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Occupational Therapists' Perceptions on The Training Needed for Children with Upper Limb Prosthesis

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ABSTRACT

The aim of this study was to develop and conduct content validation through expert panel discussion to develop a home-based self-care training module for children who fitted with a 3D printed hand prosthesis. A three-round Delphi technique was implemented. Round one involved 1) a literature search, and 2) a review of an existing user manual, and experiences of 12 occupational therapists specializing in pediatrics and orthopedic was obtained by rating the proposed components using a Likert scale from a range of 1 to 5 in round two of the study. An analysis of consensus, stability, and agreement was then performed according to the characteristics of relevance, clarity, simplicity and sufficiency in round three by 12 occupational therapists from each state in Peninsular Malaysia. Fleiss kappa statistical test was used to measured strength of agreement. All 12 experts completed and returned the survey where consensus was attained with a mean score of > 4 or 80% agreement. The strength of agreement obtained for each of the dimensions was almost perfect (κ= 1). Following the final round of the survey, a total of three phases, four steps, and 21 activities and items were finalized as the main components in the home-based self-care training module. The Delphi methodology allowing a strong consensus obtained on the key domains for a home-based self-care training module for children who fitted with a 3D printed hand prosthesis.

INTRODUCTION

The Center for Disease Control and Prevention (CDC) 2014 estimates that approximately 1,500 to 4,500 children in the United States suffer from upper limb reduction deficiency (ULRD) each year with 59% of all deficiencies in newborns affecting the upper limb. Limb loss in pediatric patients may result from congenital or acquired amputation that will cause physical and economic challenges for both children affected by this condition and their families. In addition, the prosthetic requirements and needs for children are slightly complicated because they are constantly growing and fitting a prosthetic must not hinder their social developments too.

Myoelectric prostheses are usually fitted to children who may have congenital or acquired amputations in order to promote bilateral function, make up for lost body structure, achieve body balance, and prevent compensatory overloading in the opposite arm. In the fitting process, both the prosthetist and the therapist create a custom-made prosthesis and train the patient in the manipulation and use of the prosthesis (Widehammar et al., 2021). Users of prostheses, especially the electrically-powered ones, often find it difficult to control and not up to their early expectation thus leading to frustration (Dromerick et al., 2008). Training is a crucial element for the development of the ability to operate and use myoelectric prostheses in everyday life (Soyer et al., 2016; Huinink et al., 2016). Research demonstrates the pressing need of a specific training module for these patients, without which prosthesis failure and limited use of advanced functions will remain a

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problem (Resnik et al., 2012). Some studies suggested that the reason behind this issue may be due to in insufficient training (Resnik et al., 2012; Østlie et al., 2012). Also, the abandonment in the use of a prosthesis due to dissatisfaction with its intended function is a commonly reported problem (Biddiss & Chau, 2007; Smail et al., 2021; Engdahl et al., 2015). Therefore, it is extremely important for the patients to be trained to use prostheses within the context of their everyday activities.

Upper limb prostheses rehabilitation is one of the major rehabilitative goals to improve performance in daily living, facilitating therapy for functional enhancement, and enhancing social interaction in children (Karim & Ming, 2020). Clinical researchers strongly suggest that a children's rehabilitative program should not be a duplicate of adult's program as both have different requirements and needs that must be tailor-made for optimal usage of the prostheses. On the other hand, early intervention programs and family support are equally important where an optimal upper extremity prosthetic training program should be established to enhance performance in children (Lukaszek et al., 2022). In line with the rehabilitative goal, the main goal of occupational therapy is to help children obtain age-appropriate independence and able to engage in activities they find joy in and don't feel left out. Enhancing functional ability is a key component of prosthesis users' rehabilitation process by relearning activities of daily living (Parr et al., 2022). Children with upper limb deficiency should be able to use both hands when performing activities of daily living (ADLs) with the prosthetic hand.

Thus, the main aim of this research is to develop a home-based self-care training module for children with upper limb deficiency using expert judgement based on Delphi process. The study is divided into two stages which are the development of the module which is then validated using the content validation concept.

