Co-funded by the Erasmus+ Programme of the European Union

Digitaal lab voor onderwijs in diëtetiek, dat ervaringsgericht leren en maatschappelijke dienstverlening combineert

Handleiding voor de opleiding van educatieve digitale software

2021-1-ES01-KA220-HED-000032074

Februari 2025

Co-funded by the Erasmus+ Programme of the European Union

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Inhoud

1. Inleiding

Om de leerreis en praktische ervaringen van de cursisten te vergemakkelijken, krijgen ze toegang tot twee digitale tools die door het onderzoeksteam zijn ontwikkeld: een virtuele patiëntenchatbot en een virtuele kliniek.

1.1 Een virtuele patiëntenchatbot?

Om de praktische training in diëtetiekonderwijs te verbeteren en een community-/service-learningbenadering met betrekking tot voeding te bevorderen, is er een digitale omgeving gecreëerd voor het uitvoeren van virtuele patiëntinterviews.

De educatieve digitale software is gebaseerd op de presentatie en interactie met virtuele patiënten en is bedoeld om studenten voeding/diëtetiek en diëtisten in het hoger onderwijs te helpen hun vaardigheden te verbeteren zonder direct toezicht. De digitale tool presenteert verschillende scenario's (echte gevallen van patiënten) om een ervaringsgerichte leerervaring te genereren. Deze scenario's richten zich op thema's zoals obesitas, diabetes of nefropathie, en verschillende scenario's kunnen worden ontwikkeld en opgenomen in de software.

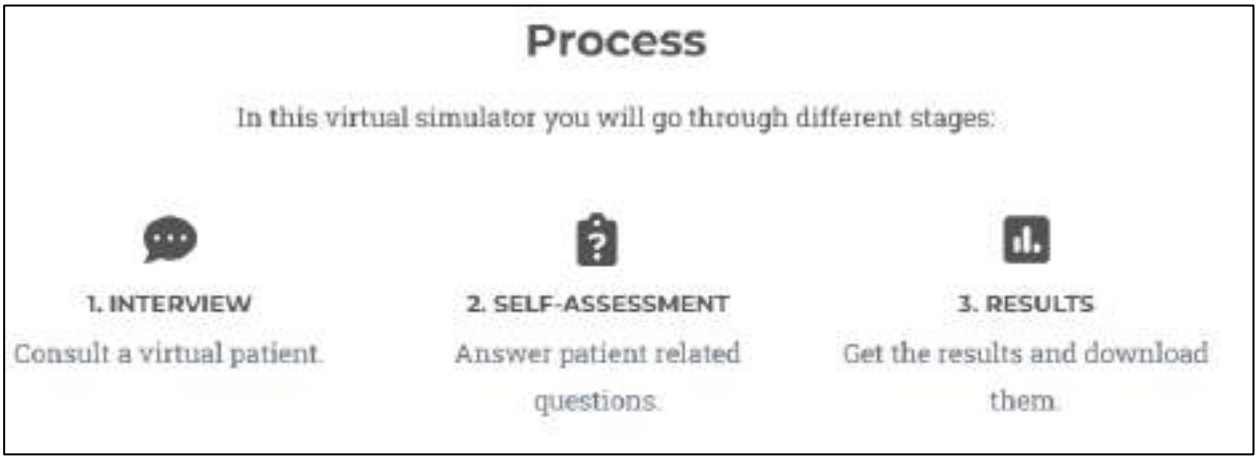
In de Educational Digital Software kan de leerling communiceren met virtuele patiënten. Studenten en diëtisten chatten met de patiënten om hun anamnesevaardigheden te verbeteren, gericht op het Dietetic Care Process (DCP – zie afbeelding 1).

Figuur1: Dieetzorgproces (DCP)

Gesprekken zijn gevirtualiseerd in een conversationele AI en intern aangestuurd door deskundige diëtisten/voedingsdeskundigen, waarbij fouten werden gecorrigeerd en hun reacties werden verbeterd.

Het proces bestaat uit drie hoofdstappen (zoals weergegeven in Figuur 2):

1) Interview met een virtuele patiënt (patiëntanamnese);
2) Zelfevaluatie met behulp van deVoedingsdiagnostische terminologie;
3) Resultaten weergeven.



