




Growing Healthy Minds, Bodies, and Communities: early childhood teachers' perceptions of a nutrition-integrated pilot curriculum

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Abstract

Objective: Healthy eating behaviours are often developed early in life, yet nutrition is rarely emphasised in early childhood education. Integration of nutrition into academic content is warranted, still its ability to positively impact teaching and learning has been understudied. Therefore, the current study explored the feasibility of application in the classroom and the perceived usability of a nutrition-integrated pilot curriculum.

Design: Early childhood teachers' perceptions of four nutrition-integrated lessons were explored through a qualitative research approach. Data were collected through pre- and post-focus groups, lesson observations and teacher feedback. Focus group transcripts were analysed using inductive thematic analysis and supplemented with observations and lesson feedback.

Setting: This pilot study took place in Northwest Mississippi at three pre-schools which are part of the Mississippi Early Learning Collaborative.

Participants: A non-probability convenience sample was utilised to acquire participants. Ten early childhood teachers and 132 Pre-K4 students participated in the study.

Results: Three themes emerged and were categorised accordingly: (a) preconceived concern of the unknown *v.* experienced reality, (b) promoting buy-in and engagement through hands-on learning experiences and (c) manifestation of perceived prioritisation.

Conclusions: Nutrition-integrated lessons were reported to be creative, facilitate positive food behaviours and highly engaging for teachers and children. Concerns for new and unfamiliar curriculum were noted but could be alleviated with more detailed instructions. Future nutrition-integrated curriculum efforts should include detailed video instructions and offer a gradual and flexible schedule allowing teacher autonomy in how to prioritise implementation.

Keywords
Nutrition education
Young children
Early childhood teachers
Curriculum integration

Young children develop nutritional preferences and eating habits early, yet the integration of nutrition into academic content is uncommon and its ability to positively impact teaching and learning has been understudied. The need for a nutrition-integrated curriculum in early childhood education stems from the notion that a child's development is rapid within the first 5 years of life wherein healthy growth and development are critical. Early childhood is when children are first developing their food preferences and exposure to healthy foods. Information about nutrition is vital during this stage of development as they begin to establish patterns of lifelong behaviours. However, as

many as 43% of children under 5 years old in low- to middle-income families are at risk of not reaching their full developmental potential as they are not in environments sensitive to their specific health and nutritional needs⁽¹⁾.

Nutrition policies

Fortunately, nutrition is not a topic that has been ignored across the USA. To address food insecurities and health behaviours regarding children, school nutrition policies have emerged through federally funded programmes such

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as the National School Lunch Program and the School Breakfast Programs. Although these and other food assistance programmes were designed to address needs regarding hunger and malnourishment among populations experiencing food insecurity, concerns have shifted as childhood obesity and associated chronic health conditions are more closely linked to nutritional imbalances as evidenced by the addition of the Healthy, Hunger-Free Kids Act of 2010⁽²⁾ legislation. The Healthy, Hunger-Free Kids Act mandated more stringent nutrition standards for school lunches⁽³⁾ and also strengthened School Wellness Policy mandates. The expanded mandates include provisions for nutrition education and promotion (NEP). While the law does not specify a determined number of hours to be dedicated to NEP, it does advocate inclusion of standards-based programmes and implementation of such programmes through development of a stand-alone course, including a comprehensive health curriculum, or incorporating NEP into other core subjects⁽⁴⁾.

Teacher barriers to nutrition education policies and practice

Although the NEP regulations set forth by the Healthy, Hunger-Free Kids Act are meant to foster positive health behaviours, difficulties can arise when classroom teachers do not possess specialised knowledge regarding nutrition education⁽⁵⁾. Most early childhood institutions are required to incorporate some type of nutrition education in their classrooms⁽⁶⁾. However, if teachers are to deliver high quality nutrition education programmes, they must receive higher levels of training and support for nutrition education teaching techniques⁽⁵⁾. Compounding a lack of support, teachers also find implementing nutrition education daunting due to the lack of available instructional time and suitable, easy to implement, curriculum⁽⁷⁾. Teachers have indicated a preference towards nutrition education that is easily integrated into core subjects and reinforced through a parental component⁽⁷⁾.