MATERIALS AND METHOD

Study Design

A Delphi technique is the method applied in this research to develop the home-based training module based on the experts' perspectives among occupational therapists and validate the content by obtaining the judgment of a panel of independent experts on this specific issue, on which there is insufficient knowledge and research evidence to provide guidance on practice (Keeney et al., 2011; Ab Latif et al., 2016). Ethical approval was approved by The National Medical Research Register Committee, with a study code of NMRR-19-4219-51664. Twelve experienced occupational therapists form the working group where they are experts in their respective domains. Experts were recruited based on their working experience and credentials in the service in pediatric and orthopedic. The study participants responded to a series of questionnaires shared in minimum three iterations for (i) the opinions of expert occupational therapists specializing in pediatric and orthopedic and (ii) consensus on the key self-care training components for children with upper-limb prostheses. The first round involved the following research question: "What should be included in the home-based self-care training module to guide children fitted with upper-limb prostheses?". An open-ended questions and ad hoc Delphi questionnaires were employed during the relevant Delphi group meetings to address the research question. The initial data was then assessed to develop a second questionnaire. The study participants began to classify essential components in the second Delphi round according to rank for consensus development and outcome-sharing among the individuals in the third round. Next, the participants were required to re-evaluate their personal judgments in the third round and further clarify both the information and initial judgments regarding the relative importance of the items. After the participants completed all three rounds were given a copy of the latest draft of the module along with the evaluation form of each of the items in the module, which were divided according to the characteristics of sufficiency, relevance, clarity and simplicity. They then completed an evaluation, which enabled them to respond to the purpose of the questionnaire, rate the final draft, provide feedback and make recommendations about what would be important to include in such a module.

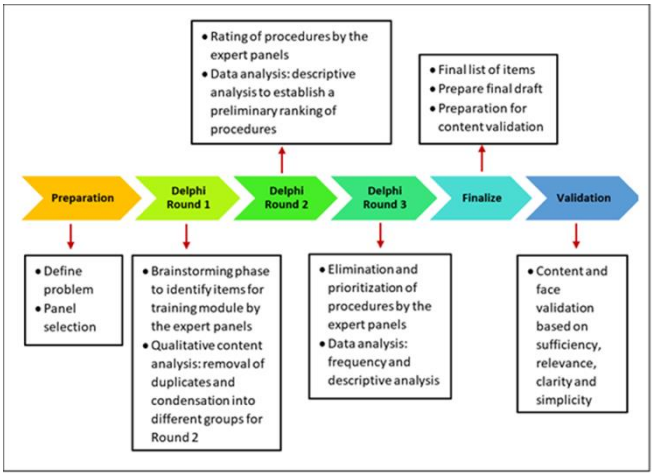

Fig. 1 Stages for development and content validation of the home-based self-care training module for children who fitted with 3D printed hand prosthesis.

Expert Panel Selection

The Delphi approach in this study utilized purposive sampling for sample selection in line with four criteria: 1) certified occupational therapist, 2) over three years of service in pediatrics or orthopedic, 3) valid credentials and 4) knowledgeability and experience in the study area. According to Dalkey (Dalkey & Helmer, 1963), it is deemed adequate to engage more than 10 expert panels in Delphi-oriented research for robust outcomes. Ziglio (Ziglio, 1966) suggested that a satisfactory outcome can be attained even with small number of panels in the range of 10-15 people. In this study context, 12 experts were initially contacted for participation in consensus development and all the participants duly agreed to participate. The project goals and processes were subsequently explained before obtaining participants' consent. The inclusion criterion involved expert occupational therapists with over three years of specialization in pediatric and orthopedic. Notably, patients were excluded as panel experts given that the study goal aimed to develop a training module parallel to rehabilitation procedures and medical advice.

Delphi Round 1

The brainstorming stage is the first round of the Delphi procedure which initiated with a group meeting where all 12 expert panels were given the draft document including the research objectives and particular guidelines for members'

involvement. This first round is to gather engagement and cooperation by asking an open-ended inquiry to produce thoughts or assertions from which the consensus process could begin. The question has to be specifically and concretely stated. In this round, the intention was to investigate if any similar research to produce a module of this kind had been conducted before, and to do so, an extensive literature review was done by using keywords of relevance to module development such as children, hand, prosthesis, training and home-based. The literature search was limited to those conducted from 2015-2020 only so that the previous researches have relative importance to the proposed approach and not outdated and the language was set to English only. This makes sure that crucial techniques and strategies that have been shown to work are covered. As part of the brainstorming process, the panel may then add to this list. The facilitator (researcher) also asked the experts to recommend an idea based on the database search, exiting user manual, personal opinions and experiences, clinical practices, or previous research. The returns of the Round 1 responses were qualitatively assessed, organized, and categorized. Items that do not meet the purpose of the study are discarded, along with duplicates. The remainder are combined together or divided into categories (for example phase, step, activity). In order to send back the survey draft in the following round, the items are organized in a clear manner. The questionnaire had a two-week deadline for all the experts to complete and submit it.

