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ADAPTATION AND VALIDATION OF THE LEARNING STYLES QUESTIONNAIRE – VARK TO MIDWIFERY EDUCATION – ME-VARK

Zofia RAPAPORT¹, Stefan COJOCARU²

Abstract

The research objective is to adapt and validate the VARK questionnaire on learning styles (Fleming, 2001, 2008) to the discipline of midwifery education in nursing – ME-VARK. The four major learning styles are: Visual, Auditory Read/write and Kinesthetic. From a sociological point of view, the working relationship between preceptor (midwife) and preceptee (student) contributes to the student's professional learning (self-efficacy in midwifery) and to the social formation of the students' identity as a midwifery practitioner. Therefore, matched learning styles between them are important for successful training, particularly in clinical practice. In order to construct the ME-VARK, following an in-depth literature review, and a documental analysis, a focus group and a Delphi procedure with in-depth literature review interviews were used to expose the subjective meanings of preceptorship relations as a social construct. Three expert-midwives that also were experienced preceptors participated in the focus group, and ten expert judges participated in six Delphi rounds (a total of 15 judgements). They were requested to propose items/responses relevant to midwifery education and then to validate the new ME-VARK. The results indicate that the chosen items are suitable to measure knowledge, competencies and learning styles in midwifery education. The adapted ME-VARK is relevant to midwifery education and encompasses the main labor stages, the central types of learning via preceptorship, and the essential topics in midwifery profession (exclusiveness). All items are relevant only to midwifery education (inclusiveness). The adapted ME-VARK was found to have all psychometric attributes: Content and construct validity, as well as face validity.

Keywords: midwifery education, preceptorship, learning styles, questionnaire adaptation and validation, Delphi method.

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Introduction

The research objective is to adapt and validate the VARK questionnaire (Fleming, 2001, 2008) to the discipline of midwifery education in nursing – ME-VARK. From a sociological point of view, the working relationship between preceptor (midwife) and preceptee (student) contributes to the student's professional learning (self-efficacy in midwifery) and to the social formation of the students' identity as midwifery practitioners (Phillips 2002; Phillips, Fawns, & Hayes, 2002). The social construction theory refers to conversations and dialogues in which the preceptees are engaged with their midwife-preceptors that are a public form of reflective practice (Phillips & Hayes, 2006), i.e., midwifery education.

Midwifery education

The role of the midwife has evolved worldwide from an unstructured occupation into a distinct profession, with clear professional boundaries, which are achieved through training, education and licensure. As a profession, midwifery has evolved to a socially constructed professional practice due to macro and micro socio-cultural factors, which have played a key-role in these transitions (Benoit *et al.*, 2005). A midwifery licensure in Israel is accessible only for registered nurses with a B.Sc. degree who have finished four years of studying in nursing faculty. The learning process is one year, and qualified midwives must pass the government examination and get a personal license.

The aim of midwifery education is to qualify competent and autonomous midwives (ICM, 2018; The World Health Organization, 2000; Lukasse Lilleengen, Fylkesnes, & Henriksen, 2017), to empower professionalism based on the philosophical point of view that “care” has always been a woman-centered phenomenon. As such, it requires acknowledging and addressing significant sociocultural, economic and professional barriers that are rooted in gender inequality, visible in social and institutional hierarchies of power. However, competence is demonstrated when students successfully perform activities in a ‘real world’ clinical situation (Eraut, 2007). A midwife is trained to provide the necessary care to conduct normal deliveries on her own, recognize warning signs of abnormal or potentially abnormal conditions which necessitate referral to doctors, and help reduce unnecessary medical interventions (Bluff & Holloway, 2008).

