

Evaluation of a capacity building clinical educational model for oral health clinicians treating very young children

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Objective: There are significant levels of dental caries in Australian school-aged children, with children aged five years having a mean dmft of 1.3. It has also been identified that, in general, oral health clinicians lack confidence to treat very young children and this study aimed to increase capacity of public sector oral health clinicians to treat preschool children. **Basic research design:** An educational program was developed, implemented and evaluated for its capability to increase the confidence and knowledge of oral health clinicians and dental assistants in providing oral care for children aged 12 months to 5 years. **Results:** In 2011 and 2012, the course was delivered to 36 clinicians (22 dentists, 12 dental therapists, and two oral health therapists) and showed increases in their confidence and knowledge for participants when providing dental procedures to preschool children. **Conclusions:** The educational program that was developed and implemented has met its objective of increasing the knowledge and confidence of practicing oral health clinicians and dental assistants in the management of preschool children. Strategies to further enhance the outcomes of this educational program have been proposed.

Key words: education, professional, dental, postgraduate, oral health, child, preschool

Introduction

A recent study by the Australian Institute of Health and Welfare (AIHW) showed that in 2007, Australian school-aged children had high rates of decay in their deciduous teeth (Mejia *et al.*, 2012). The youngest, aged five, had on average 1.3 teeth with untreated decay. In addition, just under half the six-year-olds attending school dental services had a history of dental caries in their deciduous teeth. The average decayed, missing or filled teeth (dmft) for this group was 1.9. Early childhood caries (ECC) is a virulent form of dental decay affecting the primary teeth of very young children (Davies, 1998). Estimates of ECC prevalence vary, with several studies finding up to half of Australian children enter primary school with untreated decay; 34% of four-year-olds have experienced dental caries with an average of almost three teeth decayed or missing due to decay, 80% of which is untreated active disease (Armfield *et al.*, 2003; Gussy *et al.*, 2006). Ha and colleagues (2011) showed that the significant caries index (SIC) for four-year-olds was 9.97 teeth affected in 2006. Young children in rural Victoria have 60% more decay than those living in metropolitan Melbourne (Rogers, 2011).

The introduction of the Early Childhood Oral Health Program (ECOHP), which aimed to provide dental care to all preschool children in Victoria, demonstrated that many dentists working in community dental clinics lacked the clinical skills, confidence, and knowledge to provide oral health care to preschool children. The Australian

National Oral Health Plan (NOHP) 2004-13 listed one of its key areas as “education to achieve a sufficient and appropriately skilled workforce [and communities] that effectively support and promote oral health” (Davis *et al.*, 1999). As a result, in 2006-07, funding was made available by the then Victorian Department of Human Services to develop, implement, and evaluate a capacity building clinical educational program aimed to assist dental clinicians working in community clinics to gain confidence and knowledge in the dental management of preschool children.

A review of literature published on educational models demonstrates that *passive didactic* large group educational sessions, including grand rounds, educational meetings, conferences, refresher courses, lectures, and symposia, were shown to be ineffective in changing clinicians' performance or patient outcomes (Acquilla *et al.*, 1998; Behar-Horenstein *et al.*, 2008; Forsetlund *et al.*, 2009). There was a need to experiment with learning and teaching approaches to progress from the traditional education methods to teaching through examples which appeared more efficient than teaching theory, and the use of case studies to help students see the connections between what they were learning and how they would be expected to apply it in a clinical setting (Behar-Horenstein *et al.*, 2008; 2010). These studies also demonstrated that asking more questions, encouraging small group discussions, the use of more practical examples, emphasising a hands-on experience, and introducing ‘what ifs’, encouraged students to think outside the current problem and to apply knowledge

in different situations. Other students found observing the way an instructor presented (body language and interaction with students) to be more valuable to their learning.

Confidence has been recognised as an important educational outcome and has been linked to increased clinical competence, with a number of studies demonstrating the ability of various programs to improve self-reported confidence of dental students in improving clinical care (Lynch *et al.*, 2010; Smith *et al.*, 2006).