Delphi Round 2

In this round, the panellists are required to study the list of items that were summarized in accordance with the responses given in the first round of the Delphi process and rate them in order to generate a preliminary prioritizing in the second round. The expert panels are required to review the items and rank-order them based on their overall opinion of each item using a five-point Likert scale (1 = unimportant, 2 = less important, 3 = moderate important, 4 = important, and 5 = very important) to determine which items should be incorporated into the final home-based self-care training module. Notably, the participants could comment on each item or rating. As a result of this round, “areas of disagreement and agreement are identified”. Every item required 80% (10 experts) consensuses for statement acceptance to develop the final draft (Nashir et al., 2019; Wattanapisit et al., 2019; Ismail et al., 2020).

Excel software version 2010 was used to analyze the outcome of Delphi round 2 for descriptive statistics. Measure of central tendency such as median and mean as well as level of dispersion values such as standard deviation and inter-quartile range are usually used in research that implement Delphi procedure in order to critically analyze the information about respondents' collective assessments (Hasson et al., 2000). In this study, the overall score for every item was computed as a mean score with standard deviation (SD), median value and the inter quartile range (IQR) for the degree of importance and consensus. Items with a mean score of > 4 were deemed essential and subsequently retained (achieved consensus to retain) while counterparts with a mean score of < 4 were omitted (achieved consensus to delete). Once the median and inter-quartile range are determined, these items are classified depending on the consensus level and importance level. All the experts completed and returned the questionnaire in two weeks. The Delphi round 3 questionnaire was created from the round 2 data that had been examined and ranked by mean scores.

Delphi Round 3

The panellists get the chance to reassess their prioritizing from the previous round during this last round of the Delphi procedure. Survey draft was shared with the panellists consisting the list of items just like in the previous round but in this round, the items were listed in a sequence using their mean scores as well as standard deviations found in round 2, along with previous score. The expert panels were required to review the list and eliminate procedures that they think are not applicable for home-based self-care training module for children. Following this, they are then required to rearrange the remaining items based on priority in achieving a complete step-by-step training procedure. The objective of the third round is to reach mutual agreement among the panelists thus reducing the range of disagreements among them. The outcome of this round was examined and the median and interquartile range were computed. Finally, the findings were applied to the study indirectly answering the research questions.

After every Delphi round, the level of significance and consensus are justified before making a conclusion. Based on the median and interquartile range, the consensus data of the experts was analyzed before classifying them based on the consensus of each item (high, moderate or did not reach consensus) and its corresponding importance (very important, important, unimportant and very unimportant). A high consensus level is said to be in the range of 0 to 1.00 quartiles (IQR) while moderate IQR is in between 1.01 to 1.99 and no consensus if IQR is more than 2.00 and above. The importance level is very high if the median value was 4 and above and low if the median value is less than 3.5 (Ab Latif et al., 2016).

Validation Process

This stage's goal was to verify the items on the shortlist that were generated by the three-round Delphi procedure. Twelve occupational therapists (each from 12 state in Peninsular Malaysia) were invited to participate in the validation process. Each item of the shortlist was assessed for validity in terms of relevance, clarity, simplicity, and sufficiency of items, the rating utilized a four-point scale (Fernández et al., 2020) (1 and 2 indicated negative classification while 3 and 4 implied positive classifications) (Rocha et al., 2020) for each content validation. In the events of doubt in regard to the inputs, a face-to-face discussion was set up to provide an opportunity to the researcher to explain and answer/clear the doubt. The final version of the booklet containing the research questions was created when mutual agreement was reached among all 12 panelists on the legitimacy of each input and its assigned category.

