Evaluating an enrichment program in early childhood: A multi-methods approach

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Abstract

This article reports on the evaluation of one topic in an enrichment program designed for children in their early years of learning. The program is responsive to an increased understanding of the benefits for very young children of programs that not only take advantage of the sensitive periods for learning but that also assist parents to a take a proactive approach to their children's early learning (Australian Prime Minister's Science, Engineering and Innovation Council, 2009).The program being evaluated was delivered to a group of pre-preparatory students in five sessions over a period of two weeks. Data were collected using questionnaires, photographic and film recordings and field notes to ascertain the effectiveness of the program with regard to students demonstrating increased interest in the topic, in this case flowers, as well as to provide basic concepts of the topic. The term 'brain file' is introduced to encompass evidence of both interest and a basic concept or understanding. The findings reveal that participation in the enrichment program had a positive impact on students' interest in flowers. The instruction received through the enrichment program curriculum increased students' basic concept of flowers. In addition, the enrichment program had a positive impact on parental involvement in the learning process as measured by parent feedback. This research points to the potential of young children to develop brain files, which incorporate the notion of increased interest in and greater understanding of the topic. An enrichment program based on the principle of providing young children with starting points for learning has the potential to make a unique and valuable contribution to early learning.

Keywords: Enrichment program, early childhood, interest, vocabulary, parental involvement

Introduction

> *When we are driving, Jess notices the flowers. She points them out when she sees the ones that she knows (Jess's mother).*

The feedback provided by Jess's mother reveals that the young child has developed an interest in flowers and is now noticing them everywhere, a shift resulting from her participation in the Brain Filing Enrichment Program (BFEP). The program is designed to raise interest and provide young children with a basic concept including a vocabulary of the topic. In this way the BFEP is consistent with educational enrichment programs which are defined as programs with a range of strategies designed to broaden or deepen learning and that may involve exposure to new subjects that are not usually associated with a particular age group (Bentley, 2000).

The BFEP for pre-preparatory students consists of 16 topics, which are listed in Table 1, and is designed to be delivered over one year. The Flower Enrichment Program is one topic within the BFEP. According to Christian (2012) and others, the information currently delivered to children in education is too fragmented, lacking overview and limiting understanding. For this reason, 16 topics were chosen to provide children with a broad overview and understanding of the world that

they are a part of and that give them an insight into the world of knowledge that awaits them. Underpinning the choice of topics is developing a sense of connectedness to the world, an attitude of appreciation for the beauty of this world, and sensitivity towards each other and the environment. A sense of connectedness leads to better engagement in their environment and relates well to Montessori's (1949) cosmic vision of life, to Van Manen's (1997) lifeworld concept which implies that humans beings are all part of an historical context that is shared with other human beings and to the Early Years Curriculum guideline that an effective context for learning must exhibit a sense of connectedness with others and the world (QSA, 2006).

Table 1

The BFEP Curriculum for pre-preparatory students
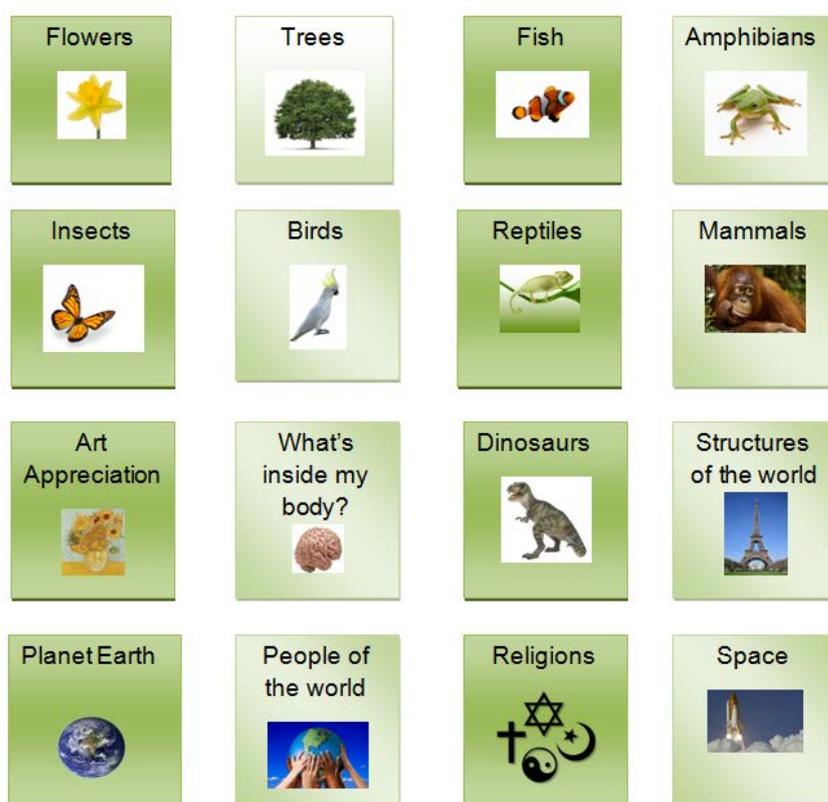
The four key elements to this enrichment program are outlined in Table 2. Images, play-based activities, books and audiovisual material and authentic experiences are featured in each of the 16 topics thereby catering for a range of different learning styles, in this case: auditory, visual and kinesthetic (Fleming, 2006). This device is regarded by educationalists as an educational principle necessary to enable the needs of a differentiated group of young learners.