With these concepts in mind, Dental Health Services Victoria (DHSV) developed and implemented a state-wide clinical educational program aimed to increase dental clinicians' confidence in the oral health management of very young children by providing community dental program clinicians and their dental assistants (DAs) with appropriate knowledge and practical skills to treat preschool children (12 months to 5 years). This included enabling clinicians to make appropriate decisions regarding the non-pharmacological oral health management of very young children; providing clinicians with the knowledge and skills to undertake quality clinical procedures essential for the emergency and routine oral health care; appropriately referring very young children for specialist services where required, and providing oral health education and advice to assist with the reduction of ECC. This paper presents the outcomes of the course that was delivered and evaluated in both 2011 and 2012.

Methods

The DHSV Human Research Ethics Committee (HREC) approved the development, implementation, and evaluation of this educational program then the DHSV called for expressions of interest from community dental clinicians and their DAs to participate in this clinical educational program. The maximum number of participants per program delivery was 20 clinicians, plus their DAs.

A reference group was established to guide and steer the development, implementation, and evaluation of this clinical educational program. Membership of the group included public and private paediatric dentists; consumers; the Health Promotion Unit, DHSV; community dentists; Royal Children's Hospital Dental Department; and the Melbourne Dental School, University of Melbourne.

The eight-day program (see Table 1) was delivered twice over the six month periods September 2011 to March 2012 and July 2012 to January 2013. This program incorporated a didactic component with interactive and reflective workshop activities delivered and facilitated by paediatric dentists (four and a half days); a clinical observation component where each dental team observed specialist paediatric dentists providing services to preschool children in private practices (one day), a pre-clinical component (half day), and a clinical practicum component where participants provided

Table 1. Detailed curriculum for preschool program

<i>Curricular areas</i>	<i>Hours</i>	<i>Topics covered</i>
Didactic	19:15	
The first dental visit	1:00	<ul style="list-style-type: none"> • child development – psychological and social qualities of oral health practitioners • structure of a successful dental consultation • examination diagnosis treatment planning (EDTP) procedure for a preschool child • well-baby examination.
Relationship building with the pre-school child	1:30	<ul style="list-style-type: none"> • developmental perspectives • behavioural issues • management strategies.
Deciduous dentition- eruption pattern and importance	1:00	<ul style="list-style-type: none"> • the importance and morphology of the deciduous dentition • development and eruption patterns of the deciduous and permanent teeth including delayed exfoliation and eruption • the effect of premature loss of the deciduous teeth on occlusion.
Review visits post-dental general anaesthesia procedures	1:15	<ul style="list-style-type: none"> • reasons for having review visit/s post a dental general anesthesia procedure for a preschool child. • development of suitable strategies that can be implemented in a public/private sector dental service for controlling caries and caries relapse in preschool children.
Dental caries – pathogenesis, prevention and control	1:30	<ul style="list-style-type: none"> • identifying and quantifying early stage caries • implementing appropriate individualised remineralisation and restorative strategies.
Early childhood caries – advanced carious lesions	1:30	<ul style="list-style-type: none"> • restorative materials and techniques • pulp therapy, extraction and space management • behaviour management and case studies.
Pulp therapy	1:30	<ul style="list-style-type: none"> • the objective of pulp therapy • indications and contra-indications to pulp therapy • approaches to diagnosis and management • diagnosis of pulpal condition (clinical, radiographic, operative) • treatment procedures

Table 1. continued overleaf ...

