# Innovative Health Education Resources on Hand Hygiene for Arabic-Speaking Students with Blindness

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#### Abstract

Background: Students with blindness rely on their hands to discover their surroundings, which increases their risk of infection. Consequently, maintaining proper hand hygiene is essential in preventing the spread of those infections. Thus, this study aimed to design innovative health education resources on hand hygiene for Arabic-speaking students with blindness. A phenomenological approach and expert consensus (Delphi method) were employed at Alnour School in Mansoura City; 39 students with blindness were selected conveniently, while 15 experts were purposefully recruited. A tool constructed from six parts, three in simple Arabic, was conveyed with interviews to collect data from students with blindness; the other three parts were self-administered in English to collect data from the expert panelists. Findings reveal that most students with blindness expressed a strong interest in learning about the definition, importance, key times, and steps of hand hygiene. Expert panelists recommended that the designed health education resources (braille-typed booklet, audio booklet, and 3-D maquette) suit all aspects of the physical characteristics of students with blindness. The study concludes that both the students with blindness and expert panelists strongly agreed on all domains of the designed health education resources on hand hygiene. The researchers recommend adopting as well as disseminating the designed innovative health education resources in school libraries and homes nationwide to enhance hand hygiene awareness among students with blindness.

Keywords: community health nursing, health education resources, hand hygiene, students with blindness

#### Introduction

#### Innovative Health Education Resources on Hand Hygiene for Arabic-Speaking Students with Blindness

Disability is a fundamental aspect of the human experience and a component of being human. It is caused by the interaction between health conditions such as blindness, dementia, spinal cord injury and environmental and personal factors. There are many types of disabilities (intellectual disabilities, chronic illnesses, mental health disabilities, vision disabilities, and hearing disabilities) that limit or more major life activities. one Approximately 1.3 billion people, or 16% of the world's population, are currently living with a significant disability (Thurber & Bandy, 2018; World Health Organization [WHO], 2023).

A visual impairment is a visual disability in vision that has a negative impact on a student's educational performance. The term includes both blindness and partial sight. Blindness refers to the prohibition of vision as a channel of learning, regardless of the adaptation of materials. Partial sight refers to the ability to use vision as a learning channel if educational materials are adapted. (Idaho State Department of Education, 2022).

Worldwide, childhood blindness (CHB) is a public health concern. Global estimates on CHB show that around 17.52 million and 1.42 million children are suffering from moderate to severe visual impairment and blindness, respectively (Bhor, Vinay, Ambildhok, & Shetty, 2021). Additionally, 61 million individuals (52.9 to 69.3 m) are predicted by 2050 to be blind (Bourne et al., 2021).

Effective hand hygiene is crucial for preventing the spread of infectious diseases, including coronavirus (COVID-19) (Batheja et

al., 2020; Feist, Updegraff, & Brannon, 2018); however, proper hand hygiene techniques are not universally practiced. Health education plays a vital role in promoting preventive behaviors and mitigating the spread of pandemics. Early childhood health education is particularly effective in instilling these behaviors and infection reducing risks (Yamamura, Tsutsui, & Ohtake, 2023). The early school years are considered a critical period for establishing hand hygiene habits (Cevizci et al., 2015).

Fortunately, people with visual impairments might benefit from stepwise, simple, and tactile-based to replace visual-based instructions Therefore. multi-sensory а tactile instructions approach. utilizing alongside resources like audiotape, braille, and magnified print, is essential for effective health education for students with blindness. This approach replaces reliance on visual learning and empowers these students to access vital knowledge health (Australian Disability Clearinghouse on Education and Learning [ADCEL], 2023; Bhor, Shetty, Garcha, & Nimbulkar, 2016).

In line with the mission of the community health nurse (CHN) to empower each student to choose their desired life and provide the means to achieve it, supporting students with blindness to live and work in their community is essential. CHNs employ various strategies to equip, support, and communicate empathically with these students (Shenouda et al., 2018).

This role stems from the CHN's specialization in promoting health for diverse populations in various settings, including healthcare, rehabilitation, and health education. They are key players in disease and injury prevention, disability alleviation, health promotion, and providing care and follow-up across a broad range of settings (Dieckmann, 2021; Woods, 2020).

Recognizing the importance of promoting well-being among individuals with special needs, particularly children with blindness, this study addresses a critical gap in existing resources by developing a multi-sensory approach to hand hygiene tailored to the physical traits of these students. To the best of the researchers' knowledge, this is the first study to design innovative health education resources specifically focused on hand hygiene for this population, empowering them and leveraging the role of CHNs.

## Aim of the Study

This study aimed to design innovative health education resources on hand hygiene for Arabic-speaking students with blindness.

## **Research Questions**

- 1. What are the students with blindness's views and expectations toward the design of innovative health education resources on hand hygiene?
- 2. What are the expert panelists' experiences, views, and expectations toward the design of innovative health education resources on hand hygiene?
- 3. What is the students with blindness' feedback toward the designed innovative health education resources on hand hygiene?
- 4. What are the expert panelists' appraisals of the designed innovative health education resources on hand hygiene?

## Method

## Design

The researchers combined phenomenological design and the Delphi technique.

The phenomenological design is qualitative research; its main focus is to examine a person's lived experiences in the world. Therefore, this research methodology is in a unique position to assist scholars studying health professions education in learning from the experiences of others (Neubauer, Witkop, & Varpio, 2019).

Concerning the Delphi technique, it can be called expert opinions on a particular subject that can be gathered using a group approach (Alexandra, 2021). Give a brief explanation of the Delphi technique. Limestone and Turoff (as cited in Yousuf, 2007, p. 1) stated that "Delphi may be characterized as a way for arranging a group communication process so that the process is effective in allowing a group of individuals as a whole to deal with a complex problem.".

### Setting

The study was carried out at Alnour School in Mansoura City for the Blind, which belongs to the West Mansoura Educational District. It serves the three educational levels (primary, preparatory, and secondary).

## Participants

There were two participant groups in the study:

**Students with blindness.** From the previously mentioned school, under the following eligibility criteria: less than 18 years, both genders and from primary level (restricted to fourth to sixth graders to be able to read using the braille method), as well as preparatory and secondary levels.

**Expert panelists.** Those willing to contribute had expertise in one or more of the following specialties: community health and medical and surgical, nursing, and people with special needs education/blindness.

Wherein, an expert can perform at peak, elite, or extraordinarily high levels on a given activity or within a certain subject and point to him/her as virtuoso, maven, master, prodigy, or genius (Bourne, Kole, & Healy, 2014).

#### Sample Size and Sampling Technique

**Students with blindness.** Conveniently, 39 students with blindness from the abovementioned setting were enrolled for preliminary data collection, while 25 of them obtained their feedback on the designed innovative health education resources on hand hygiene.

**Expert panelists.** According to Keeney, Hasson, and McKenna (2001), the sample size and heterogeneity to be recruited depend upon the purpose of the study, the number of available experts, the design selected, and the period of collection of data. In the current study, 15 expert panelists enrolled judgmentally.

#### **Tools for Data Collection**

A tool constructed from six parts was developed, which was founded on relevant literature (CDC, 2019; Fung et al., 2015). The parts belonged to students with blindness in simple Arabic language and those for panelists' experiences in English.

Part I: A structured interview questionnaire to identify students with blindness demographic characteristics. The demographic details of the students with blindness, including age, gender, residence, and school level.

Part II: Self-administered structured questionnaire to assess expert panelists demographic and professional characteristics. The age, gender, qualifications, specialty, and years of experience of the expert panelists were identified.