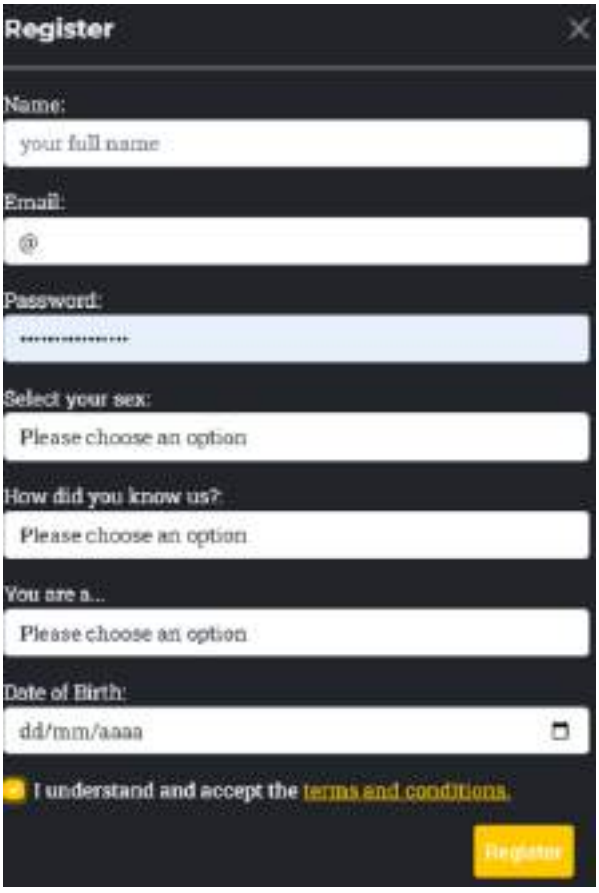
Figuur 2: Proces gebruikt voor educatieve digitale software

2. Hoe gebruik ik de educatieve digitale software?

Er is een platform gecreëerd om de interactie met de virtuele patiënten mogelijk te maken. Het is beschikbaar op:https://virtual-patient.edietinglab.eu/
De meeste partnerinstellingen van het project (St. Pölten University, Jan Kochanowski University of Kielce, Faculty of Nutrition and Food Sciences, University of Porto, Universidad Europea del Atlántico en AP Hogeschool Antwerpen) ontwikkelden virtuele patiënten onder verschillende klinische omstandigheden. Elk van de virtuele patiënten heeft een aparte diagnose en heeft een aparte nutritionele interventie nodig.
Het doel van dit platform is om de anamnesetraining en vervolgens de identificatie van de voedingsbehoeften van de patiënten en de begeleiding daarvan te vergemakkelijken (meer details hieronder).

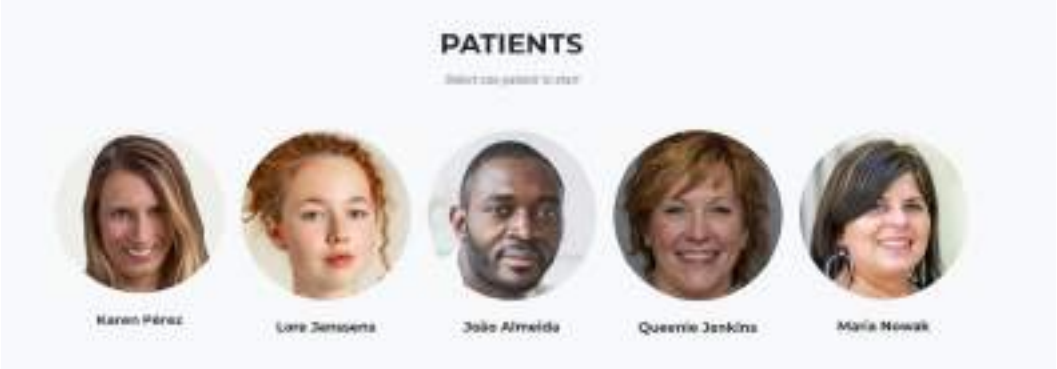
2.1 Registratie en eerste stappen

Om met de virtuele patiënten te kunnen communiceren, moeten cursisten zich registreren op dit platform en de vereiste gegevens verstrekken in het registratieformulier (zoals geïllustreerd in Afbeelding 3).



Figuur 3: Registratieformulier

Na het inloggen kunnen leerlingen kiezen uit vijf verschillende virtuele patiënten om een interview te starten: Karen Pérez, Lore Janssens, João Almeida, Queenie Jenkins en Maria Nowak (Figuur 4). Het aantal virtuele patiënten en klinische gevallen kan worden verhoogd of gewijzigd op basis van de geïdentificeerde behoeften.