Table 2			
Key elements and learning styles of the Brain Filing Enrichment Program			
Images	**Play-based activities**	**Books & Audiovisual material**	**Authentic experiences**
• 10–20 large, authentic mages • Viewed on screen • No distracting background or writing on the image • <u>Image is named,</u> for example: "This flower is a rose". • <u>An interesting fact is shared,</u> for example: "Roses have thorns along the stem".	• <u>Structured activities</u> • For example: deconstructing flowers, singing and dancing to a song, " I like the flowers" • <u>Unstructured activities</u> • For example: playing with flowers in water	• <u>Books:</u> Fiction Non-fiction relating to the topic • <u>Audio-visual clips</u> Short For example: clip of a rose blooming	• Connecting the topic to real-life experiences. • <u>At school:</u> For example: planting seedlings (refer to Photo 1) • <u>At home:</u> For example: picking flowers. Activity booklet: "I can spot a flower"
Learning Styles			
• Visual • Auditory	• Auditory • Visual • Kinesthetic	• Auditory • Visual	• Auditory • Visual • Kinesthetic

What is a brain file?

The term 'brain file' is used in this program to refer to demonstration of a high level of intrinsic interest in a particular topic which assumes that the child has a basic concept and vocabulary of the subject. A child who is aware of and interested in the flowers in their environment is said to have a 'brain file' for flowers. A brain file provides the child with a good starting point to base further learning upon. The following series of processes (Figure 1) outlines how a brain file, for the purposes of this enrichment program, is formed.
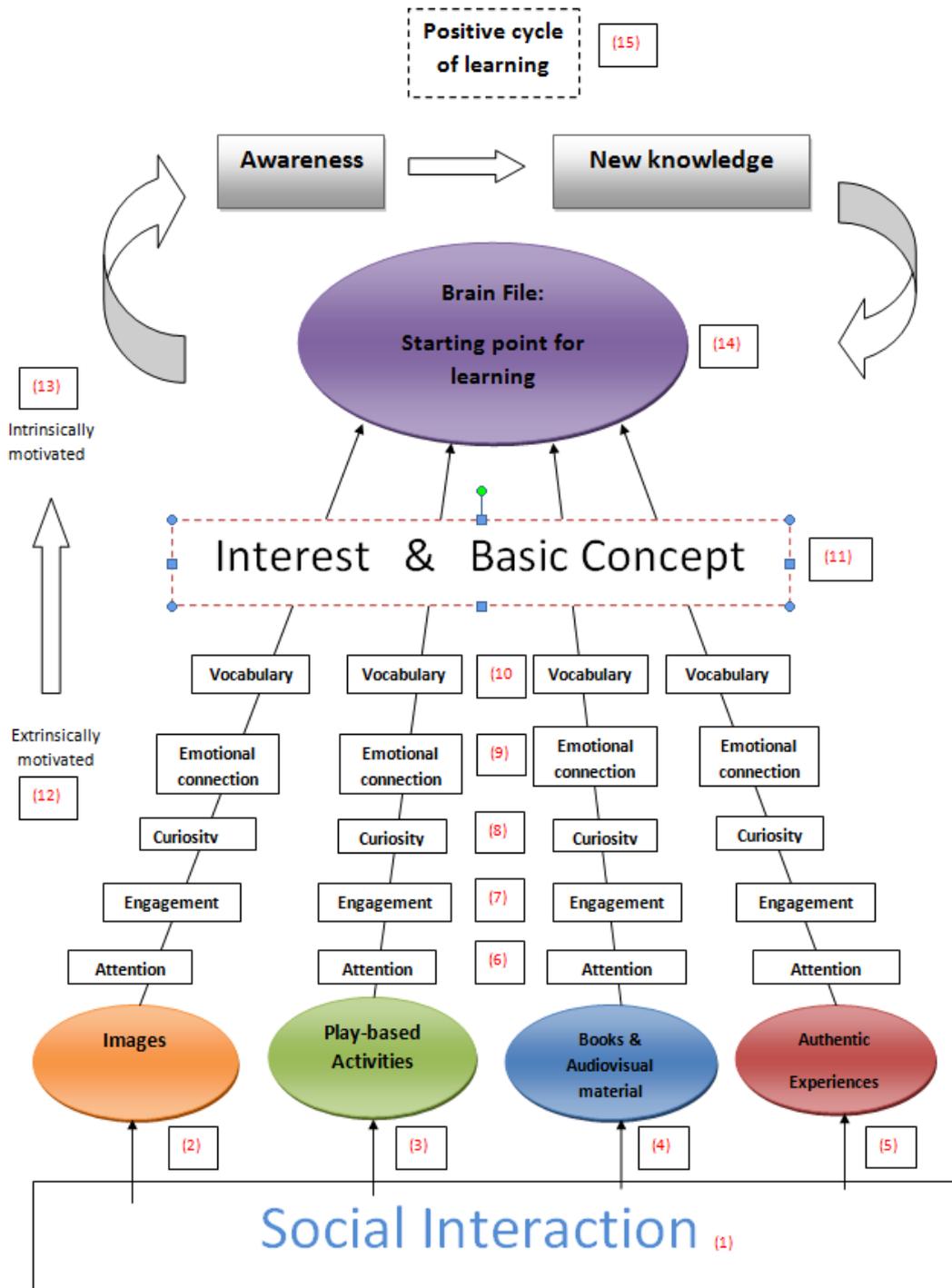
How is a brain file formed?