The aim of the Preceptorship model is to create and promote professional clinical competency in midwifery, and to assist and support students integrate theory into their clinical practice (Altman, 2006; Carlson, Wann-Hansson, & Pilhammar, 2009; Phillips, 2016), as a professional role model (Perry, 2009; Power & Ewing, 2016). Role theory, in sociology, concerns one of the most important features of social life, characteristic behavior patterns or roles (Biddle, 1979, 1986). Robert K. Merton (1959), who coined the term “role model”, hypothesized that individuals compare themselves to relevant reference groups of people who occupy the social role to which they aspire (see also Holton, 2004). Preceptorship is defined as the relationship between preceptors (role models) and one or two preceptee for a bounded period (Lambert & Glacken, 2006; Myric, 2002; Myric & Young, 2004; Nielsen *et al.*, 2017; Phillips *et al.*, 2002). The preceptor is an

expert clinician, i.e., midwife, who is familiar with the ward routine and culture and therefore can provide direct supervision and feedback according to the preceptee's learning needs, her level of confidence, and ability to think critically (Shamian & Inhaber, 1985). In other words, the preceptor supports the preceptees in making the transition from novice to expert (Benner, 2001), and in socializing into the role of a professional midwife (Altman, 2006; Happell, 2009; Hardymen & Hickey, 2001; Myrick, 2002; Myrick & Yonge, 2001, 2004; Zilembo & Monterosso, 2008). This process relies on the notion that social cognitive learning requires observation (Bandura, 1977). It has been suggested that matching the preceptee's and preceptor's learning styles may contribute to their relationship (Zilembo & Monterosso, 2008).

Learning styles – VARK

The VARK questionnaire (Fleming, 2001, 2008) has been used for the last 30 years to identify types of learning styles (Peyman *et al.*, 2014). It exhibits 16 daily-life situations which require learning but are irrelevant to midwifery education. Although it has been used in many studies for identifying students' learning styles and has been validated in several studies, (e.g., Felder & Barnett, 2005; Leite, Svinicki, & Shi, 2010), there is a need to adapt it to other disciplines, in the current study – midwifery education. Flemings' theory of Learning Styles describes four major types: Visual (learning by seeing), Auditory (learning by hearing), Read/write and Kinesthetic (learning by doing). Matched learning styles between a preceptor and preceptee are important for successful training (Hardy & Smith, 2001), particularly in the nursing preceptor-preceptee relationship the clinical setting (Alkhasawneh, Maryyan, Alashram, & Yousef, 2008; Cavanagh & Coffin, 1994).

Methodology

Research questions

- (1) Which items are suitable to measure knowledge, competencies and learning styles in midwifery education?
- (2) What are the psychometric attributes of the adapted ME-VARK?

Research approach

According to the constructivist worldview, the aim of this study is to reveal how learning styles are perceived by a culture-sharing group (Creswell, 2014; Crotty, 1998), i.e. – expert experienced midwife preceptors. The social construct of learning styles in preceptorship relations is revealed using a focus group, Delphi procedure with interview, in order to construct and validate the ME-VARK according to their subjective meanings. The interpretive framework of social constructivism relies on an epistemological belief, according to which the reality

that is constructed between the researcher and the investigated topic is formed by cumulative experiences of individuals (Creswell & Poth, 2018).

Design and procedure

Figure 1. The design and procedure of the study

Stage A – (a) Focus group

The aim of the use of the focus group is to gather information for constructing the new questionnaire related to health education in the context of midwifery education (Kitzinger, 1994, 1996), as a preliminary stage of construction of questionnaires (Detmar *et al.*, 2006). The group functions as a promoter of synergy

and spontaneity by encouraging the participants to comment, explain, disagree, and share their views. Thus, experiences are shared, and opinions voiced that might not surface during individual interviews (Carey, 1994; Stewart, Shamdasani, 1990). The questions were designed by the researchers prior to the group-interview and are used to guide the discussion (Hollis, Openshaw, & Goble, 2002; Stewart & Shamdasani, 2007). The interview with the focus group was held at noon and lasted about an hour and a half. Following their agreement to take part in this procedure, a brief explanation of the study was given and they were given a hard copy of the original VARK questionnaire (Fleming, 2008³) as an example, and an explanation of the format of a VARK question and its four possible responses (each response representing one of the four learning styles).

Stage A – (b) Documental analysis

Document analysis involves interpretation of texts and coding content into themes, in the same methods that transcripts of interviews and discussion in focus groups are analyzed (Bowen, 2009). In the current study, public records and physical evidence (O’Leary, 2014) were analyzed from three sources: The midwifery curriculum for qualified nurses (2019); the role of the midwife definition (WHO, 2017); the PNSE questionnaire (Murphy & Kraft, 1993). Each one of the documents was carefully read by the researcher and the expert on research methods (first alone and then together) in order to produce items for the new ME-VARK questionnaire.