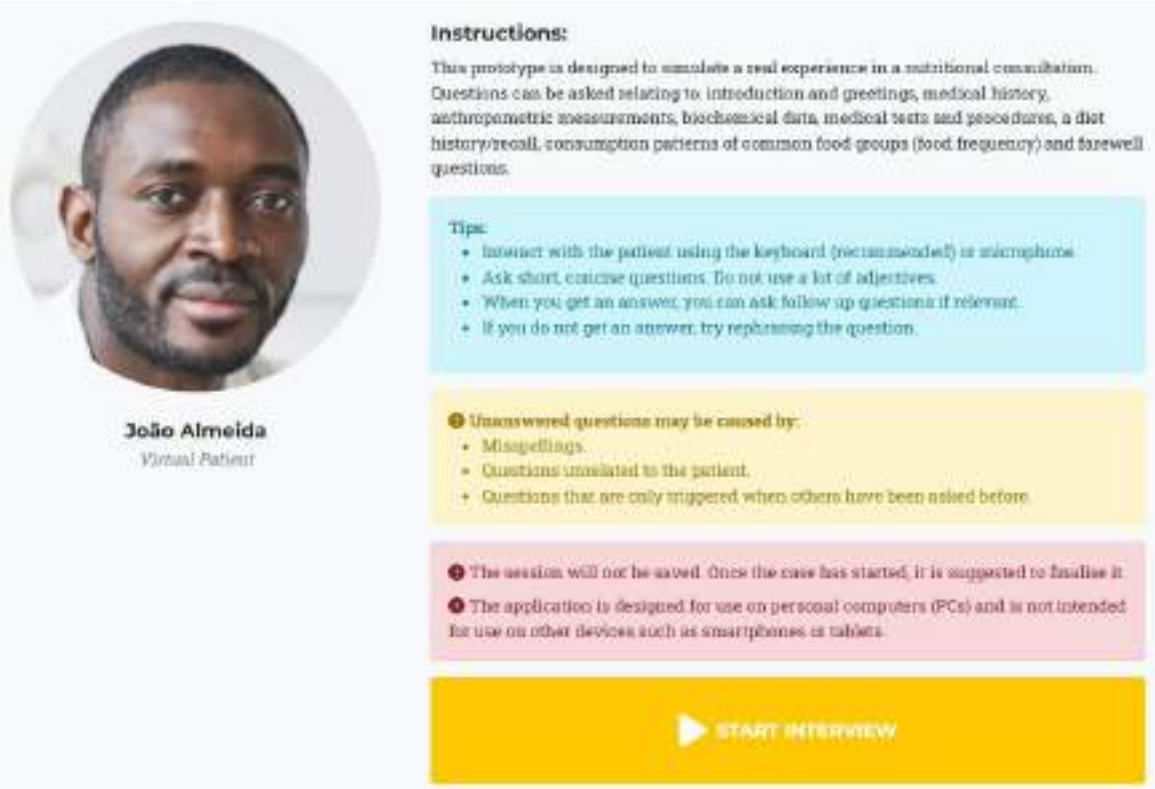


Figuur 4: Virtuele patiënten

Het interview kan in verschillende talen worden afgenomen: Engels, Duits, Spaans, Nederlands, Pools en Portugees (Figuur 5).

Figuur 5: Taalselectie

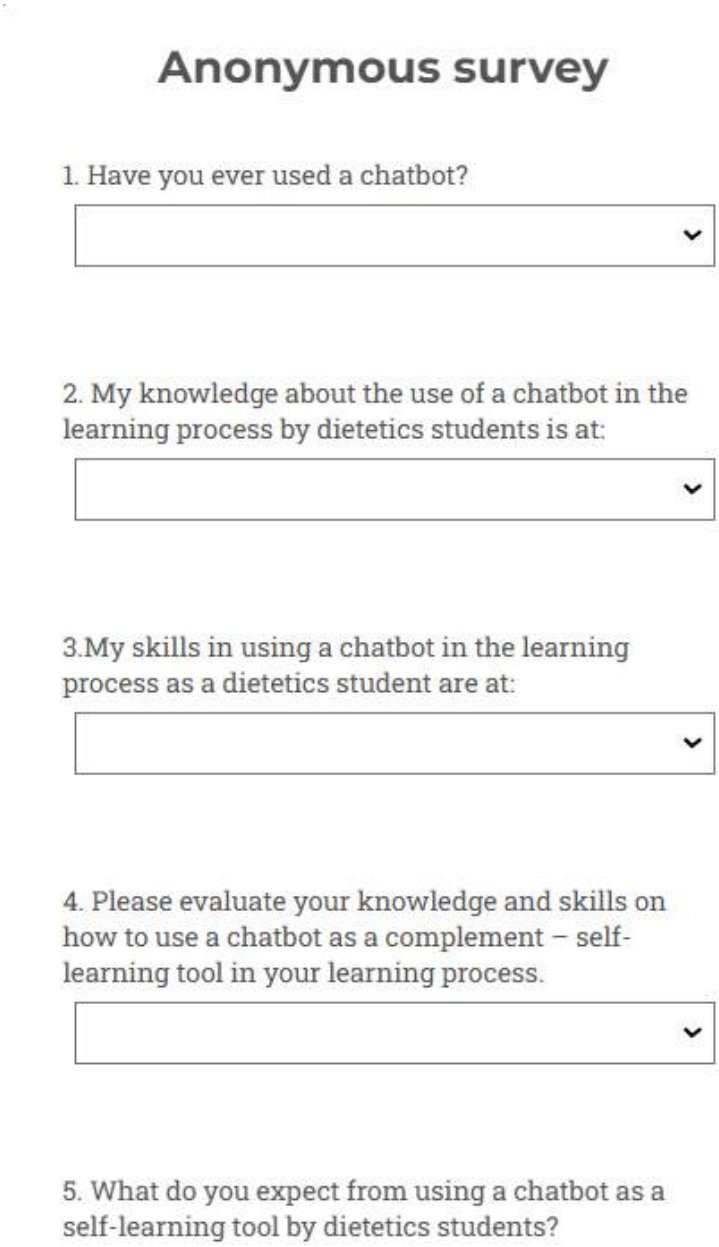
6 Na selectie van de virtuele patiënt en de gewenste taal voor het interview, krijgen de leerlingen de instructies om te communiceren met de chatbot (Figuur 6). Deze instructies kunnen ook op elk moment tijdens het interview worden geraadpleegd (knop "Instructies" onder het chatbotvenster).