Statistical Analysis

Questionnaires were used in the Delphi technique as a data collection tool. The DATAtab web-based statistics software and excel 2010 software were used for data analysis. The consequences of the Delphi round of the review were analyzed by utilizing middle and interquartile range (IQR) (Giannarou & Zervas, 2014; Ab Latif et al., 2017) This study uses the IQR values to determine the consensus level of the expert panels whether it is high (IQR 0 to 1.00), moderate (IQR 1.01 to 1.99) or no agreement (IQR > 2.00) while the median indicates the dimension of understanding where a median of 4 to 5 indicates high agreement, 2.01 to 3.99 suggests moderate agreement while anything less than that points to no agreement (Hasson et al., 2000; Peck & Olsen, 2015).

In addition, this study also performs the Pearson correlation statistical test, also known as Pearson’s r, to analyze the

statistical significance of the final outcome. This test basically measures the linear relationship between the Delphi rounds based on the outcome of the panels' consensus. As the Delphi technique consists of several rounds of inter-related questionnaires hence it is extremely important to determine the correlation between each of these rounds whether there is consistency in terms of the panels' consensus between each round. The test produces values ranging from -1 (negatively correlated), 0 (no correlation) and 1 (positive correlation). On top of that, Fleiss' kappa, the most suitable analytical statistic tool to evaluate the degree of agreement of three or more participants, is also used to measure the level of agreement among the panellists in this study (Falotico & Quatto, 2015; McHugh, 2012). Like the majority of correlation coefficients, this one also assumes a minimum value of 0 and a maximum value of 1.

RESULTS

Baseline Characteristic of Participants

Table 1 shows the professional backgrounds of the 12 Delphi panellists (six experts in pediatrics and six in orthopedic) from Hospital Tuanku Ja'afar Seremban who were invited to participate in the Delphi process. The experts were between 23 and 56 years old (mean = 34.4+7.8 years). Gender-wise, eight (66.7%) participants were females and all of them (100%) are specializing in pediatrics (Table 1).

Table 1. Expert codes and characteristics (n=12).

Expert code	Gender	Age (year)	Specialty
E1	Female	38	Pediatrics
E2	Male	54	Orthopedic
E3	Female	40	Orthopedic
E4	Female	41	Pediatrics
E5	Female	32	Pediatrics
E6	Male	30	Orthopedic
E7	Female	30	Orthopedic
E8	Male	34	Orthopedic
E9	Female	31	Pediatrics
E10	Female	28	Pediatrics
E11	Male	29	Orthopedic
E12	Female	26	Pediatrics

Delphi Round 1

All 12 panellists (100%) completed and return the survey. Five main components (education, control training, repetitive training, functional training, and daily activity training), four steps, and 29 activities and items (see Table 2) were identified in the brainstorming phase. Twenty-one duplicates were removed. The list then proceeded to Delphi round 2.

Delphi Round 2

The response rate in round 2 was 100% (12/12). The top three most important phases were (I) functional training (95% 4.75+0.45), (II) education (93% 4.67+0.49) and (III) control training (92% 4.58+0.51). Table 3 indicates that all the IQR of the items was less or equal to 0.5 (IQR < 0.5) thus indicating high level of consensus was reached. Those items that achieved consensus (all 12 experts conceded the components to be essential) were retained. After round 2 voting, expert panels reached consensus on three phases, four steps and 21 activities and items. The experts also conceded to incorporate two of the phases (repetitive training and daily activity training) into the retained counterparts. To reduce repetition, the two phases were integrated into a single statement that was approved for the final round. The revised statement consists "control and repetitive training"; "functional training in activities of daily living". Contrarily, eight items did not achieve the consensus after round 2. Table 3 illustrates the result of the Delphi method

Table 2 Ideas of Round 1 Phases, Movements, Activities and Equipment

Phase	*Step*	*Activities and item*
Education		Putting on and taking off prosthesis (donning and doffing) Caring for prosthesis Understanding the prosthesis component Safety while using prosthesis Control opening and closing off Schedule wearing of prosthesis
Control training	Grasp and release various sizes	Ball Bottle Wooden cube Marble ball Plastic cloth clip Dice
Repetitive training	Grasp and release various planes	Stack plastic cups Place soft ball in a basket Place marble ball in a bottle Stack wooden cubes Pinch plastic cloth clip Stack die
Functional training	Unilateral Activities	Drink a glass of water Eat grapes or snacks Brush teeth Comb hair
Daily activity training	Bilateral Activities	Brush teeth Wipe face Wear shirts Wear pants Wear socks Eat with spoon and fork Wear spectacles