Table 1. *continued ...*

<i>Curricular areas</i>	<i>Hours</i>	<i>Topics covered</i>
Non-pharmacological behaviour management	1:00	<ul style="list-style-type: none"> • indications and contraindications of the use of restraints • informed consent issues and decision-making with non-compliant children. Includes the paper: Feigal, 1995
The role of the dental assistant in supporting the clinician in paediatric dentistry	1:30	<ul style="list-style-type: none"> • what do dental assistants do and who are our patients? • skills required to be a paediatric dental assistant • treatment and communication with preschool children.
Oral pathology in children	1:30	<ul style="list-style-type: none"> • normal versus diseased oral tissue • management of oral pathology • referral processes.
Emergency and trauma	1:00	<ul style="list-style-type: none"> • epidemiology and aetiology • diagnosis, presentation, management, and treatment planning (for avulsions, fractures, intrusions, and subluxations).
Referrals process	1:00	<ul style="list-style-type: none"> • criteria for referral to specialist paediatric clinics and day surgery unit at local dental hospital • current situation – data, implications, costs • Day Surgery Unit Operations - the child's journey • radiography under general anaesthetic • optimal and suboptimal referrals • how to complete an optimal referral; referral processing • updated criteria for referral to specialist paediatric unit at Royal Dental Hospital Melbourne • the lap to lap exam • enablers.
Stainless steel crowns (SSCs)	4:00	<ul style="list-style-type: none"> • indications and contraindications for stainless steel crowns (SSCs) • technique of preparing the deciduous tooth to receive an SSC • tips on successful insertion of SSCs • complications associated with placement of SSCs.
Workshops (interactive)	10:30	
Live workshop with 2 preschoolers	0:15	Interactive workshop focussing on behaviour management and communication and demonstrating lap-to-lap examination on preschool children.
Treatment planning: toothache, pulp therapy and dental anomalies	1:30	Discussion of case presentations of a range of dental conditions in preschool children, including early childhood caries, dental anomalies, and soft tissue pathology.
Early childhood caries treatment planning	1:30	Examination, consent, treatment planning, risk assessment, and types of sealants.
Relationship building with preschool children	1:30	Using the DVD “Don’t be afraid”. Includes an open forum and discussion about the DVD based on hypothetical clinical scenarios based on the DVD.
Preventive concepts for preschoolers	2:00	Interactive demonstrations of preventive dentistry; diet; dental examination; sealants and fluorides.
Oral health promotion	1:15	This covers the principles of health promotion; determinants of health; DHSV oral health promotion programs and finishes with a health promotion quiz.
Treatment planning for emergency and trauma	1:00	Discussion of epidemiology and aetiology, diagnosis, presentation, management, treatment, planning (for avulsions, fractures, intrusions and subluxations).
Stainless steel crowns	1:30	Participants practice placement of SSCs on plastic deciduous teeth in manikins in a simulation laboratory environment.
Clinical Observation	8:00	Conducted over one day with observation of paediatric dentist in private dental practice.
Clinical Practicum	16:00	Conducted over two days in participants’ own clinic supervised by paediatric dentist
Total	53:45	

treatment to preschool children in their local dental clinic with support from a paediatric dentist (two days). The program involved some after-hours preparation by the participants. The didactic, interactive, and reflective workshop activities were delivered and facilitated by paediatric dentists currently working in both private and public clinics in Victoria, as well as lecturers from the Melbourne Dental School, the University of Melbourne. Handouts were provided to all participants. One of the strengths of the program was the delivery of interactive workshops, examples of which are detailed below.

The workshop on prevention for preschool children (two hours) included a session which contained demonstrations. The topics covered were oral examination of the infant and toddler as well as oral hygiene techniques; fluoride varnish application; fissure sealant placement; and dietary counselling. During the mid-way break, there were displays of relevant products by trade representatives, who also participated in the application session. Participants were divided into four groups and assigned to demonstrations which were stationed around the lecture room. The groups then rotated, spending approximately ten minutes per station, allowing each participant to practice the actual procedures under guidance. In conducting the oral examination, participants were shown how to examine the infant using a life-size baby doll placed by the 'mother' (role played by one of the participants) in a beanbag located in a dental chair. Examining toddlers was also demonstrated in the standing position with a life-sized doll standing against the clinician's knees, and also in a lap-to-lap position lying on the knees of the 'mother' and clinician. Participants were shown how to conduct a brief clinical examination and how to teach oral hygiene. The 'mother' could then practice the brushing and flossing for her infant in these positions.

Fluoride varnish application was shown at a second station on life-size models of the primary dentition, with each participant practicing the correct amount of varnish to deliver and suitable delivery techniques for the different tooth surfaces. The placement of glass-ionomer-cement as a fissure sealant was demonstrated at a third station, and participants all practiced placing a sealant on a primary tooth model. Diet counselling involved the participants study a sample diet diary for a four-year-old child, consuming foods and drinks common to the area. The diet was examined first for its nutritional adequacy with reference to the National Health and Medical Research Council (NHMRC, 2003) dietary guidelines for this age group, then with reference to its possible contribution to the child's dental problem. Hypothetical situations of extensive dental caries and erosion were discussed, and feasible dietary recommendations were developed in conjunction with the 'mother'.