Figure 1 Formation of a Brain File

Social interaction *(1)* forms the basis of developing interest and a basic concept of a topic. It is through interaction between educator and child that each key element of the program is delivered. Sharing information about the images, and video clips, reading stories, initiating play-based activities and providing the child with real-life experiences are all delivered via social interaction

between educator and child and between children themselves. This program focuses on the key role that parents can play as learning partners with their children. Kuhl (2008) points out that young children benefit from strong, nurturing relationships with adults that encourage them to be curious about the world around them. Parents are encouraged to be aware of potential learning experiences in daily living and to provide children with real-life experiences.

The attention of the children is attracted to the large, true-to-life images of the flowers *(2)*. Doman (1984) states that the images must be large and clear containing only one item with accurate detail. Small images, images with a distracting background or images with writing on them may not be as effective in gaining the child's attention. Engagement and curiosity is further invigorated by play-based activities *(3)* and audio-visual clips *(4)*. Interest is reinforced by reading to the children and through real-life experiences at school and at home *(5)*. Each key element of the BFEP has the potential to grab the attention of the children *(6)*, to engage them *(7)*, to cultivate curiosity *(8)*, to make an emotional connection *(9)* and to improve their vocabulary *(10)*, thereby contributing to an interest in and a basic concept of the topic *(11)*.

At the start of the program the children are extrinsically motivated *(12)* by the educators to view images, video clips and to take notice of flowers in the environment, but as their level of interest becomes greater, they become more intrinsically *(13)* motivated to explore and discover. Ryan & Deci (2000) describe an intrinsically motivated person as one moved to act for the fun or challenge rather than because of external prods, pressures or rewards. This intrinsically or self-motivated interest is referred to as having a 'brain file' for a subject *(14)*. A child with a brain file for flowers is therefore positioned for learning and will become aware and take notice of the flowers in the environment, allowing new knowledge in and creating a positive cycle of learning *(15)*. Pink (2009) states that what motivates is intrinsic motivation, the deeply human need to learn and create new things. Having a brain file, or a high level of self-motivated interest, is therefore viewed as a good starting point for learning.

Having a range of brain files provides many starting points for learning and increases the child's existing knowledge base. The Australian Prime Minister's Science, Engineering and Innovation Council (PMSEIC, 2009) Expert Working Group Report acknowledges that an important factor that shapes learning is the extent of the knowledge base of the individual. Existing knowledge provides the basis on which new learning builds and assists learners to structure knowledge and to make sense of new information. Hardiman (2003) notes that children are more likely to remember information that connects with pre-existing knowledge.

The BFEP is unique in terms of its focus on providing young children with brain files (interest and a basic concept) on a broad range of topics. The BFEP takes the view that interest is key to learning. Robinson (2013) states that if the spark of curiosity can be lighted in a child, they will very often learn without any further assistance. The BFEP differs from other programs in that it is not project-based, problem-based or inquiry–based, but rather interest-based. The BFEP has the potential to be utilised by existing approaches.

Interest is cultivated within the BFEP by addressing the four aspects of interest namely: attention, engagement, curiosity and an emotional connection (Table 3).

Table 3		
Achieving the aspects of interest		
Aspects of Interest	**Addressing the aspects of interest within the program**	**Social interaction**
Attention	• Using large realistic images that grab attention.	• Social interaction forms the basis of developing interest.
Engagement	• Incorporating various learning styles within each session. • Books and audio-visual clips • Teacher-initiated playful experiences • Short sessions • Introducing new/novel images and facts at every session	• Social interaction with teachers, fellow students and parents.
Curiosity/wanting to know or learn	• Sharing an interesting fact • Novelty (surprise/mystery bag)	
Emotional connection	• Modelling a love of learning and a sense of awe and wonderment of the world. • Engaging with joy. • Connecting with emotions through humour, • Fictional stories with an emotional element. • Parental involvement that includes an activity booklet • Making the connection between new knowledge and real life experiences	• Parents as role models and learning partners

While the teaching strategies used are well known and accepted, there are some unique elements within the BFEP including: the utilisation of large visually appealing images; using only a small number of images and information; sharing information specifically selected to promote curiosity and interest; balancing repetition and novelty; and incorporating parents via activity booklets, as outlined following:

- The use of very large true-to-life images to grab the attention of the young children is unique to this program. This strategy is in response to the Australian Prime Minister's Science, Engineering and Innovation Council (PMSEIC, 2009) Expert Working Group Report recommending that further research be done in the designing of learning tools and techniques that are able to get and sustain the attention of children. According to Medina (2008) visual input is more likely be recognised and recalled than text and oral presentations and pictures are able to grab attention because people pay attention to colour and size.
- Only a few images are selected, each one is named while being shown and an interesting fact is shared about each image. According to Medina (2008) one of the most common communication mistakes made is relating too much information.

- While repetition is a valuable teaching strategy, new images are added at each session to promote novelty. Jensen (2006) states that optimum enrichment is achieved when the learning is new and challenging and that novel learning is a critical ingredient of enrichment and contributes to synaptic development and survival. The BFEP balances repetition with novelty within each session.
- Parents are encouraged and given suggestions of how they can connect the content of program with authentic experiences at home and in everyday life. Activity booklets for parents to complete with their children is a unique way of involving them in the learning process.