Part III: An unstructured interview questionnaire to assess students with blindness' views and expectations toward design of innovative health educational resources on hand hygiene. Five open-ended questions were used to assess students with blindness' views and expectations in terms of the foundations/specifications that should be considered when writing and designing the main themes, content, and the required criteria and ways to display innovative health education resources.

IV: Part Α self-administered unstructured questionnaire to assess expert panelists experiences, views. and expectations towards the design of innovative health education resources on hand hygiene. Five open-ended questions were used to assess expert panelists' experiences, views, and expectations in terms of the foundations/specifications that should he considered when writing and designing the main themes, content, and the required criteria and ways to display innovative health education resources.

Part V: Structured interview scale to assess students with blindness feedback toward the designed innovative health education resources on hand hygiene. Feedback from twenty-five students with blindness on the validity and feasibility of the designed innovative health education resources before the creation of the final version. This through a four-point Likert scale (strongly agree, agree, disagree, and strongly disagree) on mine domains, including 39 statements: topic (2 items), the beginning of the booklet and audio booklet (8 items), objectives (2 items), importance (6 items), content (3 items), language (4 items), display of the audio booklet (8 items), maquette model (4 items), and summary (2 items). A rating value ranging from one to four was assigned to each response.

Part VI: A self-administered structured scale for expert panelists to appraise the designed innovative health education resources on hand hygiene. Fifteen expert panelists appraised the validity and feasibility of the designed innovative health education resources through Delphi rounds until they reached the predetermined point of consensus.

A four-point Likert scale (strongly agree, agree, disagree, and strongly disagree) on mine domains, including 55 statements: topic (2 items), the beginning of the booklet and audio booklet (8 items), objectives (6 items), importance (6 items), content (11 items), language (4 items), design of the audio booklet (9 items), maquette model (5 items), summary (2 items), the innovative resources as a teaching method (8 items). Wherein, the rating value ranging from one to four was assigned to each response.

Owing to McKenna, Hasson, and Smith; Sumison (as cited in Keeney, McKenna, & Hasson, 2011, p.143), every item has a consensus level of at least 70%. This was proposed as a powerful threshold. As the rounds went on, items with ratings lower than this would be eliminated. Both the appraisal's findings and any changes made before the final formulation would be recorded and taken into account. The following levels of agreement were determined:

*Approved.* Scores of items had at least a 70% response rate of 3, 4

*Rejected.* The scores of items had at least a 70% response rate of 1, 2

*Tool's face and content validity.* Five professors, three in community health nursing and two in special needs education revised the face and content validity of the tool in six parts.

Accordingly, the recommended adjustments were made.

## Phases of the Study

**Preparatory phase.** It covered the administrative stage, ethical considerations, pilot study, and the tool's reliability.

*Administrative stage.* To get permission to conduct the current study, the responsible authorization of the Faculty of Nursing, Mansoura University issued an official letter to the Directorate of Education in Mansoura City. The letter then proceeded to the West Mansoura Educational District and, ultimately, to Alnour School.

*Ethical considerations.* The researchers obtained approval from the Research Ethics Committee, Faculty of Nursing, Mansoura University (No. P. 0716). After explaining the aim of the study, the researchers gained approval from each student with blindness (child assent). They were informed about the following: there was no psychological or physiological harm from participating in the study, the collected data was treated confidentially and used only for research purposes, and they had the right to ask any question concerning the study and withdraw from it at any time without any responsibility.

**Pilot study**. To test the tool's reliability and feasibility, a pilot study on four students with blindness (representing 10% of the main sample) enrolled conveniently from the same study setting and involved within its sample.

*Reliability*. The value of Cronbach's coefficient alpha that confirms the consistency of tool parts V and VI was 0.84.

**Operational phase.** It covered prefieldwork preparation, preliminary data collection, carrying out the Delphi rounds (Figure 2), designing the innovative health educational resources, and feedback from students with blindness regarding it, as follows:

**Pre-fieldwork preparation.** To design innovative health education resources to be robust and scientifically sound, two of the researchers attended a course on the braille method at Mansoura University's Curriculum and Teaching Methods Department in the Faculty of Education, form From January 7th to January 8th, 2021.

**Preliminary data collection.** Monday weekly from the beginning of October 2022 to the end of December 2022, the principal researcher conducted focus group discussions (FGDs) with students with blindness to identify their demographic characteristics, assess views, and expectations for the designing of innovative health education resources on hand hygiene using tool parts I and III.

Vasileiou, Barnett, Thorpe, and Young (2018) stated that the principles of conducting FGD participants should not be more than 13. Otherwise, three to four students with blindness were involved in each FGD to suit their physical traits, which took place from 50 to 60 minutes.

The FGDs were located at the Alnour School library to ensure a calm environment. Along with field notes, non-verbal cues of the students with blindness, including facial expressions, body language, and tone of voice, were recorded since they may indicate what they were not able to express. As well as a Mpeg Audio Layer 3-MP3 was used to record. The FGD continued until the "saturation" point, wherein students with blindness add no new contributions.

Data collected in the preliminary step were analyzed to determine synonymous, similarities, and variations themes.

**Delphi rounds.** The Delphi round's number depends on the number of research questions and the available time for reaching a consensus, which is mostly two rounds to prevent exhaustion and attenuation (Green, 2014). In the current study, to achieve consensus from expert panelists' contributions to the foundation in designing and appraising innovative health education resources on hand hygiene, two rounds took place from October 2022 until July 2023.

As for the appropriate contact line for each expert panelist was identified; seven academic staff expert panelists were contacted by email and social app (WhatsApp) while conducting in-person interviews with special needs teacher panelists. Three weeks were permitted for each expert panelist to complete each round, with a reminder email before the deadline as illustrated below:

*The first round.* It began in early January 2023 and ran through February 2023. Tool parts II and IV were used to identify demographic and professional characteristics of the expert panelists as well as assessed data about their experiences, views, and expectations, which were analyzed to be the foundation of the main themes, contents, and methods to be displayed concerning designing the innovative health education resources on hand hygiene.

**Designing innovative health education resources on hand hygiene.** This began in early March 2023 and was completed in May 2023. Blending an extensive literature review, students with blindness' views and expectations, and expert panelists' experiences, views, and expectations, the researchers founded on those to design the innovative health education resources, including the braille-typed booklet, audio booklet, and a 3-D (3D) maquette. Figure 1 displays the main content.



Figure 1. The Component of the Innovative Health Education Resources

Specialists in braille typing, voiceover in audio booklet, and 3-D design assisted in the production of innovative health education resources. The braille-typed booklet's content was short, concise, properly spelled, and grammatically correct. When recording the audio booklet, clarity, speed, pitch, no monotony, and sound effects were taken into account. The creation of a 3-D maquette and its models suits the students with blindness' physical developmental stage. All resources were culture-oriented, Box A displays the designed innovative health education resources on hand hygiene for Arabic-speaking students with blindness.



Feedback from students with blindness regarding the designed innovative health education resources. This lasted from the beginning of June 2023 to its end to find out feedback from 25 out of the main 35 students with blindness on the designed innovative health education resources on hand hygiene by part V of the tool. *The second round.* This was run through July 2023 using part VI of the tool; the 15 expert panelists appraised the designed innovative health education resources on hand hygiene.



Figure 2. Expert Panelists' Process of Delphi

**Statistical analysis**. Thematic analysis was used to display the qualitative data and transcripts were examined to identify the common themes, similarities, and/or variations among the participants' views and expectations. Version 21 of the Statistical Package for the Social Sciences (SPSS) program was used to code, enter, and analyze data on a personal computer. Frequency tables with percentages were used to perform the analysis when the data entry was finished. The mean and standard deviation (SD) were used to characterize quantitative data.