Theory-based curriculum

One way to address teachers' preferences of integrated nutrition education curriculum is through the psychological theory of constructivism⁽⁸⁾. Constructivism is a powerful framework for how humans cognate and construct knowledge as it asserts that through hands-on explorations and interactions with the world, people and things, scaffolded knowledge is built⁽⁹⁾. Instead of teaching content and skills and hoping that students will see the connections to real-life application, a constructivist approach to nutrition education ensures meaningful connections are made through intentional pedagogies between nutrition and other academic content. Ultimately, this process fosters construction of knowledge through inquiry, exploration and finding one's own path to the solution⁽¹⁰⁾.

Building a conceptual framework for a nutrition-integrated curriculum

Guided by the theory of constructivism, the researchers developed preschool curriculum titled *Growing Healthy Minds, Bodies, and Communities*. This curriculum is an innovative standards-based whole child approach to learning that integrates social-emotional learning, nutrition and anti-bias/anti-bullying concepts into the classroom curriculum to support children's overall well-being. Utilising this approach to the curriculum enabled the researchers to provide teachers with opportunities for students to maximise the interconnectedness of nutrition and academics. Throughout the four nutrition-integrated lessons, students learned how plants grow through movement, read and drew pictures about healthy food choices, interacted with foods found on MyPlate, planted and grew their own vegetables, and taste-tested what they grew.

Teachers' perceived barriers of time as well as suitable and easy to implement curricula noted in the literature were also addressed pre-study through the integration of nutrition into core subjects. For example, in the first lesson *What Do We Need to Grow?*, science and English language arts were integrated simultaneously as children learned what plants need to grow in the *Seed Song* book while sequencing the order of growth from seed to plant. The barrier of support was also addressed as training, all materials and a digitised version of the curriculum were provided to support teachers and to help mitigate their aversions to teaching nutrition prior to the study. Therefore, the aim of the current study was to explore and understand teachers' pre- and post-intervention attitudes and experiences of a pilot nutrition-integrated curriculum, guided by the theory of constructivism. Subsequently, the curriculum was evaluated for its usability through multiple data collection points that aimed to mitigate the challenges of curriculum design, implementation and support structures, commonly encountered by teachers when teaching nutrition.

Methods

By focusing on the phenomenological aspect of qualitative research, the present study included teachers' perceptions of their own experiences, attitudes and thoughts about the feasibility and benefits of the nutrition-integrated pilot curriculum. The pilot curriculum consisted of three units – nutrition, social-emotional and anti-bias/anti-bullying. All of the lessons were sequential and a pacing guide was provided (see online supplementary material, Supplemental Appendix A). Each lesson included at least two Mississippi Early Learning Standards⁽¹¹⁾. For the purpose of this paper, only data pertaining to the nutrition unit were examined and reported. Utilising a qualitative research approach provided a platform through which rich descriptions could



occur⁽¹²⁾, while enabling the researchers to conceptualise the data from both an affective and intellectual standpoint.

Participants

Ten teachers from three preschools in North Mississippi were recruited to pilot test the nutrition-integrated curriculum. All of the participants were female and the demographics were 100% White. A non-probability convenience sampling was utilised to recruit the participants, as the researchers had previously worked with the participants on projects and the schools were in close proximity to the researchers. Two of the preschools that participated in the study were public preschools and followed National School Lunch Program/School Breakfast Programs guidelines which requires compliance with School Wellness Policy for inclusion of NEP. Conversely, the third preschool was under the jurisdiction of a licensed child care centre and therefore followed the State Department of Health guidelines and policies that do not require a School Wellness Policy or NEP. Despite these differences, participating preschools had a significant commonality in that they are all part of an Early Learning Collaborative (group of state-funded preschools) across Mississippi that work together to ensure quality among all preschools. All preschools utilise the same curriculum – Opening the World of Learning. However, nutrition is only part of one Opening the World of Learning unit and the lessons lack the ability to address children's health behaviours and common barriers to NEP. Furthermore, the extent to which most preschools implement NEP and School Wellness Policies is either non-existent or muddled at best⁽⁴⁾. These discrepancies between preschools emphasise the need for NEP that is innovative and can be incorporated into, and strengthen, existing curriculum.

Procedures

The study took place from September 2019 to January 2020 after University Institutional Review Board approval. Written consent was obtained from ten early childhood teachers at three preschools in Northwest Mississippi, and parental consent was acquired for 132 Pre-K4 students. All students participated in the curriculum as part of their daily activities, as the pilot curriculum was approved by each school's administrator. Participating teachers attended two training sessions held at one of the participating preschools: one on content and implementation of the lessons in July 2019 and another during August 2019 on data collection.