A basic concept of the topic is achieved by teaching young children the rudimentary vocabulary or terminology associated with the topic such as stem, leaves and roots as well as the names of ten types of flowers (e.g. rose, sunflower, tulip, etc.) in the Flower BFEP. Repetition and reinforcement are the teaching strategies used as the images and names of the flowers are repeated at every session and reinforced in the structured play-based activity, the video-clip as well as in the activity booklet. Australian research (PMSEIC, 2009) states that the basis for learning is repeated exposure to a variety of experiences as exposure to similar objects and events in different contexts allows the concept to be elaborated.

Determining the effectiveness of the program
Ratner (2002) states that hypothetical concepts must be well-defined so that they can be identified unambiguously in order to provide evidence of the effectiveness of programs. In this research, there are two main measures – demonstrated increase in the subjects' knowledge of and ability to respond to questions about basic concepts; and their reported interest in the topic. The measure of the effectiveness of the program is evidence of an increased interest in flowers as well as basic concepts or vocabulary relevant to the topic.

The notion of 'basic concept' in this research refers to a vocabulary which assists in an understanding and description of the topic. Vocabulary is of central importance in learning. Pikulski and Templeton (n.d.) stress that it is impossible to overestimate the power of words. They point out that a rich and large vocabulary is perhaps the greatest tool we can give students as it greatly influences school success. While vocabulary can be measured quantitatively, interest is measured quantitatively as well as qualitatively.

The concept of 'interest' that is used in this research is defined with the help of indicators of interest, namely: attention, engagement, curiosity and an eagerness to know or learn and an emotional connection e.g. excitement, enjoyment and love. Paying *attention* is seen as the first step to encoding new information. Medina (2008) states that the more attention the brain pays to a given stimulus, the more elaborately the information will be encoded and retained. Better attention always equals better learning. *Engagement* with the material is also important. Schmoker (2006) describes engaged students as paying attention, alert and tracking with their eyes, listening, asking questions and responding to questions, participating and reacting (laughing, crying, shouting, etc.). *Curiosity* and an eagerness to know or learn are viewed as motivational forces in learning. Robinson (2013) states that curiosity is the engine of achievement, driving human life and that if the spark of curiosity can be lighted in a child, they will very often learn without further assistance. According to Stamm (2007) children learn best and remember more when learning is connected to an emotion such as joy or excitement. He affirms that the brain pays greater attention to emotional

content thereby endorsing *emotional connection* as evidence of learning. Porter (2005) describes a blend of excitement and calm as a motivational factor in learning.

The study

The objective of this study was to evaluate the effectiveness of the Flower BFEP. An action research approach is taken as this is a dynamic process with the researcher a participant in the project, examining their own practices. The action researcher engages collaboratively with the other teachers and the parents about the program (Creswell, 2008). Insights gained from this study will allow for improvements to be made to the enrichment program.

Research questions

The enrichment program was evaluated in terms of three aspects: interest, basic concepts of the topic, and parental involvement. Hence, this study is shaped by the following three specific research questions:

1. How does participation in the enrichment program impact on student's interest in flowers?
2. To what extent does the instruction received through the enrichment program curriculum increase students' knowledge and basic understanding of flowers?
3. How does the enrichment program impact on parental involvement in the learning process?

Participants

The participants in this study consist of: an experimental group of children in a pre-preparatory classroom; a control group of children also in a pre-preparatory classroom; parents of the experimental group of children; the teacher and classroom assistant; and the researcher.

The children

The average age of the children in the experimental group was 4 years and 5 months and the average age of the children in the control group was 4 years and 6 months. There were 20 children in each group, 12 boys and 8 girls in the experimental group and 10 boys and ten girls in the control group. The control group attended the same school as the experimental group, eliminating the influence of socio-economic factors, was of similar age and was following the same curriculum as the experimental group. The children attend five days of school every two weeks; two days in the one week and three days every other week. The two groups had no contact with each other.

Parents

Parents of the experimental group attended a group session with the aim of giving them an understanding of the basic principles of the BFEP. They were given information about the program and encouraged to become involved in the process. They were told that their role was to support their children's developing understanding of, and interest in flowers by building on existing knowledge and experiences. They were given the *"I can spot a flower"* activity booklet (Image 1) and asked to complete it with their children at home. The booklet consists of images of 13 flowers, an interesting fact about each flower as well as a suggested activity, for example; *"Feel how fuzzy the stem of the Gerbera is"*. Suggestions are also included on how parents can nurture interest in flowers, for example: planting bulbs at home, arranging flowers in a vase, pressing flowers between heavy books, etc.

See how many of these flowers you can spot.

Make a tick in the box if you have spotted one of these flowers.

Take time to look at them and smell each one's unique fragrance if you can.

Rose

Roses have layers upon layers of five petals. Count five petals.

Protea

Gently touch the inside of the flower and feel how soft it is!

Gerbera

Gently touch the stems of the Gerbera. Can you feel how fuzzy it is? It is covered in fine hairs to prevent insects from crawling up the stem to eat the flower.

Image 1: The "I can spot a flower" activity booklet

The program presenter

The program presenter/researcher comes from the position of professional practice in psychology and education. The researcher as participant observer takes on the role of an observer who engages in activities at the study site (Creswell, 2008). This implies that the researcher has to record information at the same time as participating in activities. The limitation of this role is that it is difficult to take notes while participating. This difficulty was addressed by writing down observations directly after the session. As sessions were also video recorded and photographed by an assistant, they provided a valuable source of information for triangulation and participant observation.

