, children are gaining confidence in money handling skills while engaged in a genuine enterprise, and the motivation for involvement is high. Increased motivation, and therefore confidence, aligns with Elvery (2017) who stresses the importance of a nexus between literacies and authentic learning opportunities and Selmer et al. (2014) who identify school gardening programmes as an opportunity to engage in real-life learning.

While there is room for further development of the FLE in the areas of keeping financial records, simple budgeting, exposure to financial language, and decision making, the benefits include consistency of FLE activity, regular repetition of money transaction skills, the practical application of financial literacy skills in an authentic learning context, and a perceived transfer of financial concepts and skills from school to home.

Conclusion and recommendations

This study found that students involved in the market garden programme had positive experiences relating to their learning of financial literacies. It was noted, however, that this school market garden programme could be strengthened to further develop the financial literacy learning outcomes of students by incorporating several recommendations. These recommendations are grouped into two main themes: (1) involving students more in the management of the programme, and (2) improved record keeping.

Management

From the onset of the programme there is great scope for students to be more involved in determining the overall purpose of the market garden, and in decision-making processes to enhance their sense of purpose and ownership of the programme. Rather than simply being a weekly activity that is done without a clear goal, students can establish real purpose by setting sales or tithe goals, and partnering these goals with a clear understanding of what these funds are being used for. Goals related to total sales could include the achievement of an amount of money needed to purchase infrastructure, and those related to tithe may be to direct money to a focused cause, such as child-sponsorship, building of wells, or disaster relief. After clear goals have been established, students can then be involved in decisions related to the establishment of the market garden programme. Examples include: the choice of vegetables to be planted; planting regimes and location of crops; determining equipment which needs to be purchased or replaced, including comparative pricing of this equipment and its purchase; how the produce from the market garden will be advertised (i.e. in newsletters, emails); the frequency of advertising; and human resourcing, including the management of volunteers.

On-going management of the market garden's day-to-day activities could also involve students with: setting competitive prices after comparing with supermarket prices; communication to stakeholders; advertising produce for sale; deciding on what records need to be kept; determination and implementation of strategies for increasing sales; and the monitoring of progress toward the achievement of goals. The early and on-going management decisions outlined above, may be best performed after forming a Management Committee or Board of Directors where, under the guidance of teachers, student's direct management decisions, report decisions to stakeholders, and provide programme evaluations.

Record keeping

Accurate record keeping provides opportunity to follow progress toward the achievement of aims, and to be able to accurately report these to stakeholders. This can be used to enhance student engagement, improve motivation, help understand sales trends (including averages and best-selling vegetables), as well as to promote achievements to stakeholders with the potential of increasing sales. Such records also provide opportunities to promote critical thought among students where financial decision-making is further explored, including how to increase profits as well as the concept of 'perceived' versus 'actual' profits. For example, students could explore the concept that profits come only after costs have been factored, and that these costs include costs of labour, equipment, etc. It is recommended that a set template is used each week to record sales and that these are designed to be easily completed with emphasis placed on fully and accurately recording sales. Whether sales are entered electronically or are first hand-written onto printed templates, it is important to have the data stored electronically as this will help with reporting and can be used to generate graphs etc. to visualise trends.

The introduction of consumer 'credit' in the market garden programme would also be an excellent way to introduce students to other methods of financial transactions. In such an arrangement, those making frequent purchases would be able to start with a nominated amount of credit and this credit can be reduced after each weekly purchase. In the management of these accounts, students would require very accurate record keeping, and would have additional responsibility and accountability.

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