Data collection

Focus groups

Focus groups were conducted prior to the curriculum intervention and after the intervention concluded. Ten teachers participated in the pre-focus group while six of the original

ten participants participated in the post-focus group. Both focus groups were facilitated by an experienced moderator in a convenient setting at one of the participating schools. The moderator was someone that the participants had not worked with during the pilot and the researchers left the room to ensure participants felt comfortable speaking openly. Group guidelines were provided before proceeding through a series of guided, open-ended topics. Topics ranged from general to specific about the nutrition curriculum. Pre-focus group questions focused on the benefits, challenges and fears regarding participation in the curriculum, while post-focus group questions focused on those same topics after participating in the curriculum (see Table 1). Each participant chose a pseudonym to use during the focus groups for the transcription process so that participants could not be identified. The moderator elicited input from all focus group participants and encouraged them to elaborate on their responses, emphasising that there were no right or wrong answers, and that all viewpoints were plausible, even if all were different. Both focus groups were audio and video recorded and lasted between 75 and 90 min.

Field observations

Observations were conducted weekly at each of the pilot schools by at least one of the research team members and recorded on a field observation form (see online supplementary material, Supplemental Appendix B). Teachers provided feasible dates for observations at the start of the pilot. This method provided direct observational data in order to better illustrate the overall experience of both the teachers and the students. Observers evaluated the lessons' age appropriateness and flow, student engagement and performance, the use and helpfulness of materials, differences between written and implemented lessons, and areas of strength and needed improvements. Traditional field notes were recorded in the observation form and transferred into an online sharing platform following the completion of each observation.

Lesson feedback form

The pilot curriculum website provided a link to the lesson feedback form where teachers filled in the date, lesson, general observations and any changes they would make to the lesson. Teachers were prompted to reflect on each nutrition-integrated lesson to better gauge their thoughts and perceptions of how each lesson impacted both teaching and learning as it related to the nutrition and academic content (see online supplementary material, Supplemental Appendix C).

Data analysis

Focus group transcripts were reviewed by the moderator for accuracy, transcribed verbatim and analysed in NVivo (QSR International, Version 12) by the lead researcher. Identical analysis was also conducted for the field

Table 1 Schedule for pre- and post-focus group discussions

Topic area	Prompts
1. General questions about participating in the curriculum (pre-focus)	'What about this curriculum interested you? In other words, why are you here?'
2. Specific questions about experiences with teaching gardening (pre-focus)	'What do you think some of the benefits will be with teaching these lessons?'
	'What challenges do you anticipate with teaching these lessons?'
	'(Ask if needed) What are your fears about being involved?'
	'(Ask if needed) How pressured for time to you feel in the classroom?'
	'What would you say are your overall expectations for the outcome of the curriculum pilot? Big picture.'
	'If you look at your lesson plans there are three units. Unit one uses gardening in the lessons.'
	'What are your experiences with gardening and children?'
	'What might be some of your concerns?'
	'Any last comments as we come to the end of our discussions?'
3. General questions after participating in the curriculum (post-focus)	'First we start with Unit 1 Gardening/Nutrition: the benefits and challenges. Let's start with benefits first: What do you believe were some of the benefits of teaching Unit 1?'
4. Specific questions about teaching gardening after the curriculum (post-focus)	'Next are challenges.'
	'Were there any individual materials within the units that you liked or that the students really seemed to be engaged with and why? Were the lesson plans written clearly?'
	'This next question is a very broad question and open to any part of the lessons in the three units. What overall, or specifically, do you wish had been different?'
	'I am handing out a short survey for the next question. Once everyone has completed it we will discuss your answers. In general, how pressured for time did you feel when trying to incorporate the lessons into the classroom?'
	'What could the research team do better to support you?'
	'After teaching the lessons what about the curriculum was most engaging/interesting to you?'
	'What would you say are your overall thoughts of the curriculum pilot? Big picture.'
	'When thinking about experiencing the nutrition and gardening was there anything or a particular lesson that you found especially helpful for your students?'
	'Was there anything that you would like to see added to the lessons?'
	'Were there any instances or teachable moments that arose in the classroom after you'd taught these lessons that you were able to use them to refer back to? Can you share this with the group?'