Stage B – Delphi procedure (six-round)

Stage B included a Delphi procedure that was carried out in six weeks (Hasson *et al.*, 2000), to identify core competencies for advanced midwifery education. The suggestions of possible items for the adapted VARK were sent in six rounds to the panel of experts in nursing education and midwifery training, and a Ph.D. expert on research and evaluation methods, to construct, reformulate and validate the adapted version of VARK to midwifery education – ME-VARK. At each round, the expert-judge was interviewed by the researcher to help them structure and demonstrate their knowledge and experiences (Shkedi, 2003). The **interviews’** transcripts were analyzed using qualitative systematic content analysis – (Byron, 2013; Creswell & Miller, 2000; Patton, 1990) in order to choose the best items, fit to describe and measure learning styles in midwifery education for the adapted ME-VARK.

Population and participants

In Israel, all midwives are already registered nurses; consequently, all midwifery preceptees work as nurses. Despite the level of nursing experience upon entry into the program, they are novices as midwifery preceptees. Currently, five education programs are actively training registered nurses to become midwives in Israel,

³ See updated version: <http://vark-learn.com/the-vark-questionnaire/>

with each program enrolling about 30 preceptees. Thus, the maximum number of participants who can be recruited in Israel each year is about 150.

Participants – Focus Group and documental analysis: Three participants were interviewed within the focus group: two experienced (over 25 years) expert-midwives that also were experienced preceptors. Two of them work in hospitals and one midwife works at a private delivery center in the community. The documents were analyzed by the researcher and the expert on research methods.

Participants – Delphi rounds: In general, the Delphi panel sizes range from a few to fifty or more participants (Colton & Hatcher, 2004). In the current study, ten experts participated in the Delphi rounds; they were selected according to their *seniority as midwives* (at least five years) and **as preceptors** (at least three years). In the current study, the ten expert judges participated in various rounds (a total of 15 judgements).

Ethical considerations

The researcher is positioned on a scale from being engaged to disengaged (Creswell & Poth, 2018); The researcher is the director of an advanced nursing school. Therefore, precautions were taken under consideration of possible influences she might have on the integrity and ethics of the research. Permissions and Helsinki Committee Approval were received including permission to use PNSE questionnaire (Murphy & Kraft, 1993) and VARK questionnaire (Fleming, 2008). Preceptees and preceptors were requested to participate in the study and express their informed consent (Byron, 2013), (a) prior to conducting the interviews and participation in the Delphi procedure, and (b) on the first page of the questionnaires. Their identities were kept confidential throughout the research.

Results

Stage A – Formulation of items and proposed responses: Focus group and interviews

This stage began with a **Focus Group** in which three expert midwives participated (Crotty, 1998). Following the instruction: “As an experienced preceptor, please suggest some items describing the midwifery knowledge, competences and skills which are learned via preceptorship?” – they suggested 12 items and four responses for each item representing VARK learning styles. Additionally, they were requested to write up to six more items using a “form for proposing items to examine learning styles (ME-VARK), of students during CPE in midwifery within nursing-school”. This form included a brief explanation about the original VARK, a description of each learning style and two example items. Each participant filled-out the form with the researcher who **interviewed** each one of them regarding their rationale and considerations for suggestions and wording (Byron, 2013). Following

the documental analysis which supplemented the pool of proposed items, a total of 18 items/responses was gathered.

Stage B – Six-round Delphi procedure

Delphi round-1. The pool of 18 items was submitted to nine expert midwifery preceptors, who assessed face-validity (wording, relevance, etc.), content and construct validity (i.e., whether the list of items is exclusive and inclusive). They suggested some additional items/responses and changes, e.g., instead of using PNSE-terminology (before-during-after labor) – use of “Phase I-II-III”; items which were not specific to midwifery training were omitted. The validation-form included at the end of this round 25-items.