#### Limitations of the Study

Students with blindness in the third preparatory and secondary levels were excluded from the study sample because they only took the semifinal and final exams.

#### Funding

#### Results

Table 1 reveals that 76.9% of the students with blindness were in the age range of 10 to less than 15 years, with a mean of 12.71 (SD: 2.12) years. In terms of gender and place of residence, 66.7% and 56.4% of the students with blindness were girls and from urban areas, respectively. An equal percentage was recruited from the three educational levels, 33.3% of the students with blindness.

The researchers had no funding.

According to Figure 3, 69.2%, 41%, 15.4%, and 5.1% of the students with blindness received their health education through audio, radio, booklet, and maquette, respectively.

Table 2 shows that six out of 15 expert panelists who are between the ages of 35 and less than 45 years have a mean of 42.1 (SD: 7.5), and 10 are women. Concerning qualification and specialty, eight of the expert panelists had bachelor's degrees in special education and specialists in special education/blindness impairment. With a mean of 16.0 (SD: 7.8), seven of the expert panelists had been in their professions for 15 to less than 25 years. Related to attending training programs about designing health education resources, eleven of the expert panelists participated in three training sessions offered by their organization.

Views and expectations of the students with blindness towards the design of innovative

#### health education resources on hand hygiene Description of qualitative findings of the FGD:

After interviewing the students with blindness, the researchers determined two main domains, namely, "Contents of health education about hand hygiene" and "Views and expectations of the students with blindness about the types and design of the innovative health education resources about hand hygiene".

Box B The Main Domains of Views and Expectations of the students with Blindness toward Design Innovative Health Education Resources on Hand Hygiene

- First domain: Contents of the health education about hand hygiene The main themes that must be taken into account when creating the hand hygiene health education resources' content
- Second domain: Views and expectations of the students with blindness about types and design of innovative health education resources on hand hygiene

Types of health education resources on hand hygiene

- Design of innovative health education resources on hand hygiene
  - Braille-typed booklet
  - Audio booklet
  - Maquette

#### First Domain

**Contents of health education about hand hygiene.** The main themes that have to be considered when developing content of the innovative health education resources on hand hygiene.

Most of the students with blindness were interested in knowing more about hand hygiene, including its definition, importance, and key times to wash hands. The more in-depth discussion revealed steps for hand hygiene that should be incorporated into the contents of the educational resources. Students with blindness have indicated that they need to be aware of the general instructions during hand hygiene. As they said:

"...We need easy and understandable content and avoid complicated terms. Then we require a few quick instructions...". (FG2)

"...We expect to see at the beginning what the objective of hand hygiene is, including its definition, importance, key times, and steps of hand hygiene ...". (FG3)

"...We have no knowledge about this content, and we were very interested to see the educational resources...". (FG1)

Additionally, over 50% of the students with blindness expressed a desire to learn the steps of an alcohol-based hand rub: "... we need to know how to use an alcohol-based hand rub and the technique of rubbing in basic points...". (FG1), (FG2), (FG3)

#### Second Domain

Views and expectations of the students with blindness about the types and design of innovative health education resources on hand hygiene. Types of innovative health education resources on hand hygiene. Half of the students with blindness mentioned that types of innovative health education resources may include printed material in braille, audio booklet, and maquette. In this regard, the students with blindness said:

"...We believe that using audio booklet and maquettes to display the contents of health education about hand hygiene could be attractive ...". (FG1)

"...In our view, listening to audio booklet is preferable ...". (FG2)

"... Well, we believe that reading braille health education would provide us with adequate knowledge ...". (FG3)

**Design the innovative health education resources on hand hygiene**. The students with blindness suggested the design of the innovative health educational resources on hand hygiene in three types identified, namely a braille-typed booklet, audio booklet, and three-dimensional (3-D) maquette.

**Braille-typed booklet.** It was explained to over 50% of the students with blindness were informed that the booklet needed a cover and cube. Furthermore, they don't care about images and collages.

"...We preferred reading a booklet with a strong cover to preserve it ..." (FG2), (FG3)

**Audio booklet.** Most of the students with blindness favored clear Arabic language vocabulary and appealing voices that facilitated their understanding of the content. It was illustrated by: "...*The language and sound are the first sight that tempts me to begin and finish listening to audio booklet, so try to choose carefully the vocal performance* ..." (FG1), (FG2) "...Content must be clear and displayed in medium voice, not so fast or slow...". (FG2)

"...Audio booklet with tone breaks was what we wanted to hear ...". (FG3)

**Maquette.** All the students with blindness suggested that the maquette should be constructed of harmless and safe material to facilitate touching it:

"... In our opinion, a maquette built from plastic materials was better than clay and wood....". (FG1)

"...The texture of the maquette should be suitable ...". (FG2)

Views, expectations, and experiences of the expert panelists towards the design of innovative health education resources on hand hygiene

# Description of qualitative findings of the expert panelists (first round):

The researchers were able to identify from the questioning of expert panelists two main domains namely, "Contents of health education on hand hygiene" and "Views and expectations of expert panelists about the types and design of the innovative health education resources about hand hygiene".

### Box C The Main Domains of Experiences, Views, and Expectations of the Expert Panelists about the Design of Innovative Health Education Resources on Hand Hygiene

• First domain: Contents of the health education about hand hygiene The main themes that have to be considered when developing content for the innovative health educational resources on hand hygiene

• Second domain: Views, expectations, and experiences of the expert panelists about the types and design of innovative health education resources about hand hygiene Types of the health education resources on hand hygiene

Design of the innovative health education resources about hand hygiene

- Braille- typed Booklet
- Audio booklet
- Maquette

#### First Domain

**Contents of health education about hand hygiene.** When developing the content of health education about hand hygiene, the main themes that have to be considered:

All expert panelists stated that the content should consider the learning style suitable for students with blindness in acquiring knowledge and skills related to health education. The analysis of the data highlights expert panelists' views on the importance and benefits of the following, as they said:

"The content of the resources should consider the importance of hand hygiene in students with blindness's lives, depending on their functioning senses "." Error-free written letters with minimal text, few pages, high-quality printing paper, and concise, scientifically significant material are all part of the letter's integrity". "The writing style is simple, to the point, uncomplicated, and at the level of students with blindness' cognition." The content is seamless, simplified to the subject, and presented in numbered sequential points".

#### Second Domain

Views, expectations, and experiences of the expert panelists about the types and design of innovative health education resources on hand hygiene.

Types of health education resources on hand hygiene. All expert panelists agreed that illustrative aids should be considered when designing innovative health education resources on hand hygiene for students with blindness that incorporate Braille printed material, audio booklet, and maquette.

**Design of innovative health educational resources about hand hygiene.** The expert panelists proposed the design of the innovative health education resources on hand hygiene in three types identified, namely a braille-typed booklet, audio booklet, and 3-D maquette.

**Braille-typed Booklet.** All expert panelists agreed that the booklet should have a cover with simple, correct, brief, and short text content. Moreover, focus on the main knowledge. As they stated:

"...Simple words and sentence, brief, meaningful scientific, culturally oriented simple vocabulary". Audio booklet. All expert panelists emphasized the purity of voice, appropriate speed, good diction, and pitch with simple musical breaks.

**Maquette.** All expert panelists suggested that the maquette be made from harmless and safe material, taking into account safety precautions, tangible, appropriate in size, and with variation in the materials that the maquette is made of.

Table 3 declares that there was strong agreement among the 25 blind students on the following domains: topic, the beginning of the booklet and audio booklet, content of the innovative health education resources, language, display of the audio booklet, maquette model, and the summary of the booklet and audio booklet. The total mean was 3.9 (SD: 0.01) and strongly agree prevailed among 97.5% of the students with blindness responses.