observations and lesson feedback data. Next, inductive thematic analysis was employed⁽¹³⁾, wherein data were first read multiple times from the focus group transcripts, observations and lesson feedback to ensure data saturation and to generate and identify initial themes that were similar across all three data sets. As a result, perceived benefits and challenges of the curriculum were coded throughout the data sets. Codes were grouped into emerging themes, and the themes were then checked for commonalities so that the themes could be refined even further. Refinement guaranteed clear, concise and distinguishable differences between the themes⁽¹³⁾. Data were also member-checked by all researchers to ensure validity and reliability of the themes. When no new themes emerged it was assumed that data had met the saturation point.

Results

The three methods of data collection employed during the current study served to encapsulate the teachers' perceptions regarding their attitudes and experiences prior to and after the intervention. They were reported at various points throughout the study: during the pre- and post-focus groups, directly after teaching the lessons throughout the pilot through lesson feedback and from the researchers'

perspective during lesson observations. Three themes that emerged from the data were (a) preconceived experiences of the unknown *v.* experienced reality, (b) promoting buy-in and engagement through hands-on learning experiences and (c) manifestation of perceived prioritisation. Findings from pre- to post-intervention are illuminated in this section, and Table 2 shows the sub-themes and emerging themes in teachers' experiences and attitudes across all three methods of data collection.

Preconceived experience of the unknown v. experienced reality

Teachers' self-efficacy regarding nutrition education can have a significant impact on the implementation of nutrition education programmes⁽¹⁴⁾. A lack of self-efficacy emerged in the form of hesitancy during both the pre-focus group and the lesson plan feedback, specifically regarding teachers' experiences with growing microgreens during the pilot.

When asked about the anticipated challenges during the pre-focus group discussion, three teachers expressed concerns about their abilities to grow plants, but the majority still seemed to have an open mind towards planting and growing. Some teachers had direct experience with planting, growing and harvesting, and some teachers had no experience. One teacher with some experience mentioned, 'We

Table 2 Sub themes and themes: teachers' attitudes and experiences with the GHMBC pilot curriculum

Emerging themes	Pre-focus group	Post-focus group	Lesson observations	Lesson feedback
1. Preconceived experiences of the unknown <i>v.</i> experienced reality	Hesitancy and lack of self-efficacy with personal gardening experiences	Design of lessons (scaffolded, experiential, integrated) Student engagement led to teacher buy-in despite challenges Teachers supported each other resulting in positive experiences Nutrition is in the Pre-K curriculum Interconnectivity between lessons enabled transfer and application of learned concepts and skills Length of lessons – 'too long'	Student-centred and well-sequenced lessons Students engaged and having fun	Lesson activities and materials were enjoyable for students (food cards, seed song book, planting and tasting cucumbers and greens)
2. Promoting buy-in and engagement through hands-on learning experiences	More familiar with teaching nutrition than gardening		Support for teachers of unfamiliar activities (pickling/planting) was important to positive experiences Modifications of lessons Shortened lessons	Realia methods (books, food to taste, planting seeds) prompted teacher buy-in Well-received materials
3. Manifestation of perceived prioritisation	Importance of fitting everything in over content taught Balance of priorities			Whole group <i>v.</i> centres/small group Lesson adjustment

do have a garden at my house, but my husband is the one in charge of it'. Despite the feelings of hesitancy that emerged about teaching the nutrition lessons, all of the teachers agreed they were willing to give it a try as noted in the following anecdote: 'It is going to be a learning experience. I think it is ok for the kids to see that we are still learning as well'. An essential finding was the fact that the teachers were willing to try the lessons despite their hesitancy. One teacher noted:

'A big part of buy-in for the students and how that translates into learning is us getting excited about it and showing them how great it is. How we present it will be a big part of it. If we are negative they will not want to do it.' (*Pre-K4 Teacher*)