Delphi round-2. The researcher and an expert on research-methods (PhD) examined content and construct validity and relevancy to midwifery nursing, face-validity, i.e., formulation (use of the accepted terminology in obstetrics and training for midwives), during three sessions (a total of six hours). All sources of items/responses formulation were revisited to confirm that the entire questionnaire is inclusive and exclusive regarding the content realm of midwifery in nursing. The items were classified according to their wording (labor phase and competencies). At the end of this round, a new 24-item validation form was constructed for choosing 16 questions (as the original VARK) which are most related to midwifery, correcting wording and confirming (again) content and construct validity. The choice of 24 items (50% more that needed) – was considered to be a sufficient pool of items for selection and validation.

Delphi round-3. The validation-form was used to evaluate the suggested items/responses regarding: *Content validity* – verifying accordance between the items/ responses – to midwifery discipline (formulation, wording); *Construct validity* – the proposed items/responses represent various aspects of the midwifery discipline; *Inclusiveness of midwifery discipline* – all items/responses are relevant to midwifery and encompass it; *Exclusiveness* – all items/responses are relevant only to midwifery and not to other disciplines; *Face-validity* – each item/response is correctly formulated, clear and easy to understand. The instructions for filling-out the form were: “The following items/responses were proposed by expert-midwives, based on relevant professional literature and guides in midwifery education. Please classify each item **twice** (please check in the relevant column. You may check more than one)”.

The first item was an example of how to fill-out the form. The rest of the items were presented in the following format that is presented in *Figure 2*:

		(A) The labor stage or stages the question reflects			(B) The type of learning the question presents					(C) The learning style the answer describes			
		before labor	during labor	after labor	knowledge and information in midwifery	qualifications and skills in midwifery	communication with the staff and the parents	guiding parents' qualifications	other (please specify)	Visual	Aural	Read-write	Kinesthetic
Question 2.	Prepare a woman giving birth to epidural anesthesia												
Answer 1	Watch the anesthetist working												
Answer 2	Listen to the doctor explaining to the woman giving birth the epidural anesthesia procedure												
Answer 3	Read written instructions and orders for preparation giving epidural anesthesia to a woman birth to												
Answer 4	Practice in a simulation the preparation to the epidural anesthesia of a woman giving birth												

Figure 2. An example of an item in the validation-form of ME-VARK questionnaire

This form was submitted to the same experienced expert-midwives who participated in stage A and Delphi round-1. It was concluded that in order to ensure content and construct validity – i.e., appropriate representation of midwifery education, they should encompass **meta-topics** of the midwifery discipline. Thus, in addition to classification of ME-VARK items according to labor phase and competencies to be learned, the items/responses were classified according to their topic: 1. midwifery anamnesis, 2. Knowing and understanding the meaning of pregnancy tests, 3. Perineum episiotomy, 4. Pain management, 5. Premature delivery, 6. Fetal monitoring, 7. Safe delivery 8. Bonding (skin-to-skin, breast-feeding and labeling). After amending the items/responses, the researcher and the research methods' expert chose 16 items that were most inclusive and relevant to the midwifery discipline. Construct validity examined whether the items/responses describe a typical routine of all three labor stages. The second validation-form included 16 items/responses,

Delphi round-4. The second 16-item validation-form (figure 3) was checked by another expert judge that read carefully and in detail each item/response, and afterwards was interviewed by the researcher, who read the items out loud with her in order to assure that she understood their intended meaning (face-validity).

The following list presents the questions and answers suggested by the expert midwives.

Please classify each question twice (check ✓ in the correct cell):

The labor stage or stages the question reflects: before labor, during labor, after labor (A)

The type of learning the question presents: knowledge and information in midwifery, qualifications and skills in midwifery, communication with the staff and the parents, guiding parents' qualifications, other (B)

In addition, please classify each of the four answers which are proposed to each question, according to **the learning style the answer describes:** visual, Aural, Read-write, and Kinesthetic (C).