Table 4 indicates that all 15 expert panelists strongly agreed regarding the following domains: topic, the beginning of the booklet and audio booklet, language, design of the audio booklet, maquette model, the summary of the booklet and audio booklet, and resources as a health education strategy. The total mean was 3.9 (SD: 0.01) and strongly agree prevailed among 97.5% of expert panelists' responses.

	Table	(1): I	Demographi	c Chara	cteristics	of Students	with	Blindness	(n=39)
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Items	Ν	%
Age (in years)		
10 - < 15	30	76.9
15 - < 20	9	23.1
$\overline{\mathbf{x}}$ (SD) 12.71 (2.12)		
Gender		
Boy	13	33.3
Girl	26	66.7
Residence		
Rural	17	43.6
Urban	22	56.4
Education		
Primary	13	33.3
Preparatory	13	33.3
Secondary	13	33.3



Figure (3): Routs of Obtaining Health Education among the Students with Blindness (n = 39)

<b>Fable (2):</b> Demographic and Professiona	l Characteristics of the Expert Panelists (n=15)
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Items	Ν
Age (in years)	
25-<35	5
35-<45	6
45 and more	4
$\bar{\mathbf{x}}(SD)$ 42.1 (7.5)	
Gender	
Man	5
Women	10
Academic qualifications	
Professor/ Assistant professor	4
Lecturer	3
Bachelor's degree in special education	8
Specialty	
Community Health Nursing	4
Special Education/ Blindness Impairment	8
Medical and Surgical Nursing	3
Years of experience	
5 -<15	5
15 -< 25	7
25 and more	3
$\bar{\mathbf{x}}$ (SD) 16.0 (7.8)	
Number of attendance training programs	
Once	2
Twice	2
Three times	11
The type of training <sup>a</sup>	
Seminars/ workshops offered by their organization	11
Seminars/ workshops offered by another institution	7
Academic training courses	1

Note. <sup>a</sup> More than one answer was allowed.

 Table (3): Students with Blindness' Feedback Toward the Designed Innovative Health Education

 Resources on Hand Hygiene (n=25)

Items	Strongly Agree	$\overline{\mathbf{x}}$ (SD)
	Ν	
Торіс	25	4.0 (0.0)
The beginning of the booklet and audio booklet	25	4.0 (0.0)
Objectives of the innovative health education resources	23	3.9 (.13)
Importance of using the innovative health education resources	22	3.9 (.05)
Content of the innovative health education resources	25	4.0 (0.0)
Language	25	4.0 (0.0)
Display of the audio booklet	25	4.0 (0.0)
Maquette model	25	4.0 (0.0)
The summary of the booklet and audio booklet	25	4.0 (0.0)
Total		3.9 (0.01)

 Table (4): Expert Panelists' Appraisal of the Designed Innovative Health Education Resources on Hand Hygiene (n=15)

Itoma	Strongly Agree	$\overline{\mathbf{x}}$ (SD)
Items	N (15)	
Торіс	15	4.0 (0.0)
The beginning of the booklet and audio booklet	15	4.0 (0.0)
Objectives of the innovative health education resources	14	3.9 (.04)
Content of the innovative health education resources	14	3.9 (.11)
Language	15	4.0 (0.0)
Design of the audio booklet	15	4.0 (0.0)
Maquette model	15	4.0 (0.0)
The summary of the booklet and audio booklet	15	4.0 (0.0)
Resources as innovative health education strategy	15	4.0 (0.0)
Total		3.9 (0.01)

#### Discussion

Disability is a general term covering impairments, limitations in activities, and participation restrictions that may be related to vision, physical, hearing, psychosocial, cognitive, or other bodily functions (Saran, White, & Kuper, 2020). Complete darkness is a common misconception about blindness, but it is not always the case. The term "blindness" refers to a broad spectrum of visual disability; a person's sight is impaired to the extent interferes with daily activities like reading, driving, or cooking, up to total blindness (Canadian National Institute for the Blind [CNIB], 2022).

Factually, people's hands are so easily contaminated; that could end with hygiene. A crucial component of infection control is regarded as hand hygiene (Chen et al., 2020). Keeping hands clean helps prevent illness. From here, people with blindness need to be mindful of hand hygiene basics since they dominantly discover their surrounding environment through their hands (Connect Centre, 2021). According to Beal and Rosenblum; Pitchford, Kamchedzera, Hubber, and Chigeda; Supalo, Hill, and Larrick; and Supalo, Isaacson, and Lombardi (as cited in Klingenberg, Holkesvik, & Augestad, 2019, P.4), technology can provide students with blindness with new opportunities and essential access to knowledge when used in conjunction with Braille, large print, tactile devices, and audio booklet.

The current study shows that most students with blindness are curious to learn more about the definition, importance, key times to wash hands, steps, and general instruction during hand hygiene.

Along the same line, two studies, the first one in Germany conducted by Klar et al. (2022) and the second in Wuhan, China, by Chen et al. (2020), showed children know little about hand hygiene. Oppositely, in Batangas City, Philippines, a study by Asilo, Berberabe, and De Ramos (2017) showed public school students had higher scores in knowledge of hand hygiene.

Similarities in the current study findings with studies conducted in Germany and China can be

argued in context with the traits of the developmental stage of the study population, that predominantly neglect personal hygiene. Otherwise, Han et al. (2020), interpreted the unclean physical features of the study population to the social class.

The current study declares that half of the students with blindness mentioned that printed material in Braille, audio, and maquette were the ways to display innovative health education resources.

This finding closely resembles that of an Indian study conducted by Deshpande, Rajpurohit, and Kokka (2017), who declared that the most successful teaching method in health education was a combination of Braille, audio, and tactile performance techniques.

Additionally, Mahantesha et al. (2015), who conducted a study in Raichur City, Karnataka, declared that ongoing motivation and reinforcement in the form of Braille and audio booklet instruction were essential to achieve a good hygiene level for students with blindness.

This finding is also consistent with Gautam et al. (2018), who evaluated the effect of oral health education using audio booklet aids, Braille, and tactile models on visually impaired children's oral health status in Bhopal City and declared that the combination of audio booklet, Braille, and tactile models was a successful method to provide oral health education and improve their oral health status.

In the current study students with blindness views expect a braille-typed booklet should have a cover and cube. Along the same line, a Chinese study by Guo and Fan (2017), who evaluated the exterior design of Braille books for the visually impaired and/or blind people, required external morphological characteristics.

In terms of the audio booklet, the majority of the students with blindness in the current study prefer simple Arabic language vocabulary and engaging, attractive voices to help them comprehend the content. This finding is consistent with a survey conducted in the United States (USA) by Guha (2021), when creating audiobooks for children with visual impairment for virtual learning; the way of speaking should be clear and soft with the addition of sound effects to the background. As regards the maquette model, the current study indicates that all the students with blindness favored harmless and safe material since they made touching it easier. This finding is consistent with an industrial French case study conducted by Costes, Bassereau, Rodi, and Aoussat (2009) on graphic design for blind users, which indicated that to convey the concept of tactile representation, design good-feeling models with tactile sensations and soft material.

The researchers insisted on designing the resources to convey the health education message using different resources. Wherein stimulating multiple students' senses improves effective perception and allows it to be modified to accommodate various learning styles. This can be increasingly true in the situation of students with blindness since they already rely mainly on audio and tangible senses.

All the expert panelists in the current study advice considering the learning style that is appropriate for students with blindness in acquiring knowledge and skills related to health education about hand hygiene and to be displayed through combined printed material in Braille, audio, and maquette.