When alluding to the teachers' experienced reality with the nutrition-integrated lessons, one of the teachers noted in the post-focus group that the nutrition-integrated lessons 'kinda built up and you planted and you watched it grow and you had a journal and you learned about it as you went . . . those four lessons went nicely together'. Instead of focusing on just the lesson content in the post-focus group, the teachers pinpointed how the development of the lessons made teaching nutrition much less intimidating and reduced their reluctance to implement. Throughout the lessons students had ownership of the planting and growing and one teacher mentioned that 'because the students had something to do with it, they grew it technically, they learned a lot from it'. Although the central focus of the teachers' feedback was on how the students experienced the lessons, a few teachers mentioned they were unable to grow anything, while some mentioned that theirs grew mold, and yet one teacher said 'the whole thing [microgreen planting tray] filled, it was awesome!' One teacher noted that 'for the future it would be helpful to have some more detailed directions for the planting and pickling parts of the lessons'. In one of the feedback responses another teacher noted the following in regard to further directions and her experienced reality:

'I was worried about pickling the cucumbers. I called my mom to help me understand the directions. I let the children help me put the items in jars so that kept them interested. They tasted the cucumber. They were excited to see the cucumber turn into a pickle.'
(*Pre-K4 Teacher*)

While many teachers had to ask for help and learn along the way, this will always be part of the 'growing and learning experience', as one teacher noted in the pre-focus group. However, it is important for the researchers to accommodate for how the teachers' hesitant preconceived experiences of the unknown manifested themselves into experienced realities during this pilot curriculum.

Promoting buy-in and engagement through hands-on learning experiences

The notion of hands-on learning experiences was reported frequently throughout the online feedback provided by



Fig. 1 (colour online) Students acting out the *Seed Song* book through movement during lesson one

teachers and revealed a sense of buy-in from both teachers and students. During the first nutrition-integrated lesson, *What Do We Need to Grow?* there were multiple comments relating to acting out the story through body movement (Fig. 1). One teacher shared, 'I liked the book [Seed Song] and song used during this lesson. It helped the children remember what plants need, to grow'.

Notes from researcher observations also aligned with this notion of engagement during lesson one. One of the observers noted, 'They LOVED the movement. They were all engaged'. Some teachers did the movements alongside the students, while some teachers had the students create their own movements. Enabling students to explore their own movements and describe how their movements aligned with the science and nutrition-related vocabulary in the story might not only promote higher levels of recall and engagement⁽¹⁵⁾ but even further buy-in through ownership of their movements in the lesson.

While it is important for students to be engaged in the learning process to promote buy-in, it is also important to acknowledge that teachers are key stakeholders in any programme's success⁽¹⁶⁾. During the second nutrition-integrated lesson, *How Do We Grow?*, MyPlate was introduced alongside healthy food choices, and towards the end of the lesson the students observed and planted their microgreens (Fig. 2). Responses to this lesson were overwhelmingly positive, as teachers noted, 'It went very



Fig. 2 (colour online) Students observing their microgreens before planting them

well' and 'It was a lot of fun!' More specifically, one teacher noted, 'The lesson did a great job at presenting students with new food categories and the types of food in each. It really helped to expand their prior knowledge since they got to interact with the different foods'. In regard to the connection of lessons brought up in the first theme, it was also tied into the feedback regarding this lesson, as another teacher stated, 'The students seemed engaged and remembered what was taught in the previous lesson to lead into this lesson'. This recall of information demonstrates a transfer of learning from the first lesson to the second lesson. Because information in the second lesson built upon what was learned in the first less, children were able to construct meaning and transfer their learning in new ways within the second lesson⁽¹⁷⁾. Perhaps the students' engagement with this lesson was connected with the teachers' engagement and comfort level with the particular content and its relatability to other parts of the day as noted in the following anecdote during the post-focus group:

'I did like the food lesson because the kids learned a lot from it. It really tied into lunch time because we all eat lunch together. So that was very appropriate and the sorting part of the lesson was easy for them because we do a lot of hands-on learning in our classroom. We learned about the different parts of the MyPlate and I think it's good to know and I enjoyed it.' (Pre-K4 Teacher)



Fig. 3 (colour online) Student pickling cucumbers during lesson three

The topic of food and nutrition is something that the teachers mentioned they had already connected to their classroom, especially during their farm unit that teaches students about different types of animals and foods grown on a farm, so it was not an unknown topic for the teachers. This is similar to what was found with the third (pickling cucumbers) and fourth (harvesting) lessons. Therefore, buy-in may have already been embedded into this lesson due to the comfort level with the content.