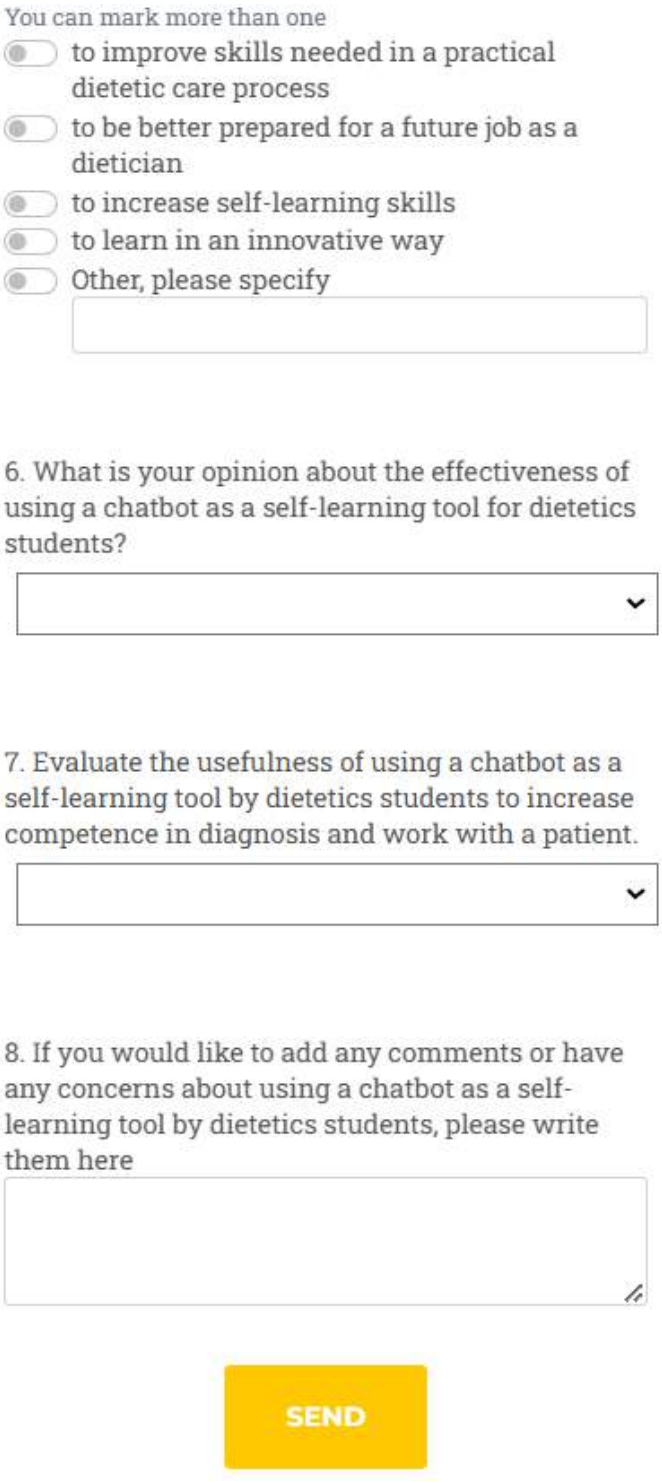


Figuur 6: Chatbot-instructies

2.2 Eerste onderzoek

Na het selecteren van de optie "Start interview" wordt een enquête weergegeven die moet worden ingevuld voordat u verder kunt gaan. Deze enquête vraagt de deelnemer naar eerder gebruik van een chatbot, percepties en verwachtingen over de effectiviteit ervan (Figuur 7).