A lecture entitled "Relationship Building with the Preschool Child" was immediately followed by a workshop on relationship building. The first part of the workshop was the screening of a DVD entitled "Don't be afraid" (DHSV, 2008) about the appropriate clinical way to deal with preschool children in a dental setting. The second part was an open forum and discussion about the DVD based on hypothetical clinical scenarios of challenging cases. The participants were divided into smaller groups of 8-10 and given a clinical case with medical and social

history and a behavioural challenge of a preschool child. The group then formulated a treatment plan and behaviour management strategy to manage the case in light of the previous lecture and the DVD. A nominated spokesperson from each group presented their case and management plan to the others (~25 minutes planning, five 10 minute presentation, and up to 15 minutes discussion).

The pre-clinical component included participants practicing the placement of stainless steel crowns (SSCs) on plastic deciduous molars in a simulation laboratory environment. The clinical observation component involved teams observing a paediatric dentist providing treatment to preschool children within a private paediatric dentistry practice. This provided opportunities for interactive, reflective, small group (one team at a time) discussions and enabled application of new knowledge to their own practice. It enabled participants to observe the communication and treatment planning approaches used by specialists in this field in the management of preschool children.

The clinical practicum component provided an opportunity for each dental team to provide dental services to preschool children with specialist paediatric dentist support delivered at participants' local clinics (two days). This provided further opportunities for interactive, reflective, small group (one – three teams at a time) discussions and enabled application of new knowledge and skills to their own clinical environment. Each community health centre was responsible for booking appropriate preschool-aged patients at their clinic for the clinical practicum for each team in the program. Appointments included examination, treatment planning, diet analysis, and treatment, including restorations. Six-eight preschool patients were seen by each participating team per clinical practicum day. Participating teams were encouraged to appoint challenging patients to fully utilise this learning opportunity.

The evaluation of the educational program involved process and impact evaluation. Process evaluation of the educational program was undertaken immediately after each day to identify any issues and strengths of the program. Questions included how relevant and easy to understand the presentations were, as well as the usefulness of the clinical observation and clinical practicum sessions. The process evaluation was measured using a Likert scale from: 1, strongly disagree, to, 6, strongly agree.

The impact evaluation included a pre-course questionnaire assessing the participants' skills, knowledge, and confidence before commencing the course; and a post-course questionnaire covering the same topics implemented immediately upon completion of the course and again at three months post-completion. The areas measured were confidence and knowledge of dental clinicians with preschool children in the following areas: developing a rapport, undertaking comprehensive examinations, identification of treatment needs, developing comprehensive treatment plans, providing simple restorations, providing more complex treatment, and referring for management. This data was measured using a scale of confidence: 5, extremely confident; 4, confident; 3, somewhat confident; 2, not at all confident; and, 1, unsure. For knowledge the scale was: 5, very high; 4, high; 3, good; 2, not so good; and 1, none at all.

Results

The eight-day educational program regarding preschool children was delivered in both 2011 and 2012 and overall was attended by 22 dentists, 12 dental therapists and two oral health therapists from metropolitan, regional and rural clinics. The process evaluation of the educational program consistently received high scores indicating that the program met the participants' expectations and that the speakers were knowledgeable and presented well. The feedback for the didactic training was positive, the only notable comment being that the lectures could include administering local anaesthetic to preschool children and prescribing antibiotics for preschool children. Participants were positive about the clinical observation and practice components; identifying that the specialist dentists delivering these sessions were knowledgeable and approachable, answering any questions those participants had. It was also noted that the information provided (fact sheets, videos, manual) was extremely important to participants.

Before starting the course, more than 75% of clinicians were involved in undertaking at their local clinics: comprehensive examinations, restorations, treatment plans, pulpotomies, and extractions for preschool aged children. Fewer participants provided SSCs, orthodontic procedures, and pulpotomies; however, the percentage involved in these three procedures did increase markedly immediately after completion and at three months post-completion of this course (Figure 1). Following comple-

tion of the educational program, dentists' and therapists' self-reported level of knowledge increased across the range of procedures in preschool children (Figure 2). Pre-course, most participants felt they had low levels of knowledge ranging from a mean of 2.5-3.0 (not so good to good). Immediately after the program, these levels increased to 3.5-4.2 (good to high) and were sustained at three months post-course (Figure 2).