Lesson three, *It Takes a Community for Everything to Grow*, proved to have the most discrepancy regarding lesson perception and its impact on the students and their engagement levels. Much of the enjoyment in the feedback alluded to the outcome of trying the pickles that each class made. However, the process of actually getting there (pickling the cucumbers) was the part of the lesson that several teachers mentioned ‘needs to be simplified’, and in regard to following the pickling instructions teachers noted that ‘there needs to be more details’. Although some teachers mentioned the need for more guidance, it did not seem to deter from the buy-in of pickling cucumbers in future lessons or the impact it had on their students as revealed in the following statement when prompted on what should be kept in the nutrition unit: ‘The pickles were fun, don’t drop it!’ (Fig. 3)

The last lesson, *Hard Working Hands Happily Harvesting*, asked the students and their teachers to harvest and taste test the microgreens they planted. This particular lesson revealed



Fig. 4 (colour online) Microgreens growing at the end of the nutrition unit

some trials and tribulations that the research team had anticipated during the pre-focus group and as the planting process began. Because the microgreens did not grow for some, while others had an overabundance of greens, some adjustments were made by the research team to support the teachers (Fig. 4). However, teachers were still successful due to the support the research team provided and brought into the hands-on process of making the dressing for the salad to taste test, as revealed in lesson feedback:

‘It was a good lesson. The kids enjoyed the dressing and I had six that liked it. We could not harvest them [microgreens] because they were not big enough, but someone [research team member] brought us some so we were able to taste them. We will let them continue to grow. We have been watering them every day because we don’t know how much to do. They are growing, so I guess we are doing well.’
(Pre-K4 Teacher)

The hands-on part of taking care of the plants throughout this unit seemed to either gain momentum or confusion by teachers with minimal planting experience. Teachers mentioned that they were ‘concerned about disappointing the children’ since they would be excited about their plants. However, the research team provided support via email to address some of the concerns teachers had while growing the microgreens, and provided greens at the end for those who either had few or no microgreens to harvest.



Manifestation of perceived prioritisation

Teachers stated in the pre-focus group, 'The biggest challenge every teacher faces is always time. We have everything else we have to do, where are these lessons going to go?' The idea of time manifested itself as a prioritisation in how the teachers perceived the curriculum. Throughout the pre-focus group data, *time* emerged in a multitude of ways. Firstly, instead of teachers focusing on *my* students and their needs, the conversation turned to *I* in relation to the focus being on the teachers' perceptions of prioritisation of time. Consequently, the focus on what the students might obtain and how they might benefit from the lessons became less apparent when the concern of time arose in discussion. In regard to perception of time during the pre-focus group, one teacher noted the following:

'I find myself trying to appease everyone. I don't want to exclude a certain family or a group or community outreach during certain weeks. Like community helper weeks we go to the fire department, so it is making sure I am able to keep that balance of staying true to this pilot because we are committed to it, but then also staying true to the spirit of our school and having so many people come share from other outlets too.' (Pre-K4 Teacher)

Time and pressure to complete everything seemed to emerge in every facet of the data. During the post-focus group, teachers grappled with the notion of how to prioritise all of their demands. One teacher noted, 'Looking at it alone is not a lot of pressure, but when you think about the fact that we are doing the Collaborative [state-funded Pre-K program with additional requirements], OWL curriculum, and adding up all the things we are required to do this year, it was kind of a lot of pressure'. This anecdote revealed itself through several teachers' responses during the post-focus group, wherein one teacher noted, 'I felt like the shorter lessons were better because we do have so much going on'. Agreeing with this perspective, another teacher mentioned that 'while the lessons were great they were too time-consuming'. This lack of time and reality of prioritising all of the expectations teachers have to meet seemed to result in shortening of the lessons for some during the pilot, while others chose to conduct lessons as a whole group instead of small group, and some teachers simply did not complete a lesson because of the time of year the unit took place.