Along the same line, Paths to Literacy (2023) recommended the top access tips for print media, keeping the layout simple, uncluttered, removing unnecessary additional text information, and choosing papers ideally weighing over 90 grams per square meter (GSM).

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Furthermore, Cushman (2023) recommended auditory methods and objects, and tactile symbols as suitable print materials for teaching students who are blind or visually impaired.

The current study's results illustrate that all expert panelists emphasise that the audio booklet has to have pure voice, good diction, appropriate pitch, and speed with simple musical breaks.

This finding is consistent with Fansury, Lutfin, and Arsyad (2019), in Slbyapti Makassar assessed audiobooks as teaching media to students with blindness in learning English as a Foreign Language (EFL) and discovered that the use of audiobooks where the tone of voice was important, simple vocabulary accompanied by music, and sound effects.

The current study demonstrates that all expert panelists suggest that the maquette model's design has to be tangible, appropriate in size, and made from safe and harmless materials while taking into account safety precautions.

This finding is fairly comparable to the Indonesian study conducted by Arlinwibowo and Retnawati (2015), which assessed the development of audio-tactile for visually impaired students; the tactile media had already been recognized as a strong media, not dangerous, easy to use, simple, and accurate.

In the current study, all students with blindness strongly agree on the following domains of the innovative health education resources: topic, the beginning of the booklet and audio booklet, content, language, display of the audio booklet, maquette model, and the summary of the booklet and audio booklet.

This is supported by the findings of Ximenes et al. (2019), who stated that to construct and validate an educational booklet for fall prevention in hospitals, consider its content and understandability in a way that has a viable use.

As well as, Vinay, Rao, and Rayala (2016) stated that a combination of all three forms of health education - verbal, Braille, and tactile - proved to be effective for the oral hygiene awareness instructions on the oral health status of visually impaired or blind children.

Additionally, three studies first: in the USA by Guha (2021), second: by Fansury et al. (2019), and third, in Taiwan by See and Advincula (2021), all stated that children with visual impairment or blindness had positive feedback towards audiobooks and tactile education materials that motivated them to learn and the traits of audiobooks, allowed to study at anytime and anywhere.

All the expert panelists in the current study strongly agreed on the appraisal domains of the designed innovative health education resources: topic, the beginning of the booklet in Braille and audiobook, language, design of the audiobook, maquette model, the summary of the booklet in Braille and audiobook, and those resources as a health education strategy.

This finding is inconsistent with a study conducted by Greenvall, Tiano, Chandani, and Minkara (2021) that evaluated the influence of a blind professor in a bioengineering course and indicated that the experts had high satisfaction with the education resources.

Furthermore, study conducted а by Samathavakul and Thamaduangsri (2022)evaluated the uses of learning media for improving the use of proverbs in the communication of students with visual disabilities. They discovered that the developed learning media for those students' use in communication were of extremely high quality.

Thus, according to the students' feedback and the expert panelists' appraisal, the researchers claim that the designed innovative health educational resources demonstrates realistic health education messages to students with blindness. These resources (booklet typed in Braille and audio booklet) can be kept in hand anytime and anywhere.

During the study's fieldwork phase, the researchers touch on the pivotal importance of paying special attention to creating methods on other subjects to suit students with blindness' special needs. This will enable community health nurses to convey various health education messages. As one of the students' mothers asks the researchers, "*Where have you been since ago*?"

## Conclusion

According to the results drawn from this study, it is concluded that expert panelists' experiences, views, and expectations are combined with those of the end beneficiaries. which provide the foundation for designing the innovative health education resources (a braille-typed booklet, audio booklet, and 3-D maquette) for students with blindness. Based on the students with blindness' feedback and expert panelists' appraisals of the designed innovative health education resources on hand hygiene, almost all strongly agree on all domains of the scales.

#### Recommendations

Based on the findings and conclusion of the present study, the following recommendations are proposed:

- 1. Adopt, as well as disseminate the designed innovative health education resources that have been produced for students with blindness in their schools (library) and homes across the national scale.
- 2. Utilize the designed innovative health education resources when performing training for students with blindness on hand hygiene.
- 3. Conduct a larger-scale pragmatic research with people with blindness to gauge the efficacy of the designed innovative health education resources.
- 4. Conduct additional studies to investigate students with blindness' health-related issues and how to address them.

#### Acknowledgement

Greetings to all students with blindness and experts who participated in the study.

#### Strengths of the Study

To the best of the researchers' knowledge, this is the first study that discussed the subject of hand hygiene and designed innovative health education resources on hand hygiene for Arabicspeaking students with blindness. This is considered promising to pay more attention to health-related issues for those populations.

#### Limitations of the Study

It was struggling to discuss the current study findings as limited published studies were conducted on similar study populations since only one focused on students with blindness while the others recruited sighted students.

#### References

- Abdelazeem, A. M., Hossein, Y. E., Eltomy, E. M., & Mohamed, M. D. (2022). Healthy Lifestyle practices among Visually Impaired Adolescent Students at El-Noor School in Minia Governorate. *Minia Scientific Nursing Journal*, 11(1), 21-31.
- Açıl, D., & Ayaz, S. (2015). Screening of visually impaired children for health problems. *Asian Nursing Research*, 9(4), 285-290.

- Akinbadewa, B. O., & Sofowora, O. A. (2020). The effectiveness of multimedia instructional learning packages in enhancing secondary school students' attitudes toward Biology. *International Journal on Studies in Education (IJonSE)*, 2(2), 119-133.
- Alexandra, T. (2021). *Delphi Method*. Retrieved September 4, 2023 from https:// www. investopedia.com/terms/d/delphi-method.asp
- Arlinwibowo, J., & Retnawati, H. (2015). Developing audio tactile for visually impaired students. *International Journal on New Trends in Education and Their Implications*, 6(4), 78-90.
- Asilo, M. M., Berberabe, J., & De Ramos, A. (2017). Hand hygiene knowledge, practice and facilities utilization of pupils in Batangas city, Philippines: Basis for proposed hand hygiene activities. *LIFE Int. J. Heal. Life-Sciences*, *3*(3).
- Australian Disability Clearinghouse on Education and Learning. (2023). *Vision Impairment and Blindness*. Retrieved October 2, 2023 from https://www.adcet.edu.au/inclusiveteaching/specific-disabilities/blind-visionimpaired
- Batheja J. K., Katto M. S., Siddiqui A. A., Sahito B., Jamil M., Rasheed N. (2020). Knowledge, attitude, and practices of healthcare workers regarding the use of face mask to limit the spread of the new coronavirus disease (COVID-19). *Cureus*, *12*(4).
- Better Health. (2021). *Handwashing Why it's important*. Retrieved August 13, 2022 from https://www.betterhealth.vic.gov.au/health/co nditionsandtreatments/handwashing-why-itsimportant#rpl-skip-link
- Bhor, K., Shetty, V., Garcha, V., & Nimbulkar, G. C. (2016). Effect of oral health education in the form of Braille and oral health talk on oral hygiene knowledge, practices, and status of 12–17 years old visually impaired school girls in Pune city: A comparative study. *Journal of International Society of Preventive & Community Dentistry*, 6(5), 459.
- Bhor, K. B., Vinay, V., Ambildhok, K., & Shetty,V. (2021). Effectiveness of oral health educational interventions on oral health of visually impaired school children: A

systematic review and meta-analysis. *Special Care in Dentistry*, *41*(3), 291-308.