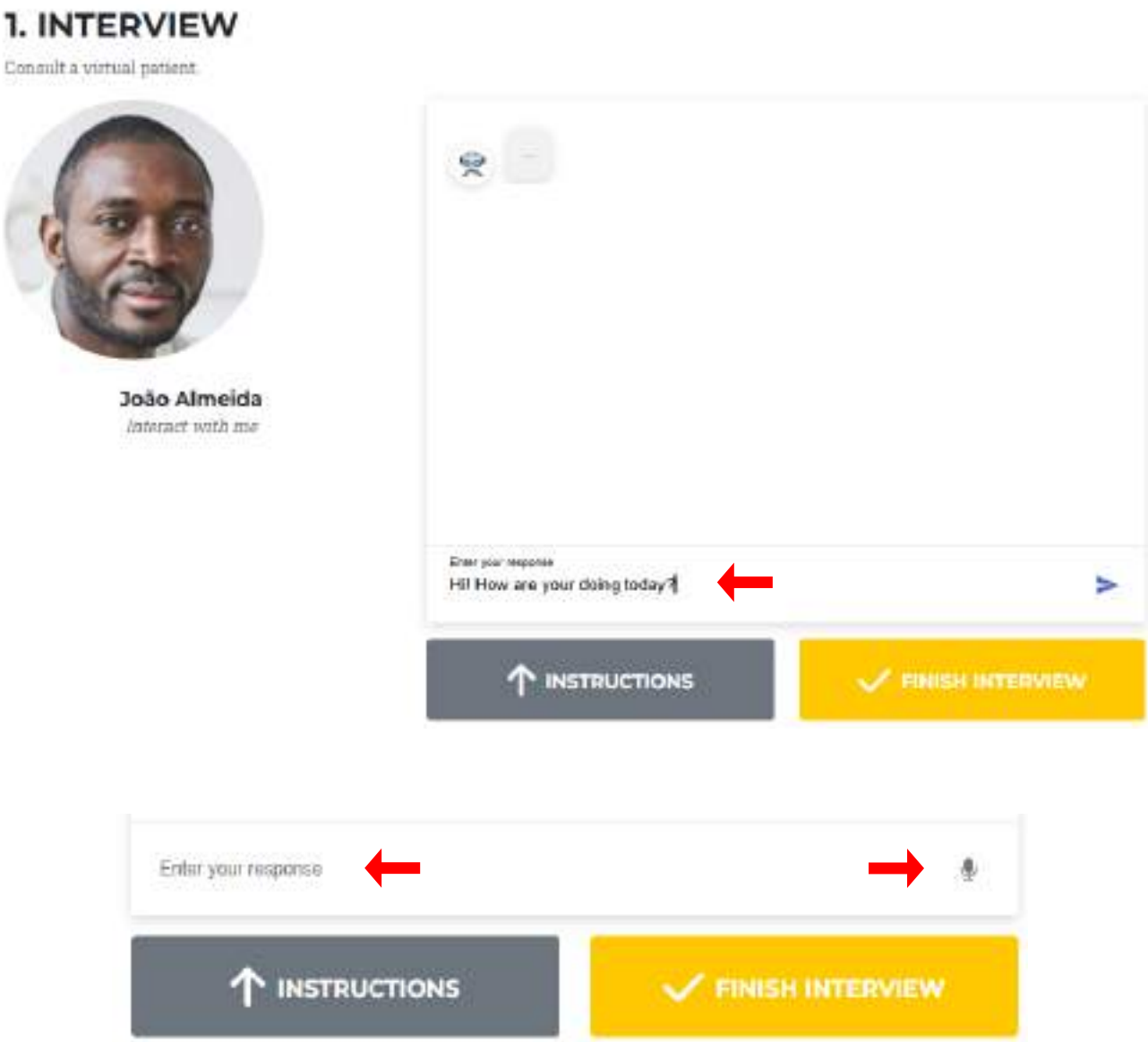




Figuur 7: Eerste onderzoek

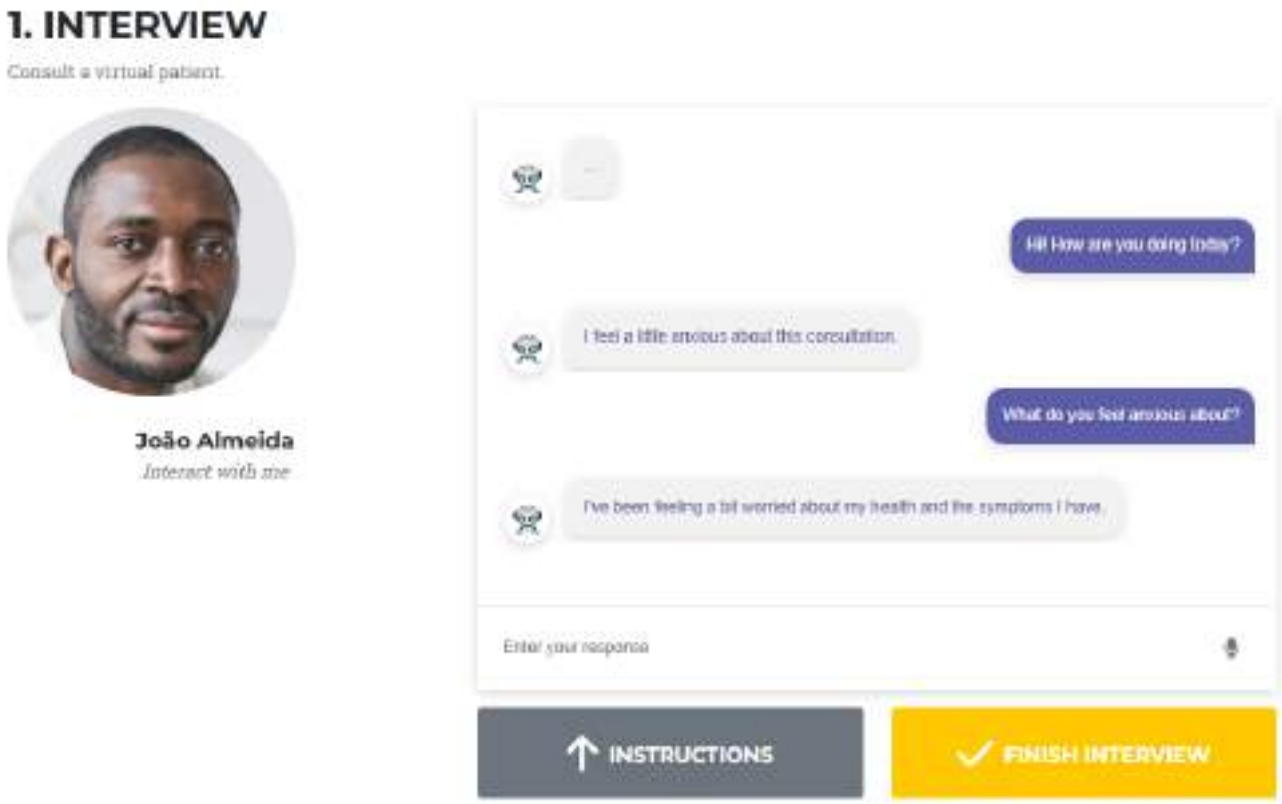
2.3. Chatbot-interactie

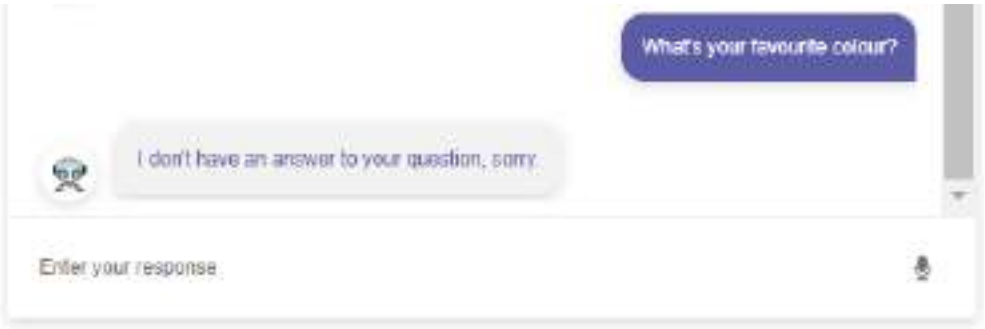
Vervolgens wordt een chatbot weergegeven, die de interacties mogelijk maakt (Figuur 8). Leaners kunnen een onbeperkt aantal vragen stellen om alle benodigde informatie te verzamelen. De vragen kunnen schriftelijk of gesproken worden (met behulp van het microfoonteken, Figuur 9).



Figuur 8 en 9: Chatbot

De virtuele patiënt geeft antwoord op de gestelde vragen (Figuur 10). Als er geen informatie beschikbaar is voor een specifieke vraag, geeft de virtuele patiënt die informatie, zodat de vraag vervangen of geherformuleerd kan worden (Figuur 11).





Figuur 10 en 11: Interactievoorbeelden

2.4. Zelfevaluatie

Na het afronden van het interview (gele knop onder de chatbot) wordt de gebruiker doorgestuurd naar een zelfbeoordelingsvragenlijst. De vragenlijst is specifiek voor de geselecteerde virtuele patiënt en stelt meerkeuzevragen op basis van de Nutrition Diagnostic Terminology (Figuur 12).