Data collection techniques
Data were collected from various sources (questionnaires, field notes from classroom observations, video recordings and photographic material) to address the research questions, making this a multi-methods study. Mills (2000) has divided action research data collection techniques into three categories: experiencing, that is observing and taking field notes, enquiring, that is informal interview and questionnaires and examining, that is using and making records such as field notes, photographs and videotapes. Each research question was addressed by more than one data collection instrument, as outlined in Table 4.

Table 4
Data collection instruments

Research question	Data collection instrument
1. How does participation in the enrichment program impact student's interest in flowers?	• Questionnaires • Observations (Field notes) • Video & photographic material
2. To what extent does the instruction received through the enrichment program curriculum increase students' knowledge and basic understanding of flowers?	• Questionnaires • Observations (Field notes) • Video and photographic material
3. How does the enrichment program impact parental involvement in the learning process?	• Questionnaires • Observations (Field notes)

As social desirability bias is a major limitation in the parent questionnaires, the researcher pre- and post questionnaires and interview provides a more direct measure of each child's level of interest and knowledge of the topic. Social desirability bias reflects the basic human nature to present oneself in a positive manner to others (Neeley & Cronley, 2004). Parents could possibly claim that their children knew more than they did, in order to give a good impression of their knowledge. It was therefore more reliable for the researcher to evaluate the knowledge and interest of the children. To overcome weakness in the research, triangulation was achieved by using quantitative and qualitative methods, and also by using multiple data sources. Sagor (2000) states that more sources allow for more triangulation and a better understanding of the problem.

Data collection process
The process of data collection follows a series of steps that is reflected in a pre-test phase, an application phase and post-test phase. This reflects the steps in a typical Action Research model, allowing for cycles of implementing and reflecting:

A. Pre-test phase
Before the commencement of the Flower Enrichment Program, the parents were given an information booklet containing information about the program and asked to provide children with real-life flower experiences. They were also given an activity booklet, the *"I can spot a flower"* booklet that encouraged them to spot flowers in their environment. A pre-test questionnaire was conducted by the researcher with the experimental group. The aim of this questionnaire was to determine what concept or understanding the children had of flowers, what types of flowers they were familiar with and whether they enjoyed looking at images of flowers.

B. *Application phase*

Five sessions of the Flower BFEP were presented over a period of two weeks. During each twenty minute session the children were:

- shown large, true-to-life images of flowers on a screen,
- given an interesting fact about each flower,
- shown video clips of, for example, a flower blooming,
- presented with a real flower from the Mystery Bag that could be touched and smelled,
- and participated in structured play activities such as deconstructing a flower.

At each following session the previous images were revisited and a new type of flower was introduced. Children were encouraged to bring in their activity booklet and to share with the class what they have done in their booklet or observed in their environment. They could also bring in samples of flowers from their environment.

Each session was video-recorded and photos were taken during the session. The research was approved by the Ethics Committee at Griffith University. The identity and confidentiality of the children participating in the study is protected. Parental consent was obtained for each child allowing them to be photographed and video recorded with the understanding that these photos may form part of publications such as a journal article.

Notes of classroom observations were made directly after the session by the researcher. According to Creswell (2008) the advantages of observations include the opportunity to record information as it occurs in a setting, to study actual behaviour and to study individuals who have difficulty verbalizing their ideas such as pre-school children. The class teacher or teacher-aide present during the session also contributed to the observations.

C. *Post-test phase*

After completion of the two week program, a post-test questionnaire was sent to the parents of the experimental group. The post-test questionnaire contained questions regarding interest level and knowledge of children in the various subject areas, after the implementation of the program, as well as questions regarding parental participation during the program. A post-test researcher questionnaire was undertaken by the researcher with the children of the experimental group as well as with the children of the control group.

Research Findings

The research findings relate to the three research questions:

- How does participation in the enrichment program impact student's interest in flowers?
- To what extent does the instruction received through the enrichment program curriculum increase students' knowledge and basic understanding of flowers?
- How does the enrichment program impact parental involvement in the learning process?

Hence the basic concept and vocabulary that the children have of flowers, their interest in flowers and parental involvement in the learning process were evaluated.

Evaluating Basic Concepts and Vocabulary

The knowledge and understanding that the children have of flowers were determined by evaluating their basic concept and vocabulary of flowers. The first step during the pre-test phase was determining whether the children understood the concept of a flower. This was determined by

showing each child images of various plants (flower, tree, grass, fern) and asking them to point to the flower. All of the children in the experimental group as well as the control group were able to correctly point to the flower. This indicates that they all have a basic understanding of what is flower is, as well as what a flower is not. A flower is not a tree, grass or a fern. It was therefore not necessary to repeat the question in the post-test phase.

The next question required children to draw a stem, some leaves and some roots for a flower. The purpose of this question was to determine whether the children understood the concepts of a stem, leaves and roots. They were given a picture of a flower head and asked to draw in the parts of the flower. Table 5 reflects the pre-test and post-test scores of the experimental group, indicating how many children were able to draw a stem, draw leaves and draw roots for the flower. The control group, who did not take part in the application phase of the research, only did one assessment at the same time as the post-test phase. The rationale for not doing a pre-test with the control group was that by doing an assessment with them, their interest in flowers could be influenced.