- Bourne Jr, L. E., Kole, J. A., & Healy, A. F. (2014). Expertise: defined, described, explained. *Frontiers in psychology*, 5, 186.
- Bourne, R., Steinmetz, J. D., Flaxman, S., Briant, P. S., Taylor, H. R., Resnikoff, S., ... & Tareque, M. I. (2021). Trends in prevalence of blindness and distance and near vision impairment over 30 years: an analysis for the Global Burden of Disease Study. *The Lancet* global health, 9(2), e130-e143.
- Braille Institute. (2019). *How Visually Impaired Students Use Audio Books to Study and Learn.* Retrieved July 2, 2022, from https://brailleinstitute.org/blog/sight-lossblog/how-visually-impaired-students-useaudio-books-to-study-and-learn
- Buzzi, M. C., Buzzi, M., Leporini, B., & Mori, G. (2011, July). Educational impact of structured podcasts on blind users. In *International Conference on Universal Access in Human-Computer Interaction* (pp. 521-529). Springer, Berlin, Heidelberg.
- Cambridge University Press and Assessment. (2024). *Definition of pupil*. Retrieved January 10, 2024 from https:// dictionary. cambridge. org/ dictionary/ english/pupil
- Canadian National Institute for the Blind. (2022). *What is Blindness*? Retrieved Septemper 2, 2023 from https://www.cnib.ca/en/sight-lossinfo/blindness/what-blindness? region= on#:~:text=The%20term%20%E2%80%9Cbl indness%E2%80%9D%20covers%20a,experi ence%20of%20blindness%20is%20unique.
- Centers for Disease Control and Prevention. (2016). *Hand Hygiene*. Retrieved June 4, 2022 from https:// www. cdc. gov/ oralhealth/ infectioncontrol/ faqs/hand-hygiene.html
- Centers for Disease Control and Prevention. (2019). *Hand Hygiene in Healthcare Settings*. Retrieved June 6, 2022 from https://www.cdc. gov/ handhygiene/index.html
- Centers for Disease Control and Prevention. (2019). *Keeping Hands Clean*. Retrieved June 12, 2022 from https://www.cdc.gov/ healthywater/hygiene/hand/handwashing.html

- Centers for Disease Control and Prevention. (2020). *Disability and Health Overview*. Retrieved June 1, 2022, from https://www.cdc.gov/ncbddd/disabilityandhea lth/disability.html#:~:text=A%20disability%2 0is%20any%20condition,around%20them%2 0(participation%20restrictions).
- Centers for Disease Control and Prevention. (2020). Show Me the Science - Why Wash Your Hands? Retrieved June 11, 2022, from https://www.cdc.gov/handwashing/whyhandwashing.html#:~:text=Handwashing%20 with%20soap%20removes%20germs,mouth %20and%20make%20us%20sick.
- Centers for Disease Control and Prevention. (2021). *Hand Sanitizer Use Out and About*. Retrieved June 18, 2022, from https:// www. cdc.gov/handwashing/hand-sanitizer-use.html
- Centers for Disease Control and Prevention. (2022). When and How to Wash Your Hands. Retrieved June 11, 2022 from https:// www. cdc.gov/handwashing/when-howhandwashing.html
- Centers for Disease Control and Prevention. (2022). *Handwashing in Communities: Clean Hands Save Lives*. Retrieved June 13, 2022, from https://www. cdc. gov/ handwashing/ index.html
- Centers for Disease Control and Prevention. (2022). *Hand Hygiene in School and Early Care and Education*. Retrieved August 15, 2022, from https:// www. cdc. gov/ handwashing/handwashing-school.html
- Cevizci, S., Uludag, A., Topaloglu, N., Babaoglu, U. T., Celik, M., & Bakar, C. (2015). Developing students' hand hygiene behaviors in a primary school from Turkey: A schoolbased health education study. *Int J Med Sci Public Health*, 4(2), 155-61.
- Chen, X., Ran, L., Liu, Q., Hu, Q., Du, X., & Tan, X. (2020). Hand hygiene, mask-wearing behaviors and its associated factors during the COVID-19 epidemic: A cross-sectional study among primary school students in Wuhan, China. *International journal of environmental research and public health*, 17(8), 2893.
- Cho, J. D. (2021). Multi-Sensory Interaction for Blind and Visually Impaired People, *Electronics*, 10(24), 3170.

- Chowdary, B. P., Uloopi, K. S., Vinay, C., Rao, V. V., & Rayala, C. (2016). Impact of verbal, braille text, and tactile oral hygiene awareness instructions on oral health status of visually impaired children. *Journal of Indian Society* of *Pedodontics and Preventive Dentistry*, 34(1), 43-47.
- Cimon, K., & Featherstone, R. (2018). Jewellery and nail polish worn by health care workers and the risk of infection transmission: a review of clinical evidence and guidelines. Retrieved August 5, 2023 from https:// europepmc. org/article/NBK/nbk487444
- Cleveland Clinic. (2020). *Hand Washing*. Retrieved August 13, 2022, from https://my.clevelandclinic.org/health/articles/1 7474-hand-washing
- Cleveland clinic. (2023). *Blindness*. Retrieved August 13, 2023, from https://my. clevelandclinic. org/health/diseases/24446blindness
- Connect center. (2021). Clean Hands are Critical to People with Vision Loss. Retrieved Septemper 3, 2023, from https:// aphconnectcenter. org/visually-impaired-nowwhat/clean-hands-are-critical-to-people-withvision loss/#:~:text=Importance% 20of%20 Hand%20Washing,-Why%20is%20washing&text=Personal%20h ygiene%20can%20start%20and,use%20our% 20hands%20more%20frequently.
- Costes, E., Bassereau, J. F., Rodi, O., & Aoussat, A. (2009). Graphic design for blind users: an industrial case study. *International Association of Societies for Design Research, Seoul, South Korea, Oct,* 18-22.
- Cushman, C. (2023). Strategies for Teaching Students Who Are Blind or Visually Impaired. Retrieved septemper 10, 2023 from https:// www.pathstoliteracy.org/strategies-teachingstudents-who-are-blind-or-visually-impaired/
- Dajaan, D. S., Addo, H. O., Ojo, L., Amegah, K. E., Fiagbe, L., Bechala, B. D., & Benjamin, B. B. (2018). Hand washing knowledge and practices among public primary schools in the Kintampo Municipality of Ghana. *Int J Community Med Public Health*, 5(6), 2205-2216

- Department of Health. (2022). *Hand hygiene*. Retrieved June 6, 2022 from https://www. healthywa.wa.gov.au/Articles/F\_I/Factsabout-hand-hygiene
- Deshpande, S., Rajpurohit, L., & Kokka, V. V. (2017). Effectiveness of braille and audiotactile performance technique for improving oral hygiene status of visually impaired adolescents. *Journal of Indian Society of Periodontology*, 21(1), 27.
- Dieckmann, J. (2021). The History of Public Health and Public and Community Health Nursing. *Foundations for Population Health in Community/Public Health Nursing-E-Book*, 20.
- Elliott, L., Kennedy, C., Rome, A., Cameron, S., Currie, M., Pow, J., & Mackenzie-Baker, M. (2012). Study of the implementation of a new community health nurse role in Scotland.
- Evett, L., & Brown, D. (2005). Text formats and web design for visually impaired and dyslexic readers—Clear Text for All. *Interacting with computers*, 17(4), 453-472.
- Fansury, A. H., Lutfin, N., & Arsyad, S. N. (2019). Audio Books as Teaching Media to Blind Students in Learning EFL. *Klasikal: Journal of Education, Language Teaching and Science*, 1(1), 1-9.
- Feist J., Updegraff J. A., Brannon L. (2018). Health psychology: An introduction to behavior and health (9<sup>th</sup> ed.). Cengage Learning.
- Fung, I. C. H., Cai, J., Hao, Y., Ying, Y., Chan, B. S. B., Tse, Z. T. H., & Fu, K. W. (2015). Global Handwashing Day 2012: a qualitative content analysis of Chinese social media reaction to a health promotion event. Western Pacific Surveillance and Response journal, 6(3), 34.
- Gautam, A., Bhambal, A., & Moghe, S. (2018). Effect of oral health education by audio aids, Braille & tactile models on the oral health status of visually impaired children of Bhopal city. *Journal of Oral Biology and Craniofacial Research*, 8(3), 168-170.
- Gawai, P. P., Taware, S. A., Chatterjee, A. S., & Thakur, H. P. (2016). A cross sectional

descriptive study of hand washing knowledge and practices among primary school children in Mumbai, Maharashtra, India. *Int J Community Med Public Health*, 3(10), 2958-2966.