Even though a few teachers did reveal that they had to adjust the lessons to their needs based on their perception of how they needed to prioritise their time, all ten of the teachers completed lessons one and two, nine completed lesson three and eight completed the final lesson. It was also noted that a solution to this situation might be to flip-flop when the units were taught. Because the nutrition unit ties in so well with Halloween, farming and Thanksgiving, some teachers thought it would be better to provide some flexibility regarding when the lessons were taught, instead of being on a

restricted timeline. One teacher suggested the following regarding the timeline:

'If they could make it to where the units were flexible as long as you just keep the weeks within the unit together. We could put the plants for the gardening and nutrition unit near our farm and harvest units and it might be different for different teachers depending on if you do it during the fall or the spring.' (Pre-K4 Teacher)

Seamlessly fusing this curriculum into the already mandated curriculum proved challenging because this was a pilot curriculum and voluntary. However, this manifestation of prioritisation does urge the research team to rethink how they will rebuild and implement the curriculum. While it is impossible to know all of the inner workings of a teacher's classroom and school schedule, it is essential to assist with alleviating such manifestations of perceived prioritisation by interweaving what is known as time components for teachers in with future pilot lessons to ultimately benefit the students in the classroom.

Discussion

Results from the current study revealed three primary themes: (a) preconceived experience of the unknown *v.* experienced reality, (b) promoting buy-in and engagement through hands-on learning experiences and (c) manifestation of perceived prioritisation. Embedded within these findings are ways in which potential elements – curriculum design, implementation and support structures – of the conceptual framework functioned to improve outcomes and/or lend themselves to warranting further research in future pilots of the GHMBC curriculum or other nutrition education programmes.

Unlike other nutrition education lessons, such as those accessible through the USDA⁽⁶⁾, this pilot curriculum is unique in that it was designed to break down barriers of implementing nutrition education to meet teacher and student needs. A primary barrier noted in the literature was that teachers lacked adequate support and nutrition knowledge to effectively implement NEP⁽⁵⁾. By providing hands-on training at the beginning of the pilot as a support structure to mitigate a preconceived experience of the unknown, teachers were exposed to the nutrition content, provided examples, and were able to ask questions related to the lessons. Throughout the pilot, teachers were also provided with ongoing support via classroom visits, phone calls and follow-up emails. Teachers were also provided with all of the tangible materials needed to teach all of the lessons. These built-in support structures were developed as part of the conceptual framework and provided a pathway to continuation of the lessons instead of teachers simply giving up along the way.

Despite the support system provided, the notion of a lack of self-efficacy still emerged during the focus groups



which can be a deterrent to teachers taking on extra-role behaviour⁽⁸⁾. Thus, in order to further increase positive experienced realities and to mitigate hesitancy towards implementing a nutrition-integrated curriculum, it might be helpful in future research as it relates to support structures for teachers to have the opportunity to present the lessons in small stages, specifically where some teachers were hesitant and afraid of failure. Teacher confidence could possibly be improved by offering small-risk opportunities to try the curriculum during training prior to the pilot. Since the planting portion of the unit was challenging for a majority of teachers, the research team plans to include detailed instructions for planting in subsequent pilots through development of a planting and harvesting manual and accompanying instructional videos. Another support structure that may be of use for future nutrition education curriculum programmes is providing testimonies from teachers who have previously piloted the lessons to further build self-confidence of new teachers piloting the curriculum.

Another barrier related to teachers implementing nutrition education is the lack of instructional time and unsuitable curriculum available⁽⁷⁾. In alignment with this view, teachers' perceived prioritisation of time emanated during both pre- and post-focus groups. However, researchers believe that designing curriculum via integration is one potential element to alleviating time constraints and feasible curriculum⁽⁷⁾. Although the teachers were excited about teaching the integrated lessons, the constant time constraints that teachers encountered remained a challenge throughout the study. This challenge during the implementation phase of the pilot reveals that although curriculum integration may have the potential to mitigate some time barriers, further research is warranted. Offering some lesson flexibility in future research may provide one avenue to assuaging this systemic barrier of time.

The research team also addressed what was impactful – or not – through food behaviours for students and through feedback within the curriculum from teachers. The hands-on nature of the lessons, wherein the students planted and grew their own food, aligns with the curriculum design and implementation element of the conceptual framework. Throughout the implementation phase of the pilot, feedback was positive regarding integrated and experiential learning processes. In alignment with the literature⁽¹⁸⁾, teachers saw the integration and build of the nutrition and gardening lessons as easy to follow. Additionally, because nutrition is a significant part of food, teachers were able to relate back to the content learned in the lessons throughout the school day. This was especially evident in discussions on healthy foods during snack or lunchtime. This transfer and application of knowledge provides evidence that integrated curriculum grounded in a constructivist approach has the potential for positive outcomes on students' food behaviours.