Table 5			
Draw a stem, some leaves and some roots for a flower			
	Stem	Leaves	Roots
Pre-test (n=20)	5	9 (7)	1
Post-test (n=20)	19	19 (6)	15
Control group (n=20)	4	8(3)	1

The data points to a marked increase in the number of children in the experimental group who, after completing the enrichment program, were able to draw a stem (from 5 to 19), draw leaves (from 9 to 19) and draw roots (from 1 to 15). Of the 9 children who were able to draw leaves in the pre-test phase, 7 were not able to draw them in the correct position on the stem indicating a possible confusion between leaves and petals. Of the 19 children drawing leaves during the post-test phase, there were still 6 children who were unsure of where to draw the leaves. Scores of the control group were similar to the pre-test scores of the experimental group with 4 children being able to draw a stem, 8 being able to draw leaves and 1 child knowing where to draw the roots. Of the 8 children drawing leaves, 3 were not positioned correctly on the stem. An example of completing this task successfully is presented in Image 2a & b.

Image 2a: Pre-test   Image 2b: Post-test

In image 2a, the child was able to draw a stem but was unsure of where to position the leaf and unable to draw roots. In the post-test Image 1b, the child was able to draw a stem, leaves in the appropriate position and roots. Although there was a considerable increase in the number of children who were able to draw leaves (from 2 to 13 children) there are a group of children who are still unsure where the leaves are located. Some of the children confused leaves with petals. It may be necessary to point out to the children not only what a leaf is, but also what a leaf is not. By clarifying the difference between a petal and a leaf, the children are likely to perform better.

In the next question children were asked to point to a picture of a flower by name. These flowers were chosen as they are commonly available in local supermarkets and florist shops. A total of 16 types of flowers were shown to the experimental group in the pre-test and in the post–test phase and to the control group in the post-test phase. The children were asked to point to the following 10 flowers: Rose, Tulip, Bird of Paradise, Daffodil, Sunflower, Orchid, Carnation, Protea, Poppy and a Gerbera.

Table 6										
Name flower types										
Name of flower	Rose	Tulip	Bird of Paradise	Daffodil	Sunflower	Orchid	Carnation	Protea	Poppy	Gerbera
Pre-test (n=20)	3	1	1	1	3	1	0	0	0	0
Post-test (n=20)	18	19	20	11	19	13	7	11	16	10
Control Group (n=20)	8	0	0	0	13	0	1	0	0	0

The experimental group had little knowledge of various types of flowers during the pre-test phase as did the control group. The most recognisable flowers were roses and sunflowers. A possible explanation for the high sunflower score is that the school had planted a sunflower in the garden and the children had seen it grow into a mature plant. Children were also more exposed to roses in the popular media. One girl said that she learnt about a rose from the children's show, The Wiggles, explaining that: *"Dorothy from the Wiggles always has a rose"*. After participating in the program the children's knowledge of the various types of flowers was noticeably enhanced. The children were able to recognise on average 7.5 out of 10 flowers.

Even though all the four year old students (in the pre-test phase) knew what a flower was, many did not have a basic understanding of the basic parts (stem, leaves and roots) of a flower. Their vocabulary of the various types of flowers was also limited with some children knowing what a rose and a sunflower was. After participating in the Flower BFEP their understanding of the basic parts of the flower and their knowledge of the various types of flowers was noticeably enhanced. The instruction received through the flower enrichment program increased the students' knowledge and basic understanding of flowers.

Evaluating Interest

Interest was evaluated by viewing the four indicators of interest, namely: attention; engagement; curiosity; and evidence of an emotional connection made with the topic. For each indicator of interest, certain aspects have been identified to determine if the indicator of interest is being achieved.

Attention: Attention is the first indicator of interest and the aspects of attention are alertness, eye contact and being quiet or not talking. The attention given by the children to the Flower BFEP is evaluated by looking at the video material, photos taken during the session and notes taken after each session by the researcher and teacher. In evaluating attention the aspects of attention, the indicators that were considered are presented in Table 7:

Table 7	
Indicators of attention	
Attention	**Attention**
Alertness	Alertness
Eye contact/looking	Eye contact/looking
Quiet	Quiet

Initially all the children were focussing on the screen, alert, sitting quietly and looking at the images. The large colourful authentic images on the screen helped to focus the attention of the children. It was noted that the quicker the images were shown, the more attention was given to them by the children. When children began to lose attention, it was possible to regain their attention by changing to another element of the program, e.g. changing from viewing images to an audiovisual clip or to an authentic experience.

Image 3: Viewing large, authentic images on a large screen.

Some factors that had a negative impact on attention were identified. Distractions around the group, e.g. late-comers, parents talking, an emotional or disruptive child all had a negative effect. If the group was large, the lack of space between the children could also be distracting to them. It was found that a group of 12 children or less was most effective. The children also became distracted if the technology (the big screen) did not work immediately.

Engagement: Engagement with the program is the second indicator of interest and the aspects of engagement are: listening; asking questions; contributing to conversations; participating in the activities; and reacting to the content of the program. The level of engagement that the children had with the program was evaluated by looking at the video material photos taken during the session and notes taken after each session by the researcher and teacher. The following indicators of engagement, as outlined in Table 8, were assessed to determine the level of engagement.