- Green, R. A. (2014). The Delphi technique in educational research. *SAGE Open*, 4(2), 2158244014529773.
- Greenvall, B. R., Tiano, A. L., Chandani, A., & Minkara, M. S. (2021). The influence of a blind professor in a bioengineering course. *Biomedical engineering education*, 1, 245-258.
- Grisham, T. (2009). The Delphi technique: a method for testing complex and multifaceted topics. *International Journal of Managing Projects in Business.* 2(1), pp. 112-130. https://doi.org/10.1108/17538370910930 545
- Guha, S. (2021). Creating Audio Books for Children with Visual Impairment: The Collaborative Approach Leading to Virtual Learning. International Journal of Technology in Teaching and Learning, 16(1), 37-48.
- Guo, Y., & Fan, Y. (2017, January). The Exterior Design of Books for the Visually Impaired. In 2016 2nd International Conference on Economics, Management Engineering and Education Technology (ICEMEET 2016) (pp. 799-803). Atlantis Press.
- Hallowell, M. R., & Gambatese, J. A. (2010). Qualitative research: Application of the Delphi method to CEM research. *Journal of Construction Engineering and Management*, 136(1), 99-107.
- Han, L., Gao, X., Liao, M., Yu, X., Zhang, R., Liu, S., & Zeng, F. (2020). Hygiene practices among young adolescents aged 12-15 years in low-and middle-income countries: a population-based study. *Journal of global health*, 10(2).
- Handbook Germany. (2023). Educational Education Participation Package æ \_ Opportunities Under 25 Years. Retrieved January 8. 2024 from https:// handbookgermany. de/en/educationalpackage

- Hatcher, T., & Colton, S. (2007). Using the internet to improve HRD research: The case of the web-based Delphi research technique to achieve content validity of an HRD-oriented measurement. *Journal of European Industrial Training.* 31(7), pp. 570-587. https://doi.org/10.1108/03090590710820060
- Hoekstra, B. A., Young, V. L., Eley, C. V., Hawking, M. K., & Mcnulty, C. A. (2016). School Nurses' perspectives on the role of the school nurse in health education and health promotion in England: a qualitative study. *BMC nursing*, 15(1), 1-9.
- Idaho State Department of Education. (2022). *Visual Impairment Including Blindness*. Retrieved October 5, 2023 from file:///C:/ Users/ Me/ Downloads/Documents/Visual-Impairment-Including-Blindness-Guidance.pdf
- In, J. (2017). Introduction of a pilot study. *Korean journal of anesthesiology*, *70*(6), 601-605. doi: 10.4097/kjae.2017.70.6.601
- Johnson, K. (2022). Care of Students with Disabilities in Schools: A Team Approach. Online Journal of Issues in Nursing, 27(3).
- Jonathan, H., Salvin, M. D.(2016). Visual Impairment. Retrieved June 1, 2022 from https://kidshealth.org/en/teens/visualimpairment.html
- Keeney, S., Hasson, F., & McKenna, H. P. (2001). A critical review of the Delphi technique as a research methodology for nursing. *International journal of Nursing Studies*, 38(2), 195-200.
- Keeney, S., McKenna, H., & Hasson, F. (2011). The Delphi technique in nursing and health research. *John Wiley & Sons*.
- Klar, K., Knaack, D., Kampmeier, S., Hein, A. K., Görlich, D., Steltenkamp, S., ... & Becker, K. (2022). Knowledge about Hand Hygiene and Related Infectious Disease Awareness among Primary School Children in Germany. *Children*, 9(2), 190.
- Klingenberg, O. G., Holkesvik, A. H., & Augestad, L. B. (2019). Research evidence for mathematics education for students with

visual impairment: A systematic review. *Cogent Education*, *6*(1), 1626322.

- Less, C., Luna, F., Bruch, K. A., & Heiman, M. (2020). The School Health Services Team: Supporting Student Outcomes. Position Statement. *National Association of School Nurses*. Retrieved August 22, 2023 from https://eric.ed.gov/?id=ED605749
- Light House. (2018). Ten things to know about tactile graphics. Retrieved August 22, 2022 from https://lighthouse-sf.org/ 2018/06/ 29/tactile-graphics/#:~: text= Tactile% 20graphics% 20convey% 20non% 2Dtextual, graphs% 2C% 20diagrams% 20and%20 other %20 images.
- Hoekstra, B. A., Young, V. L., Eley, C. V., Hawking, M. K., & McNulty, C. A. (2016). School Nurses' perspectives on the role of the school nurse in health education and health promotion in England: a qualitative study. *BMC nursing*, 15(1), 1-9.
- Mahantesha, T., Nara, A., Kumari, P. R., Halemani, P. K. N., Buddiga, V., & Mythri, S. (2015). A comparative evaluation of oral hygiene using Braille and audio instructions among institutionalized visually impaired children aged between 6 years and 20 years: A 3-monthfollow-up study. *Journal of International Society of Preventive & Community Dentistry*, 5(Suppl 2), S129.
- Mahoney, J. E., Clemson, L., Schlotthauer, A., Mack, K. A., Shea, T., Gobel, V., & Cech, S. (2017). Modified Delphi Consensus to Suggest Key Elements of Stepping on Falls Prevention Program. *Frontiers in Public Health*, 5(21). https:// doi. org/ 10. 3389/ fpubh.2017.00021
- Mbakaya, B. C., Lee, P. H., & Lee, R. L. (2017). Hand hygiene intervention strategies to reduce diarrhoea and respiratory infections among schoolchildren in developing countries: a systematic review. *International journal of environmental research and public health*, 14(4), 371.
- Miller, C. (2024). Sample Form: Benefits of Braille. Retrieved January 8, 2024 from https://www.pathstoliteracy.org/resource/sam ple-form-benefits-braille/

- National Association of School Nurses. (2021). *Teach and reinforce hand hygiene*. Retrieved November 27, 2023 from https://www.nasn.org/glossary/teach-andreinforce-hand-hygiene
- Neubauer, B. E., Witkop, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. *Perspectives on medical education*, 8, 90-97.
- Paths to Literacy. (2023). *Top Access Tips for Print Media.* Retrieved septemper 10, 2023 from https://www.pathstoliteracy.org/topaccess-tips-print-media/
- Pimentel, J. L. (2019). Some Biases in Likert Scaling Usage and its Correction. *International Journal of Science: Basic and Applied Research, 45*(1), 181-191.
- Ragab Mohamed, O., Guirguis Ragheb, S., & Khalil Ibrahim, W. (2022). Girls' Adjustment with Blindness. *Egyptian Journal of Health Care*, *13*(2), 808-819.
- Raghav, P. R., Kumar, D., & Bhardwaj, P. (2016). Experience of Delphi technique in the process of establishing consensus on core competencies. *International Journal of Applied and Basic Medical Research*, 6(3), 191.
- Ry-Kottoh, L. A., Esseh, S. S., & Agbo, A. H. (2022). Audiobooks: Improving Access to and Use of Learning and Teaching Materials for the Print-Disabled. *The Journal of Electronic Publishing*, 24(2).
- Samathayakul, A., & Thamaduangsri, S. (2022). Uses of Learning Media for Improving the Use of Proverbs in Communication of Students with Vision Disabilities. *Journal of Educational Issues*, 8(1), 345-355.
- Saran, A., White, H., & Kuper, H. (2020). Evidence and gap map of studies assessing the effectiveness of interventions for people with disabilities in low-and middle-income countries. Campbell Systematic Reviews, 16(1), e1070.
- Sasami, R. H., & Sujarwo, S. (2019). Development of Maquette to Promote Primary School Students' Critical Thinking Ability in Social Sciences. *KnE Social*