The first question is an example:

		(A) The labor stage or stages the question reflects			(B) The type of learning the question presents					(C) The learning style the answer describes			
		before labor	during labor	after labor	knowledge and information in midwifery	qualifications and skills in midwifery	communication with the staff and the parents	guiding parents' qualifications	other (please specify)	Visual	Aural	Read-write	Kinesthetic
Question 1.	Prepare and treat a woman giving birth and the newborn baby in a forceps delivery		✓			✓							
Answer 1	Watch the preceptor and/or relevant short films									✓			
Answer 2	Listen to the preceptors' explanation										✓		
Answer 3	Read written instructions and orders											✓	
Answer 4	Practice in a simulation, the treatment of a woman giving birth in a forceps delivery												✓

Figure 3. The instructions for the first and second validation form

As a result of this validation process some changes were introduced: One irrelevant item was omitted because it describes a period of time which is not under the responsibility of the midwife (content validity); the items were rephrased focusing on clinical reasoning – and not other competencies (e.g., instead of “deciding to give Pethidine...” – “Giving Pethidine according to the guidelines”); Responses which described kinesthetic learning style were reworded to describing action (e.g., “to suggest and apply” was changed to “practice in simulation”).

Delphi round-5. The validation-form was submitted to two expert-judges. Following all comments of the judges, the following classification was determined (content and construct validity):

Table 1. Labor phases and learning competencies

Labor Phase			Learning Competencies			
P1= phase I	P2= phase II	P3= phase III	C1= Theoretical preliminary Knowledge in midwifery	C2= qualifications and skills in midwifery	C3= communication with the staff	C4= communication with the mother, family and significant others, and guidance

A few amendments were introduced to the wording of the items/responses, e.g., “Providing safe care for mother and infant immediately following birth including weight and labeling” was changed to “identification and labeling”, because it focuses on bonding between mother and baby – and weighing is a technical skill. In accordance all items’ responses were amended as well.

Delphi round-6. The ME-VARK questionnaire was translated into English and back into Hebrew by a professor of English literature and by an expert in research and evaluation methods (PhD). In addition, the wording was compared to the Myles textbook for midwives (Marshall & Raynor, 2014) and relevant curricula in English. The researcher and the expert on research methods (PhD) reviewed again all items/responses and decided that each item should begin with a gerund (e.g., “performing”) as with most items in the original VARK (Fleming, 2001, 2008) and that the order of the responses to each item should be presented in the exact order of the original VARK questionnaire. Then, it was submitted again to the judge who participated in the 1st&3rd Delphi rounds. She noted that instead of using “to practice” in the responses that represent the Kinesthetic learning style – the wording should be “performing... in real time or in simulation”. This change of the verb from infinitive construct (infinitive) to verbal noun (gerund) was introduced into the Hebrew and English ME-VARK questionnaires.

The final validated ME-VARK

The final ME-VARK questionnaire included 16 items (as the original VARK), describing knowledge and competencies that are learned during midwifery training, through the interaction between the preceptor and the preceptee. For each item, four responses were worded which describe the four learning styles. The responses were presented in the same order of learning styles as in the original VARK questionnaire, to maintain construct validity.