Similarly, mean self-assessed confidence levels pre-course for dental clinicians was between 2.6-3.7 (not at all to somewhat confident) with the least confidence in providing complex dental treatment in young children (mean 2.5, not at all confident, Figure 3). Post-course, the reported confidence levels increased to means above four (confident to extremely confident) except for more complex dental treatment (mean 3.8, somewhat confident to confident) and remained at those levels for three months post-course.

Discussion

Children are recognised by the NOHP 2004-13 as a priority group to focus on for the delivery of appropriate and timely oral care services, including reducing the level of oral disease in this population. The aim of this study was to develop, implement and evaluate an educational program that was tailored to increase the confidence of dental clinicians in treating preschool children.

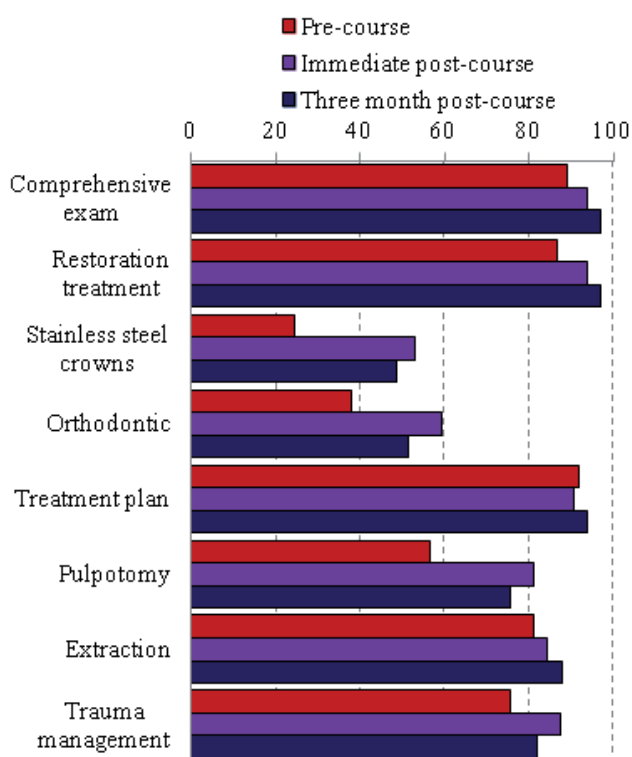


Figure 1. Percentage of dental clinicians providing dental services to preschool children before undertaking the course, immediately after completion of the course and three months later

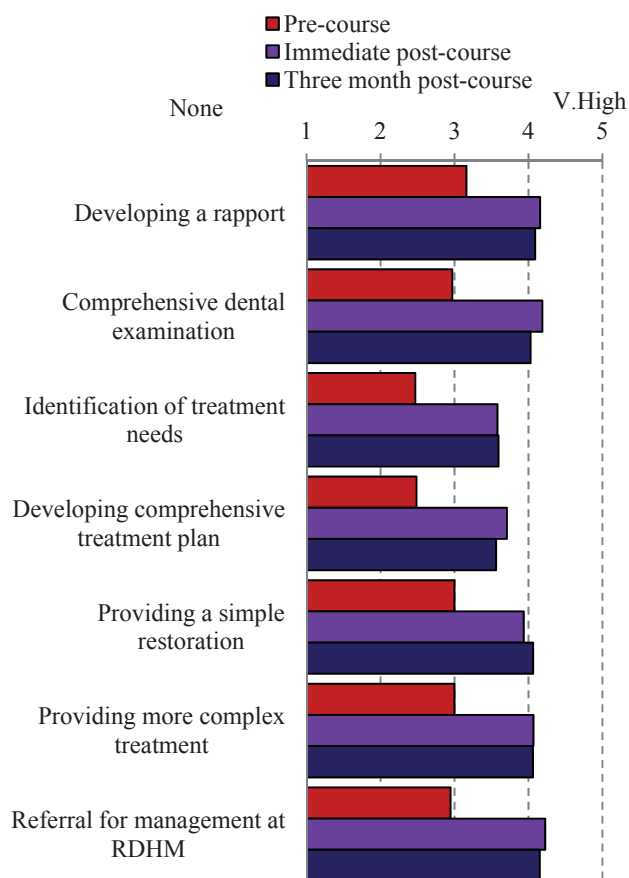


Figure 2. Mean self-rated knowledge of dental clinicians on a range of dental procedures in preschool children before undertaking the course, immediately after completion of the course and three months later