Nutrition DiagnosticTerminology

INTAKE **NI**

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal) balance"

- ❑ Unused NI-1.1
- ❑ Increased energy expenditure NI-1.2
- ❑ Unused NI-1.3
- ❑ Inadequate energy intake NI-1.4
- ❑ Excessive energy intake NI-1.5
- ❑ Predicted suboptimal energy intake NI-1.6
- ❑ Predicted excessive energy intake NI-1.7

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral intake NI-2.1
- ❑ Excessive oral intake NI-2.2
- ❑ Inadequate enteral nutrition infusion NI-2.3
- ❑ Excessive enteral nutrition infusion NI-2.4
- ❑ Less than optimal enteral nutrition NI-2.5
- ❑ Inadequate parenteral nutrition infusion NI-2.6
- ❑ Excessive parenteral nutrition infusion NI-2.7
- ❑ Less than optimal parenteral nutrition NI-2.8
- ❑ Limited food acceptance NI-2.9

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared with patient goal"

- ❑ Inadequate fluid intake NI-3.1
- ❑ Excessive fluid intake NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food components, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake NI-4.1
- ❑ Excessive bioactive substance intake NI-4.2
- ❑ Excessive alcohol intake NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (*specify*) _____ NI-5.1
- ❑ Malnutrition NI-5.2
- ❑ Inadequate protein-energy intake NI-5.3
- ❑ Decreased nutrient needs (*specify*) _____ NI-5.4
- ❑ Imbalance of nutrients NI-5.5

Fat and Cholesterol (5.6)

- ❑ Inadequate fat intake NI-5.6.1
- ❑ Excessive fat intake NI-5.6.2
- ❑ Inappropriate intake of fats (*specify*) _____ NI-5.6.3

Protein (5.7)

- ❑ Inadequate protein intake NI-5.7.1
- ❑ Excessive protein intake NI-5.7.2
- ❑ Inappropriate intake of protein or amino acids (*specify*) _____ NI-5.7.3

Carbohydrate and Fiber (5.8)

- ❑ Inadequate carbohydrate intake NI-5.8.1
- ❑ Excessive carbohydrate intake NI-5.8.2
- ❑ Inappropriate intake of types of carbohydrate (*specify*) _____ NI-5.8.3
- ❑ Inconsistent carbohydrate intake NI-5.8.4
- ❑ Inadequate fiber intake NI-5.8.5
- ❑ Excessive fiber intake NI-5.8.6

Vitamin (5.9)

- ❑ Inadequate vitamin intake NI-5.9.1
  (*specify*) _____
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)
- ❑ Excessive vitamin intake NI-5.9.2
  (*specify*) _____
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)

Mineral (5.10)

- ❑ Inadequate mineral intake NI-5.10.1
  (*specify*) _____
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)
- ❑ Excessive mineral intake NI-5.10.2
  (*specify*) _____
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)

Multi-nutrient (5.11)

- ❑ Predicted suboptimal nutrient intake NI-5.11.1
- ❑ Predicted excessive nutrient intake NI-5.11.2

CLINICAL **NC**

Defined as "nutritional findings/problems identified that relate to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty NC-1.1
- ❑ Biting/Chewing (masticatory) difficulty NC-1.2
- ❑ Breastfeeding difficulty NC-1.3
- ❑ Altered GI function NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization NC-2.1
- ❑ Altered nutrition-related laboratory values (specify) _____ NC-2.2
- ❑ Food-medication interaction NC-2.3
- ❑ Predicted food-medication interaction NC-2.4

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight NC-3.1
- ❑ Unintentional weight loss NC-3.2
- ❑ Overweight/obesity NC-3.3
- ❑ Unintentional weight gain NC-3.4

BEHAVIORAL-ENVIRONMENTAL **NB**

Defined as "nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as related, observed or documented"

- ❑ Food- and nutrition-related knowledge deficit NB-1.1
- ❑ Harmful beliefs/attitudesabout food- or nutrition-related topics (use with caution) NB-1.2
- ❑ Not ready for diet/lifestyle change NB-1.3
- ❑ Self-monitoring deficit NB-1.4
- ❑ Disordered eating pattern NB-1.5
- ❑ Limited adherence to nutrition-related recommendations NB-1.6
- ❑ Undesirable food choices NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality-of-life problems as reported, observed, or documented"

- ❑ Physical inactivity NB-2.1
- ❑ Excessive physical activity NB-2.2
- ❑ Inability or lack of desire to manage self-care NB-2.3
- ❑ Impaired ability to prepare foods/meals NB-2.4
- ❑ Poor nutrition quality of life NB-2.5
- ❑ Self-feeding difficulty NB-2.6