Item number-classification V/A/R/K response	
1-P1C124	(1) Performing individualized maternal health assessment
Kinesthetic	1. Receiving a woman in the labour unit in real time and/or through simulation
Aural	2. Listening to the preceptor's explanations
Read/Write	3. Reading written guideline, instructions and the relevant text books
Visual	4. Watching the preceptor and/or relevant short videos
2-P12C124	(2) Performing vaginal examination of a woman in labour
Visual	1. Watching films that demonstrate the examination
Aural	2. Listening to the preceptor's explanations regarding the procedure of performing the examination
Read/Write	3. Reading guidelines and instructions regarding performing the examination
Kinesthetic	4. Practicing the examination in real time and/or through simulation
3-P1C1234	(3) Apply a fetal monitor on a woman in labor for the first time
Kinesthetic	1. Placing a fetal monitor on a woman in real time and/or through simulation
Visual	2. Watching a film that demonstrates the correct placement of a fetal monitor
Read/Write	3. Reading guidelines and instructions regarding the correct placement of a fetal monitor
Aural	4. Listening to the preceptor's explanations
4-P12C124	(4) Interpret fetal monitor strips
Kinesthetic	1. Placing a woman in labour on a fetal monitor and interpreting the findings, in real time or by simulation
Aural	2. Listening to the explanations of the preceptor and other members of the team as they interpret the displayed results of the fetal monitor strips
Visual	3. Watching the preceptor and other members of the team interpret the fetal monitor strips
Read/Write	4. Looking at the displayed results and reading textbook that explain how to interpret them
5-P123C1234	(5) Recognizes the stages of labour
Aural	1. Listening to the explanations of the preceptor as to how to identify the stages of labor
Visual	2. Watching a film that demonstrates the stages of labour
Kinesthetic	3. Performing a vaginal examination in real time and/or through simulation
Read/Write	4. Reading explanations in textbooks or recognizing the stages of labor
6-P123C1234	(6) Skilled care of the woman and fetus during pre-mature labor with preceptor's supervision
Kinesthetic	1. Practicing through simulation care of the woman and fetus during pre-mature labor
Read/Write	2. Reading in the textbook how to care for a woman during pre-mature labour
Visual	3. Watching the preceptor administer skilled care to the woman and fetus during pre-mature labour
Aural	4. Listening to preceptor's consultation and explanations regarding observation and examination of the woman during pre-mature labor
7-P123C1234	(7) providing adequate interventions when protracted labor is identified
Kinesthetic	1. Implementing suitable solutions for protracted labor with a preceptor and the woman's cooperation
Aural	2. Discussing probable solutions with the preceptor in cases when protracted labor is identified
Visual	3. Watching tutorial films of birth including protracted labor and its possible solutions
Read/Write	4. Reading textbooks and articles that describe possible solutions for protracted labor
8-P1C12	(8) Clinical decision making for pethidine administration guidelines
Read/Write	1. Reading the guidelines for pethidine administration
Kinesthetic	2. Making decisions regarding the administration of pethidine in real time and/or through simulation
Visual	3. Watching the preceptor decide and administer pethidine, along with an informative explanation to the woman
Aural	4. Discussing the preceptor's reasons for pethidine administration and listening to her give an informative explanation to the woman
9-P123C2	(9) Identify post-partum hemorrhage and treatment
Read/Write	1. Reading in textbooks about care for the woman with postpartum hemorrhage
Aural	2. Discussing with the preceptor the care of a woman with postpartum hemorrhage
Kinesthetic	3. Treatment of postpartum hemorrhage in real time and/or through simulation
Visual	4. Watching the preceptor care for a woman with postpartum hemorrhage

Figure 4. The final ME-VARK after validation and classification into labor stages and midwifery competencies that are learned via preceptorship

Item number-classification V/A/R/K response	
10-P12C12	(10) Identify signs of fetal distress
Kinesthetic	1. Identification of signs of fetal distress by reading fetal monitor strips in real time and/or through simulation
Visual	2. Watching the preceptor and other team members identify signs of fetal distress
Read/Write	3. Reading about the signs of fetal distress in textbooks and preparing a written summary
Aural	4. Discussing with the preceptor and/or listening to a discussion between other team members about the signs of fetal distress
11-P23C1234	(11) Enabling a safe birth environment for mother and her infant
Visual	1. Observing the preceptor actions that enable a safe birth
Read/Write	2. Reading in textbooks how to maintain a safe birth for mother and her infant
Aural	3. Listening to the preceptor's explanations about necessary procedures for maintaining safety of mother and child
Kinesthetic	4. Management of safe labor in real time and/or through simulation
12-P3C124	(12) Providing safe care for mother and infant immediately following birth including identification and labeling
Aural	1. Listening to the preceptor's explanations about necessary procedures for mother and infant immediately following birth including identification and labeling
Read/Write	2. Reading the Ministry of Health's guidelines on providing appropriate care including identification of mother and her infant immediately following birth
Visual	3. Watching the preceptor provide appropriate care including identification of the mother and her infant immediately following birth
Kinesthetic	4. Care giving to the infant immediately following birth in real time and/or through simulation
13-P3C1234	(13) Assess general condition of the newborn following birth including determining Apgar scoring
Kinesthetic	1. Practicing with the preceptor assessment of the newborn including determination of Apgar scoring
Aural	2. Listening to the preceptor's explanations regarding assessment of the newborn including the determination of Apgar scoring
Read/Write	3. Reading in relevant textbooks descriptions explaining the assessment of the newborn following birth including the determination of Apgar scoring
Visual	4. Watching movies that demonstrate assessment of the newborn following birth including the determination of Apgar scoring
14-P3C124	(14) Encourage early bonding of parent-baby with emphasis on skin to skin and breastfeeding
Kinesthetic	1. Practicing encouraging and early bonding of the parent-baby unit with emphasis on skin to skin and breastfeeding
Read/Write	2. Reading in textbooks how to encourage early bonding of the parent-baby unit with emphasis on skin to skin and breastfeeding
Aural	3. Listening to the preceptor's explanations regarding the best ways encouraging early bonding of the parent-baby unit with emphasis on skin to skin and breastfeeding
Visual	4. Watching the preceptor encourage early bonding of the parent-baby unit with emphasis on skin to skin and breastfeeding
15-P3C4	(15) Helping initiate early breastfeeding as soon as possible following birth, help finding safe and appropriate positioning
Kinesthetic	1. Applying what was learned in guiding the mother in early breastfeeding with help and support
Aural	2. Listening to the preceptor help and support the mother in early breastfeeding after birth
Read/Write	3. Reading guidelines about how to help and support a mother in breastfeeding after birth and summarize in writing
Visual	4. Watching the preceptor help and support the mother in early breastfeeding after birth
16-P3C2	(16) Guiding the woman in care for her perineum following birth with emphasis on treating the stitches
Visual	1. Watching films that demonstrate guiding the woman to care for the perineum following birth including stitches
Aural	2. Listening to the preceptor and asking her to explain how she guide the women to care for the perineum following birth including stitches
Read/Write	3. Reading guidelines that focus on care for the perineum following birth including stitches
Kinesthetic	4. Practicing in real time and through simulation guiding the woman to care for the perineum following birth including stitches