Delphi Round 3

ound 3 achieved 100% response rate too (12/12) where this round was utilized to make decisions about items from the previous round. Additionally, it was employed to produce additional items when a different thought emerged. In round 3, three phases, four steps and 21 activities and items reached consensus after discussion and were accepted into the final module document. Two of five phases were reduced into three

phases because of redundancy. The expert panels felt these two combinations would serve to help the parent and children more understand the instruction. In total, three phases, four steps and 21 activities and items were accepted into the final module document (see Table 4).

After completing round 3, a Pearson correlation statistical test was conducted to analyse if there was any correlation between the 2nd and 3rd round. The outcome of the Pearson correlation revealed a significant relationship between 2nd and 3rd round, $r(36) = 1$, $p = <.001$(Figure 2). There is a very high, positive correlation between the variables 2nd and 3rd with $r = 1$. Null hypothesis which stated that there is no association between 2nd and 3rd round is rejected.

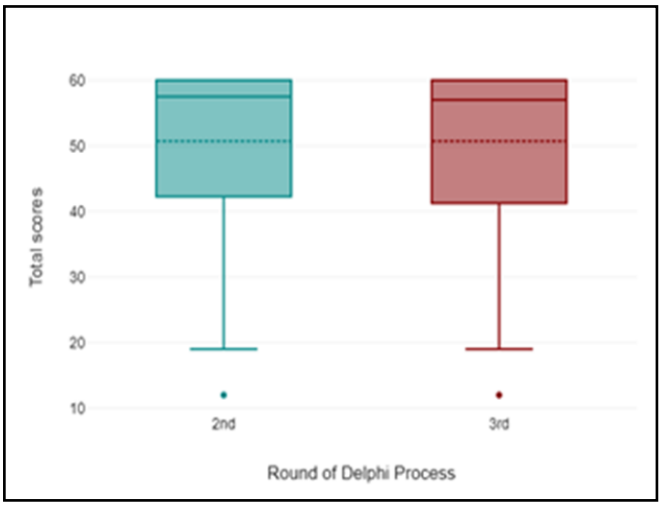

Fig. 2 Result on the strength of the relationship correlation between 2nd and 3rd round Delphi.

Content Validation by Expert Panels Judgment

An online discussion meeting was conducted to validate the final module document with an emailed validation sheet (content as well as face validity). In the content of training module evaluation, the level of agreement of each dimension was considered in the calculations of Fleiss' kappa. The characteristics of the content in training module regarding the indicators of relevance, clarity, simplicity and sufficiency were assessed using the Likert scale. An interrater reliability analysis was performed between the dependent samples of 12 occupational therapists. The Fleiss Kappa showed that there was an almost perfect agreement between the samples of the 12 occupational therapists in relation to the final consensus with $\kappa = 1$. A strength of agreement "almost perfect" was found in all items ($\kappa = 1$) based on the degree of overall agreement among the occupational therapists. The final module, including all phases, steps, activities and items with pictures, were agreed upon and unanimously accepted by the group.

DISCUSSION

This study aimed to develop a home-based self-care training module for children who fitted with 3D printed upper-limb prostheses. The panels conceded to retain three phases, four steps, and 21 activities and items post-round 3. The final list addressed the key steps of education, control and functional training following the Management of Upper Extremity Amputation Rehabilitation Working Group (UEAR). Perhaps, the three phases of training appear to be well-established in the literature and are mentioned in the majority of the sources referred to in this study1. Most of the training activities could be performed in home settings with common tools, such as spoons, cups, toothbrushes, and attires. Interestingly, all (100% consensus) the expert panels agreed to retain both step 3 (unilateral ADL training) and 4 (bilateral ADL training) and all the items under both steps that were initially recommended by the project team.

Meanwhile, the experts conceded to omit two steps that did not achieve consensus following the second Delphi round. For example, the "repetitive" and "activities of daily living" steps were omitted post-round 2 as both steps did not achieve the cut-off levels of agreement concerning its pertinence. The two phases were combined into a single statement to reduce redundancy and as all the training activities required repetitive movements in daily living, the aforementioned steps were suggested to be integrated with other retained counterparts following expert suggestions. Similarly, eight items did not achieve consensus while specific items were not practical for training purposes ("grasp and release plastic cloth clip" and "pinch plastic cloth clip") as they are more important basic training activities and items for children, thus justifying the omission.