*Sciences*, 528-536. doi 10.18502/kss.v3i17.4680

- Schiffman, J., Darmstadt, G. L., Agarwal, S., & Baqui, A. H. (2010, December). Communitybased intervention packages for improving perinatal health in developing countries: a review of the evidence. *Seminars in perinatology*, 34(6), pp. 462-476). WB Saunders.
- See, A. R., & Advincula, W. D. (2021). Creating Tactile Educational Materials for the Visually Impaired and Blind Students Using AI Cloud Computing. *Applied Sciences*, 11(16), 7552.
- Senjam, S. S. (2020). Impact of COVID-19 pandemic on people living with visual disability. *Indian journal of Ophthalmology*, 68(7), 1367.
- Shenouda, M. S., Amany, A., & Mervat, E. (2018). Evaluation of Personal Hygiene Among Students with Visual Impairment at Al-Nour School for Blind: Ismailia City. *The Medical Journal of Cairo University*, 86(September), 3187-3196.
- Singapore Association of Visually Handicapped. (2021). Audio Handwashing Guide for the Visually Impaired. Retrieved June 11, 2022 from https://savh.org.sg/audio-handwashingguide-for-the-visually-impaired/.
- Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education: Research*, 6(1), 1-21.
- Srivastava, R., & Mehta, A. S. (2018). Hand hygiene practices among school children of a periurban area Firozabad district. *International Journal of Community Medicine* and Public Health, 5(8), 3544-3547.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd
- The International Agency for the Prevention of Blindness. (2017). *Press Release: The importance of Braille Literacy*. Retrieved June 27, 2022 from https:// www. iapb. org/ news/ press-release-the-importance-of-brailleliteracy/

- The University of Tennessee Medical Center. (2018). *Here Are the Handwashing Basics Everyone Should Know*. Retrieved June 10, 2022 from https:// www. utmedicalcenter. org/here-are-the-handwashing-basicseveryone-should-know/#:~:text= The% 20Four%20Main%20Principles%20of%20Ha ndwashing&text=Wash%20your%20hands% 20when%20they,eyes%2C%20nose%2C%20 or%20mouth.
- Thurber, A., & Bandy, J. (2018). *Creating accessible learning environments*. Vanderbilt University Center for Teaching. Retrieved October 10, 2023 from https:// cft. vanderbilt. edu/ guides-sub-pages/creating-accessiblelearning-environments/
- Unicef for every child. (2021). State of the world's hand hygiene. Retrieved June 10, 2023 from https:// data. unicef. org/ resources/ state-of-the-worlds-hand-hygiene/#:~: text= This%20has%20created%20a%20unique,'no %2Dregrets'%20investment.
- Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC medical research methodology*, 18, 1-18.
- Vaske, J. J., Beaman, J., & Sponarski, C. C. (2016). Rethinking Internal Consistency in Cronbach's Alpha. *Leisure Sciences*, 39(2), 163–173.
- Wadhwani, M., Vashist, P., Singh, S. S., Gupta, V., Gupta, N., & Saxena, R. (2020). Prevalence and causes of childhood blindness in India: A systematic review. *Indian journal* of ophthalmology, 68(2), 311.
- WeCapable. (2022). *Blindness: Definition, Meaning as a Disability*. Retrieved June 3, 2022, from https://wecapable.com/blindnessdefinition-meaning-disability/
- Weiss, J. N. (2022). Blindness. In Visual Prosthesis: A Concise Guide, (pp. 1-3). Cham: Springer International Publishing. [e-book]. Retrieved October 3, 2023, from https://books.google.com.eg/books?hl=en&lr =&id=sFeEEAAAQBAJ&oi=fnd&pg=PR6& dq=Blindness.+In+Visual+Prosthesis:+A+Co ncise+Guide&ots=CEWxzra99A&sig=cKCl

KKOaT0x\_tdV9epMSuJCEpKs&redir\_esc=y #v=onepage&q=Blindness.%20In%20Visual %20Prosthesis%3A%20A%20Concise%20G uide&f=false

- White, S., Thorseth, A. H., Dreibelbis, R., & Curtis, V. (2020). The determinants of handwashing behaviour in domestic settings: an integrative systematic review. *International Journal of Hygiene and Environmental Health*, 227, 113512.
- Wijiastuti, A., Andajani, S. J., Walgino, W., Purbaningrum, E., Widajati, W., & Ashar, M. N. (2021). Parents' tutorial on how to keep hands hygiene among children with disabilities during the covid-19 pandemic. *Jurnal Penelitian Pendidikan Indonesia*, 7(2).
- Woods, D. (2020). Infection prevention in care homes: the role of community nurses. *Nursing And Residential Care*, *22*(2), 83-85.
- World Health Organization. (2017). Forgetting to wash your hands can cost lives. Retrieved August 10, 2022 from https:// www. who. Int /news-room/feature-stories/detail/forgettingto-wash-your-hands-can-cost-lives
- World Health Organization. (2020).Handwashing an effective tool to prevent COVID-19, other diseases. Retrieved June 15, 2022, from https://www. who.int/ southeastasia/ news/detail/15-10-2020handwashing-an-effective-tool-to-preventcovid-19-other-diseases#:~:text= With% 20 COVID%2D19%20transmission.others%20ar ound%20us%20safe.
- World Health Organization. (2021). State of the world's hand hygiene: a global call to action to make hand hygiene a priority in policy and practice. Retrieved June 3, 2023 from https://www.who.int/publications/i/item/9789 240036444
- World Health Organization. (2021). *Blindness and vision impairment*. Retrieved August 23, 2022 from https://www.who.int/newsroom/fact-sheets/detail/blindness-and-visualimpairment
- World Health Organization. (2022). *Eye care, vision impairment and blindness*. Retrieved June 3, 2022 from https:// www. who.

int/health-topics/blindness-and-vision-loss#tab=tab\_1

- World Health Organization. (2023). *Disability*. Retrieved October 3, 2023 from https:// www. who. int/news- room/fact-sheets/detail/ disability- and-health
- World Health Organization. (2023). *Blindness* and vision impairment. Retrieved October 5, 2023 from https://www.who.int/newsroom/fact-sheets/detail/blindness-and-visualimpairment
- World Health Organization. (2023). *World Hand Hygiene Day.* Retrieved November 1, 2023 from https://www.who.int/campaigns/worldhand-hygiene-day
- Ximenes, M. A. M., Fontenele, N. Â. O., Bastos, I. B., Macêdo, T. S., Galindo, N. M., Caetano, J. Á., & Barros, L. M. (2019). Construction and validation of educational booklet content for fall prevention in hospitals. *Acta Paulista de Enfermagem*, 32, 433-441.
- Yamamura, E., Tsutsui, Y., & Ohtake, F. (2023). The effect of primary school education on preventive behaviours during COVID-19 in Japan. *Sustainability*, 15(11), 8655.
- Yousuf, M. I. (2007). Using experts opinions through Delphi technique. Practical assessment, research, and evaluation, 12(1), 4.