Figure 4 (continued) . The final ME-VARK after validation and classification into labor stages and midwifery competencies that are learned via preceptorship

The instructions for filling-out the ME-VARK were formulated similar to the original VARK instructions and adapted to preceptors' and preceptees' questionnaires.

Discussion

According to the first research question, in the current study items that are suitable to measure knowledge, competencies and learning styles in midwifery education were identified. Following an in-depth literature review, and to the best of our knowledge, this is the first attempt to adapt and validate the VARK questionnaire to a specific professional discipline, in the current study midwifery education.

The validation procedure of the ME-VARK questionnaire was carried out by expert-judges, and included a focus group, documental analysis and a six-round Delphi procedure. Following the stages of validation, it may be concluded, that (a) the adapted ME-VARK is relevant to midwifery education and encompasses the main labor stages, the central types of learning via preceptorship, and the essential topics in midwifery profession (exclusiveness). This aspect ensures that midwifery education will produce qualified, competent, and autonomous midwives (The World Health Organization, 2000; Lukasse *et al.*, BMC Medical Education, 2017). This aspect contributes to midwifery education a professional midwife with strong prenatal-efficacy and solid professional identity with clear understanding not only the core of the profession, but also its boundaries; (b) all items in the adapted ME-VARK are relevant only to midwifery education and not to specifically to other nursing specialties (inclusiveness).

In response to the second research question, the adapted ME-VARK was found to have all psychometric attributes: content and construct validity, as well as face validity.

The innovation and unique contribution of the study is twofold; first, it constructs a systematic, evidence-based procedure to adapt the VARK questionnaire to additional professional disciplines (figure 1), and second, it adapts and validates VARK to the professional discipline of midwifery education – ME-VARK.

Research on matched preceptor-preceptee learning styles may promote midwifery education and training in the clinical setting by successfully integrating theory into the clinical practice. In addition, it may also contribute to promoting the professional development of the preceptors themselves.

In further research it is suggested to further validate this new ME-VARK questionnaire in additional samples of preceptors and preceptees (in Israel and other countries). It is also suggested that the systematic, evidence-based procedure developed in this study be used to adapt VARK to additional disciplines. In intervention research, it is recommended to develop and apply workshops for individual training according to specific learning styles profiles that may be identified via the ME-VARK questionnaire.

Preceptors should be aware that it is highly important to match their teaching methods and requested assignments to their students' unique learning styles.

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