This novel training module for children upper-limb prosthetic users implied two primary differences compared to Ottobock and iLimb (Touch Bionic). First, the users mainly involved children between 7 and 13 years old unlike two published manual (Ottobock and iLimb) which was designed for adults primarily. Second, the current training module only emphasized on basic activities of daily living (BADL) or personal activities of daily living that include eating, drinking, personal hygiene, grooming and dressing. The manual that has been published focuses more on Instrumental activities of daily living (IADL) that demanded cognitive abilities that are more complicated than BADL. IADL include things like cooking, cleaning, doing laundry, using computer, taking public transportation, and driving.

As the title of the study suggests, this training module was focused on occupational therapists' perspectives hence we did not include children/family feedback on the training module. Nonetheless, all active activities, however, were created to be as enjoyable and functionally effective as possible. The goal of the expert group was to create exercises that could be done at home with equipment that is easily accessible (e.g., cups, balls, spoon, and bottle). Since there are also occupational therapists in health clinics, future works include incorporating them into this study in order to collect more extensive and diverse information.

As this manual was primarily structured for children with functional upper-limb prostheses to execute basic activities, the components might not be relevant to counterparts with non-functional upper-limb and cosmetic prostheses. In the future, if there is a need to produce training modules for children or adults who use cosmetic prosthetic hands, then the use of Delphi techniques may be used in the future.

Table 3 Data Analysis for the Round Two and Round Three of Delphi Process (Agreement among experts in both rounds)

No.	Dimensions	Statements	Round	Median (IQR)	% mean±SD	Agreement	Result
1.	Phases	Education	2nd	5(1)	93% 4.67±0.49	High	Retained
			3rd	5(0.5)	95% 4.75±0.45	High	
2.		Control training	2nd	5(1)	92% 4.58±0.51	High	Retained
			3rd	5(0.5)	95% 4.75±0.45	High	
3.		Repetitive training	2nd	3(1)	65% 3.25±0.62	Moderate	Dropped (combine)
			3rd	3(1)	65% 3.25±0.62	Moderate	
4.		Functional training	2nd	5(0.5)	95% 4.75±0.45	High	Retained
			3rd	5(0)	97% 4.83±0.39	High	
5.		Daily activity training	2nd	3(0)	60% 3.00±0.74	Moderate	Dropped (combine)
			3rd	3(0)	60% 3.00±0.74	Moderate	
6.	Steps	Grasp and release various sizes	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
7.		Grasp and release various planes	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
8.		Unilateral Activities	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
9.		Bilateral Activities	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
10		Putting on and taking off	2nd	5(0)	100% 5.00±0.00	High	Retained

		prosthesis (donning and doffing)	3rd	5(0)	100% 5.00±0.00	High	
11.		Caring for prosthesis	2nd	4(1)	87% 4.33±0.65	High	Retained
			3rd	5(1)	92% 4.58±0.51	High	
12.		Understanding the prosthesis component	2nd	3(0)	60% 3.00±0.74	Moderate	Dropped
			3rd	3(0)	60% 3.00±0.74	Moderate	
13.		Safety while using prosthesis	2nd	3(0)	60% 3.00±0.74	Moderate	Dropped
			3rd	3(0)	60% 3.00±0.74	Moderate	
14.		Control opening and closing off	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
15.	**Activities and items**	Schedule wearing of prosthesis	2nd	4(1)	88% 4.42±0.51	High	Retained
			3rd	5(1)	92% 4.58±0.51	High	
16.		Ball	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
17.		Bottle	2nd	4(1)	88% 4.42±0.51	High	Retained
			3rd	5(1)	92% 4.58±0.51	High	
18.		Wooden cube	2nd	5(1)	92% 4.58±0.51	High	Retained
			3rd	5(1)	92% 4.58±0.51	High	
19.		Marble ball	2nd	4.5(1)	90% 4.50±0.52	High	Retained
			3rd	5(1)	92% 4.58±0.51	High	
20.		Plastic cloth clip	2nd	3(0)	60% 3.00±0.74	Moderate	Dropped
			3rd	3(0)	60% 3.00±0.74	Moderate	