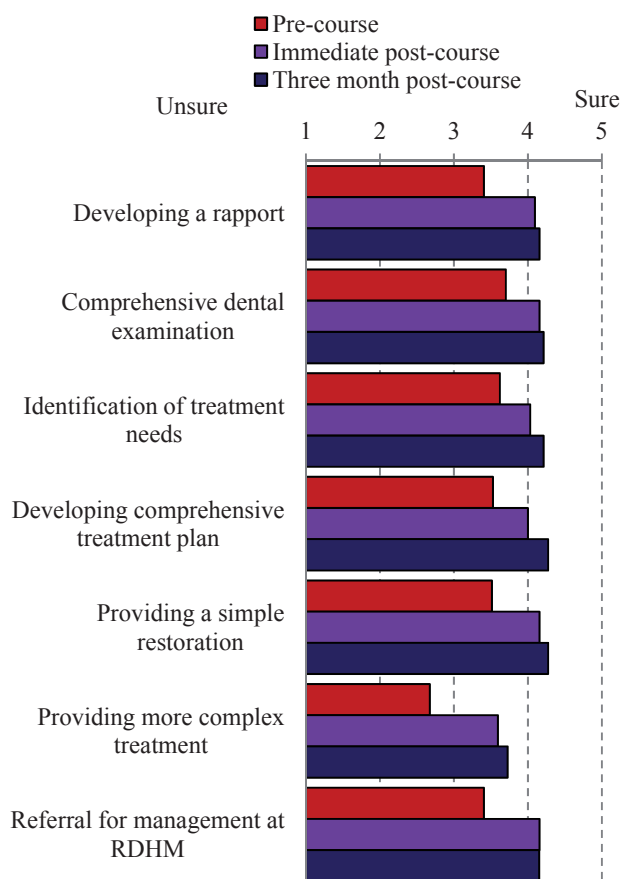


Figure 3. Reported mean confidence of dental clinicians in dental procedures with preschool children before undertaking the course, immediately after completion of the course and three months later

The eight-day interactive training program that was developed as part of this project resulted in an increased knowledge and confidence of the dental teams in treating preschool children. Knowledge increased from baseline (pre-course), which was often a mean of 2.0-3.0 (not so good to good) and increased to a mean value of 3.5-4.2 (good to very good). Confidence also increased between baseline and three months after the training. Mean confidence values increased to four after the course indicating that the training could be modified in the future to address any perceived gaps, possibly by including more clinical time, and increased opportunities to ask questions.

There is growing recognition of the importance of providing support and treatment in preschool children. However, many preschool children are not seen by dentists, and dental clinicians often have little training or confidence in working with very young children. This program addresses this gap in skill level among dental clinicians within the public sector. Through delivery of this program it is anticipated that clinicians will be more confident to see preschool children and provide them with more timely and appropriate care with a reduction in general anaesthesia for dental procedures in these children. The evaluation by participants was very positive and participants felt they increased their knowledge and confidence in providing oral care to preschool children. Whilst there were increases in confidence from pre-course to post-course, more can be done to increase the confidence levels. Ideally, the educational program would lead to very

high levels of confidence and knowledge. The evaluation results may be lower because it is self-evaluation and participants that are new to this area may feel they are less knowledgeable than they actually are. One possible strategy to address this is to build in an assessment component (written and/or viva voce examination) to confirm participants' level of knowledge and confidence on completion of the course. Another strategy to focus on in future educational programs would be to include more varied practical sessions (observations and clinical practicum) to ensure that the participants see and treat a wide range of conditions affecting preschool children. Participants considered these components to be very valuable. Only a quarter of clinicians were undertaking SSCs (complex restorations) in preschool children. This result is not unusual as there is a tendency for clinicians across the world to be reluctant to place conventional SSCs in the dental chair for preschool children (Innes *et al.*, 2011). Nevertheless, this program raised the confidence level in this area with about half of clinicians undertaking this procedure post-course. Recommendations to further enhance the outcomes of this educational program include incorporation of more practical sessions, questions and answer sessions, and written and oral assessment of participants on completion of the course.

Conclusions

The educational program developed and implemented has met its objective of increasing the knowledge and confidence levels of practicing public dental clinicians in the management of preschool children. Strategies to further enhance the outcomes of this educational program have been proposed.

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