Table 8	
Indicators of engagement	
Engaged	**Not engaged**
• Listening	• Not listening, distracted
• Asking questions	• Not asking questions
• Contributing to conversations	• Not contributing
• Participating in the activities (dancing, singing, smelling, tasting)	• Not participating
• Reacting (laughing, smiling, shouting, pointing, getting excited)	• No reaction

The assessment of these indicators revealed that most of the children were engaged with the program. They were listening, asking questions about flowers, contributing by telling about their own experiences with flowers, participating enthusiastically in the various play-based activities and reacting to the program by laughing, smiling, pointing and getting excited. There were two children with low levels of engagement. One child participated in everything but his level of reaction was very low and he showed resistance to using a crayon or a pencil. His behaviour could be related to a lack of confidence regarding fine-motor control. Another observed everything but participated in very little, showed little reaction and was selectively mute at times. According to the teacher his

behaviour is related to emotional problems. It is promising however that at the last session he brought a flower in to class and presented it to his teacher indicating that although he did not participate in much, his interest in flowers had been sparked.

Engagement with the flower program was promoted by:

- Keeping each session short, no longer than 20 minutes in total.
- Giving small bits of interesting information.
- Being sensitive to the cues that the children give that they are losing focus.
- Combining 'old' and 'new' knowledge by a repetition of knowledge learnt in previous sessions and adding new bits of information at each session.
- Including video clips into the program. Video clips containing music were found to be especially effective in engaging the children. When more than two video clips were shown however, some of the children started to became distracted.
- Incorporating various learning styles within each session. One session could include: looking at the large images, singing a flower song, watching a short audiovisual clip of a flower blooming and deconstructing a flower or pretending to be an insect sipping the nectar of a flower.

Image 4: Sipping the 'nectar' (apple juice).

Image 5: Deconstructing a flower

Some factors that had a negative effect on the engagement of the children with the program were identified. Giving 'too much' information or the presenter talking too much led to disengagement. Not changing to a new element (e.g. from images to a play activity) soon enough also influenced the level of engagement in this program.

Curiosity: Curiosity and eagerness to know and learn is the third indicator of interest and the aspects of curiosity that were utilised in this research are: an awareness of flowers, talking and asking questions about flowers, an eagerness to look at books about flowers, a keenness to pick flowers and unstructured 'flower' play. The level of curiosity was evaluated by a questionnaire given to the parents, looking at the video material photos taken during the session and notes taken

after each session by the researcher and teacher. The indicators of curiosity (Table 9) were assessed to determine the level of curiosity.

Table 9	
Indicators of curiosity	
Curious	**Not curious**
• Aware (of flowers)	• Unaware
• Talks about (flowers)	• Does not talk about
• Asks questions (about flowers)	• Does not ask questions
• Keen to look at books (about flowers)	• Not interested in looking at books
• Wants to pick flowers	• Does not want to pick flowers
• Unstructured 'flower' play	• No 'flower' play

In the questionnaire, the parents were asked what behaviour they had noticed since their children had participated in the program. Parents reported the following, as presented in Table 10.

Table 10				
Parent reporting of child behaviours following the program				
Which of the following have you noticed since undertaking the program?				
My child is more aware of the flowers in his/her environment.	My child talks more about flowers	My child wants to look at books about flowers	My child asks more questions about flowers	My child wants to pick flowers
18	8	2	6	9

The parents noticed that most of the children were more aware of the flowers in their environment. Some of the children talked more about flowers and wanted to pick flowers. A few children were asking questions about flowers and a couple of children wanted to look at books about flowers. Curiosity was promoted by:
- Sharing an interesting fact about each image, for example, "Tulips come in all colours except blue!"
- Surprises, e.g. the Mystery bag, as seen in *Image 6* where a Bird of Paradise flower is taken out of the *Mystery* bag and presented to the class so that they may touch and smell it.

Image 6: The Mystery bag

The parents of the experimental group were asked if they thought that the Flower BFEP had increased their child's interest in flowers. Of the 19 who participated, 14 indicated their child's interest had increased considerably; 4 a bit, and one indicated that there had been no increase in the child's interest in flowers. One parent wrote: *"Sam wants to grow his own sunflower. He has shown a lot of interest in learning new things. When he comes home he tells his family all about what he has learnt. It has blown us away. We are very proud."*

Researcher notes and photographs also reveal unstructured flower play activities such as painting a flower (Image 7) or playing with flowers (Image 8), all pointing to an interest in flowers.

Image 7: Painting a flower   Image 8: Playing with flowers

Connecting with emotions:
The effectiveness of the program in connecting with the emotions of enjoyment, excitement and love was evaluated with a questionnaire given to the children, video recordings and photos and notes taken by the researcher and teacher. The following three primary indicators of connecting with emotions are presented in Table 11.

Table 11	
Connecting with emotions	
Connecting	**Not Connecting**
Enjoyment	No enjoyment
Excitement	No excitement

In determining the level of enjoyment experienced by the children when looking at flower images the following question was put to them: *How did you like looking at these pictures of flowers? (Point to the face)*. The results are presented in Table 12.

Table 12			
Children's level of enjoyment when looking at flower images			
	I did not like looking at them at all ☹	It was ok. I liked looking them a little bit 😐	Liked looking at them a lot. 🙂
Pre-test	2	3	15
Post-test	0	1	19
Control Group	1	6	13

The majority of the children, 18 in the experimental group and 19 in the control group, liked looking at the flower images even before participating in the program. They immediately gained enjoyment from looking at images of flowers, pointing to the natural curiosity and love of learning inherent to young children. After completing the Flowers BFEP four more children in the experimental group indicated that they liked looking the flowers a lot and none of the children indicated that they did not like looking at the flowers at all. By participating in the Flower BFEP the level of enjoyment experienced when looking at flowers had increased.