21.		Dice	2nd	3(1)	62% 3.08±0.90	Moderate	Dropped
			3rd	3(1)	62% 3.08±0.90	Moderate	
22.		Stack plastic cups	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
23.		Place soft ball in a basket	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
24.		Place marble ball in a bottle	2nd	4(1)	87% 4.33±0.65	High	Retained
			3rd	5(1)	92% 4.58±0.51	High	
25.		Stack wooden cubes	2nd	4(1)	88% 4.42±0.51	High	Retained
			3rd	4.5(1)	90% 4.50±0.52	High	
26.		Pinch plastic cloth clip	2nd	2(1)	43% 2.17±0.72	No agreement	Dropped
			3rd	2(1)	43% 2.17±0.72	No agreement	
27.		Stack die	2nd	2(1)	33% 1.67±0.65	No agreement	Dropped
			3rd	2(1)	33% 1.67±0.65	No agreement	
28.		Drink a glass of water	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
29.		Eat grapes or snacks	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
30.		Brush teeth	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
31.		Comb hair	2nd	5(0)	100% 5.00±0.00	High	Retained

			3rd	5(0)	100% 5.00±0.00	High	
32.		Brush teeth	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
33.		Wipe face	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
34.		Wear shirts	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
35.		Wear pants	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
36.		Wear socks	2nd	1(1)	32% 1.58±0.79	No agreement	Dropped
			3rd	1(1)	32% 1.58±0.79	No agreement	
37.		Eat with spoon and fork	2nd	5(0)	100% 5.00±0.00	High	Retained
			3rd	5(0)	100% 5.00±0.00	High	
38.		Wear spectacles	2nd	1(0)	20% 1.00+0.00	No agreement	Dropped
			3rd	1(0)	20% 1.00+0.00	No agreement	

Table 4 Final Result of Components, Steps, and Items

Phases, Steps, Activities and Items		**% Agreement Level**	**Mean**	**SD**
Phase 1: Education		**95**	4.75	0.45
	Putting on and taking off the prosthesis (donning and doffing)	100	5.00	0.00
	Caring for the prosthesis	91.67	4.58	0.51
	Control opening and closing of prosthesis	100	5.00	0.00
	Schedule wearing of prosthesis	91.67	4.58	0.51
Phase 2: Control and Repetitive Training		**95**	4.75	0.45

Step: 1	**Grasp and release various sizes**	**100**	5.00	0.00
	Ball	100.00	5.00	0.00
	Bottle	91.67	4.58	0.51
	Wooden cube	91.67	4.58	0.51
	Marble ball	91.67	4.58	0.51
Step: 2	**Grasp and release various planes**	**100**	5.00	0.00
	Stacking plastic cups	100.00	5.00	0.00
	Place soft ball in a basket	100.00	5.00	0.00
	Place marble ball in a bottle	91.67	4.58	0.51
	Stacking wooden cubes	90.00	4.50	0.52
Phase 3: Functional Training in Activities of Daily Living		**96.76**	4.83	0.39
Step: 3	**Unilateral activities**	**100**	5.00	0.00
	Drink a glass of water	100	5.00	0.00
	Eating grapes or snacks	100	5.00	0.00
	Brush teeth	100	5.00	0.00
	Comb hair	100	5.00	0.00
Step: 4	**Bilateral activities**	**100**	5.00	0.00
	Brush teeth	100	5.00	0.00
	Wipe face	100	5.00	0.00
	Wear shirts	100	5.00	0.00
	Wear pants	100	5.00	0.00
	Eat with spoon and fork	100	5.00	0.00

CONCLUSION

This study developed a home-based self-care training module for children who fitted with 3D printed hand prosthesis through a literature review and published manual, expert panel brainstorming meeting, content validation by the expert panels. Following the use of the Delphi technique, content validation allowed for expert consensus on all phases, steps, activities and items in the training module. This module predictably will result in significant improvements in gross and fine motor dexterity, bimanual coordination, and functional activities in self-care during the home-based training. This training module is believed to be able to aid the children fitted with the prostheses in daily practice and could also facilitate in clinical practices and parents in upper-limb prosthetic rehabilitation for children with amputation.

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