Although findings of the current study suggest that there were positive outcomes from the curriculum intervention, it

is not without limitations. One limitation of the current study is that it was completed with a limited number of early childhood teachers. Additionally, all of the materials and training were grant funded and programme sustainability depends on adaptation of curriculum and support mechanisms by the preschool or state Department of Education. Lastly, teachers who piloted the curriculum were enthusiastic about the curriculum. Results might be different if the curriculum was implemented through a top-down approach.

Conclusion

This pilot is novel as it addressed challenges to teaching nutrition education through a conceptual framework derived from the literature that addressed curriculum design, implementation and support structures. Although findings suggest positive outcomes regarding changes in teachers' attitudes and experiences from pre- to post-intervention, there are still areas within each of the conceptual framework elements that warrant further research on nutrition education curriculum. Nonetheless, the current study broadens the scope of knowledge on what we know about developing and implementing nutrition education curriculum for policy makers, researchers, and educators and paves the way for a continued focus on effective nutrition education programmes that garner teacher buy-in and ultimately improve children's health.

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research study participants were approved by the University of Mississippi's Institutional Review Board. Written informed consent was obtained from all subjects.

Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S136898002100118X>

References

1. DeCosmi V, Scaglioni S & Agostoni C (2017) Early taste experiences and later food choices. *Nutrients* **9**, 107–122.
2. Black MM, Walke SP, Fernald LCH *et al.* (2017) Early childhood development coming of age: science through the life course. *Lancet* **389**, 77–90.
3. USDA Food and Nutrition Service (2013) Healthy Hunger-Free Kids Act. <https://www.fns.usda.gov/school-meals/healthy-hunger-free-kids-act> (accessed March 2020).
4. Wight V, Chau M & Aratani Y (2011) Who are America's poor children? National Center for Children in Poverty. http://www.nccp.org/publications/pub_1001.html (accessed January 2020).
5. Hayes D, Contento IR & Weekly C (2018) Position of the academy of nutrition and dietetics, society for nutrition education and behavior, and school nutrition association: comprehensive nutrition programs and services in schools. *J Acad Nutr Diet* **118**, 913–919.
6. USDA Preschoolers. ChooseMyPlate. <https://www.choosemyplate.gov/browse-by-audience/view-all-audiences/children/health-and-nutrition-information>. (accessed April 2020).
7. Wang D & Stewart D (2013) The implementation and effectiveness of school-based nutrition promotion programmes using a health-promoting schools approach: a systematic review. *Public Health Nutr* **16**, 1082–1100.
8. Perera T, Frie B, Wong S *et al.* (2015) Improving nutrition education in US elementary schools: challenges and opportunities. *J Educ Pract* **6** 41–50.
9. Piaget J (1971) The theory of stages in cognitive development. In *Measurement and Piaget*, pp. 1–11 [Green D, Ford M & Flamer G, editors]. New York: McGraw-Hill.
10. Simon MA (1995) Reconstructing mathematics pedagogy from a constructivist perspective. *J Res Math Educ* **26**, 114–145.
11. Mississippi Department of Education (2018) Mississippi early learning standards for classrooms serving infant through 4-year-old children. https://www.mdek12.org/sites/default/files/final_edited_infants_through_4-year-old_early_learning_standards_2020_04.09.pdf (accessed April 2020).
12. Creswell J (2012) *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 3rd ed. Los Angeles: SAGE Publications.
13. Lincoln Y & Guba E (1985) *Naturalistic Inquiry*, Vol 75. Beverly Hills: SAGE Publications.
14. Unusan N & Yalcin H (2020) Teachers' self-efficacy is related to their nutrition teaching methods: self-efficacy and nutrition teaching methods. *Prog Nutr* **22**, 84–89.
15. Lindgren R & Johnson-Glenberg MC (2013) Emboldened by embodiment: six precepts for research on embodied learning and mixed reality. *Educ Res* **42**, 445–452.
16. Margolis J (2009). How teachers learn how teachers lead teachers. *Educ Leadership* **66**, 7.
17. Sousa DA (2017) *How the Brain Learns*. Thousand Oaks, CA: Corwin, a Sage Publishing Company.
18. Wang D & MacMillan T (2013) The benefits of gardening for older adults: a systematic review of the literature. *Act Adapt Aging* **37**, 153–181.