The level of excitement was determined by looking at the video recordings of each session. Excitement was seen in the body language, facial expressions and the verbalisations of the children. Many excited verbalisations such as *"I like that one!"* or *"I've seen that one!"* were noted. Comments such as, *"I love flowers!"* or *"I want that one!"* and children bringing flowers to give to their teacher (Photo 8) or to share with the class, are indicators of a love of flowers. Children watering and caring for the flowers at school are also an indication that they care about them.
Connecting with the emotions of joy, excitement and love/care (for flowers) was promoted by:

- Modelling a love of learning and an excitement about learning about the topic.
- Modelling a sense of awe and wonderment of the world, e.g. the beauty of the flower, the sensuousness of the soft petals, the sweet taste of the nectar.
- Incorporating humour and a sense of fun into the program e.g. *"How funny, this flower looks just like a bird!*

- Repetition and reinforcing of new knowledge through the various key elements.
- Making the connection between the new knowledge learnt and real life, for example knowing the name of a flower seen in a supermarket.
- Caring for a plant by planting a seedling, watering it and watching it grow (Photo 10)
- Reading fictional stories about plants such as, *The Tiny Seed by Eric Carle* as the children can connect emotionally to a story that tells of the perilous journey of a tiny seed.

Image 9: Bringing flowers to class

Image 10: Planting seedlings at school

Interest was evaluated by viewing four indicators of interest, namely attention, engagement, curiosity and evidence of an emotional connection made with the topic of flowers. The large authentic images were effective in grabbing the attention of the children, and the attention of the children remained focussed on the images when they were shown at a fairly quick pace. Most of the children engaged very well with the program. Low level of engagement was related to other emotional and behavioural issues. Evidence suggests that even the children who were not engaging well were still showing interest in the topic. According to the parents, nearly all the children became more aware of and interested in the flowers in their environment indicating a heightened level of curiosity. The majority of the children were able to make an emotional connection with the Flower BFEP and enjoyed looking at images of flowers. Feelings of excitement and love/care for flowers were indicated by the body language, facial expressions, actions and the verbalisations of the children. The four indicators of interest show that participation in the Flower BFEP had a positive impact student's interest in flowers.

Evaluating Parental Involvement
The parents were encouraged to complete the activity booklet (Image 11) with their children. When asked about the booklet, most of the parents (14 of 20) said that their child enjoyed doing the activity booklet and 13 parents said that they enjoyed doing it with them. A few parents said that they did not have time to do the activity with their children, for example:

I did have good intentions of working through the homework book with him - sorry it didn't happen. I did not have the time (Harry's father).

The activity booklet makes use of incidental learning, encouraging children and parents to take notice of the flowers in their environment, and therefore completing it does not to take up much time. By being made aware before-hand that the activity is not very time-consuming, more

parents may have attempted to complete it. None of the parents thought that the activity was too difficult for young children and none considered learning about flowers to be a waste of time.

Image 11: The "I can spot a flower" activity booklet.

Parents were asked if they themselves had become more interested in flowers. Three of the parents said that they themselves had become more interested in flowers and six said that they had became slightly more interested in flowers as a result of the Flower BFEP. Half of the parents (10) however indicated that they have not become more interested in flowers. The activity booklet was received positively with the majority of parents indicating that their children enjoyed doing it and that they enjoyed doing it with them at home. The parents who did not engage with the booklet said that they did not have the time to do it. It is promising that some parents have found that their own interest in the topic was sparked. This is an indication of parental involvement and social interaction occurring in the learning process and refers to the parents as not only role models but also learning partners in the learning process. The Flower BFEP generally had a positive impact on parental involvement in the learning process.

Conclusion
The Brain Filing Enrichment Program is being developed in direct response to the recommendation by the Australian Government that programs and resources be developed that assist parents to take a proactive approach to their children's early learning and that take advantage of the sensitive periods for learning (PMSEIC, 2009). The BFEP recognises age related optimum learning times for young children which supports the view that the early years are the most important years for laying the foundations for learning and for developing brain files because the brain is at its most malleable and impressionable. For this reason the BFEP is delivered to young children.

The findings from this study reveal that participation in the Flower BFEP impacted positively on student's interest in flowers, enhancing level of interest in the topic, the instruction received through the enrichment program curriculum increased students' basic concept and vocabulary of flowers and the enrichment program had a positive impact on parental involvement in the learning process.

The results are not surprising as young children are naturally curious and interested in the world around them. Jensen (2006) describes the young brain as burning with the desire to learn and Robinson (2013) describes children as natural learners.

If it is possible for young children to develop interest in and a basic concept of flowers within a short period of time (5 sessions) then this research indicates the potential of young children to develop interest and a basic understanding (brain files) in other areas as well.

This research emphasizes the benefits of having brain files. Having an interest in and a basic concept of a subject at a young age will not only raise their awareness of the subject but also provide young children with good starting points for learning. Brain files in a wide range of topics will provide them with a substantial knowledge base on which to build new learning and also provide them with a broad perspective and developing their sense of connectedness to the world.

The question that this research raises is whether enough is being done to cultivate the interest of young children in various subjects? This study highlights the need to further explore the potential of very young children to develop brain files for a wide range of subjects, subjects that are not usually associated with this particular age group.

The BFEP has the potential to be utilised by current pre-school programs. An enrichment program that utilises parents as learning partners and that enables young children to develop a wide range of brain files has the potential to make a unique contribution to early learning.

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