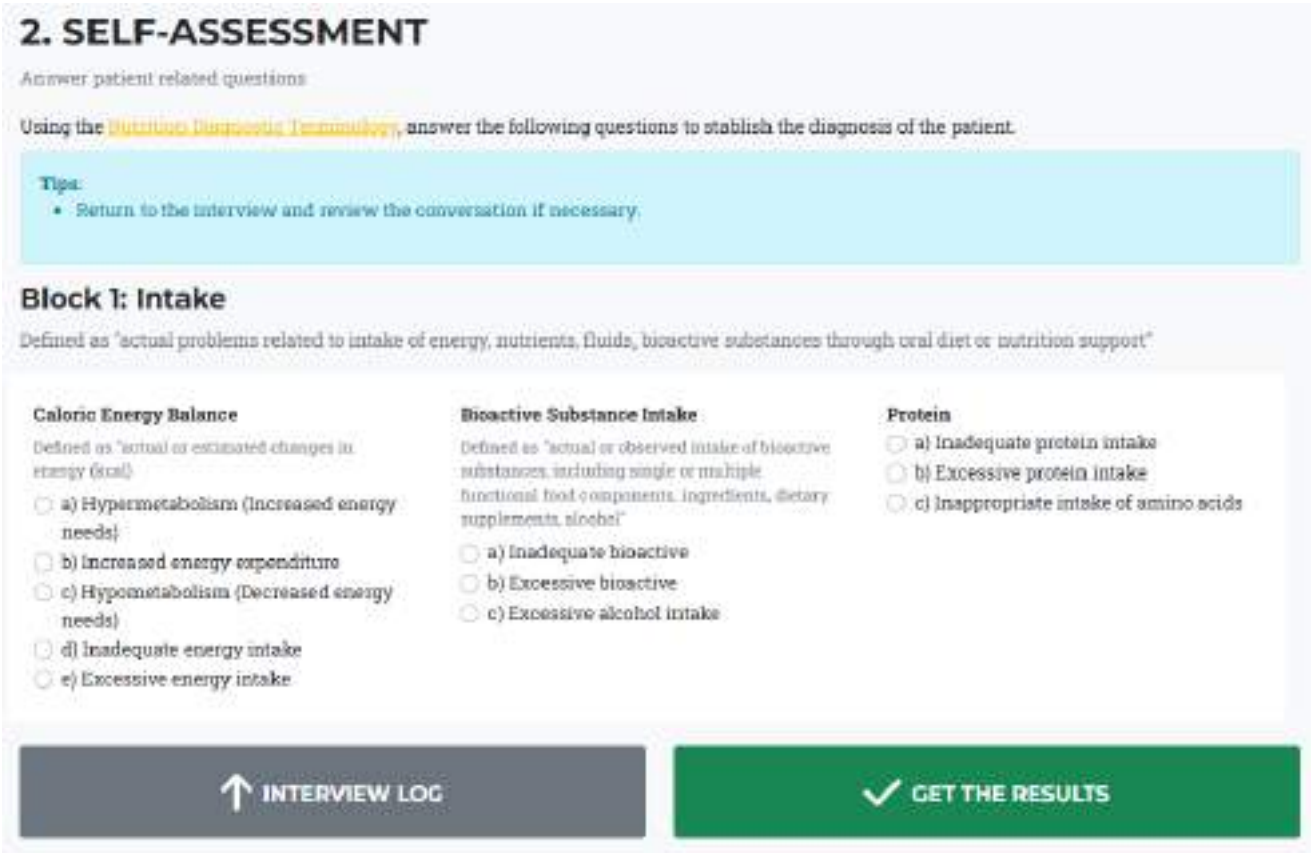
Food Safety and Access (3)

Defined as "actual problems with food safety or access to food, water, or nutrition related supplies"

- ❑ Intake of unsafe food NB-3.1
- ❑ Limited access to food or water NB-3.2
- ❑ Limited access to nutrition-related supplies NB-3.3

Figuur 12: Terminologie voor voedingsdiagnostiek

De vragen zijn verdeeld in vier blokken, die de vier hoofdafdelingen van de Nutrition Diagnostic Terminology vertegenwoordigen: Inname, Klinisch, Gedrags- en omgevings- en Dieetbehandelingen. Afhankelijk van het specifieke gebruik van de chatbot kunnen aanvullende en specifiekere vragen worden toegevoegd om de verzameling van specifieke informatie en interventieopties te beoordelen. Afbeelding 13 presenteert een voorbeeld van vragen die in deze beoordeling worden gebruikt.



Figuur 13: Zelfbeoordelingsvragen

2.5. Eindonderzoek

Nadat de deelnemer klaar is met het beantwoorden van de vragen, selecteert hij de knop ‘Resultaten ophalen’ en wordt hem gevraagd een tweede enquête in te vullen over het gebruik en de effectiviteit van de chatbot (Figuur 14), voordat hij doorgaat naar de resultaten.

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3. My skills in using a chatbot in the learning process as a dietetics student are at:

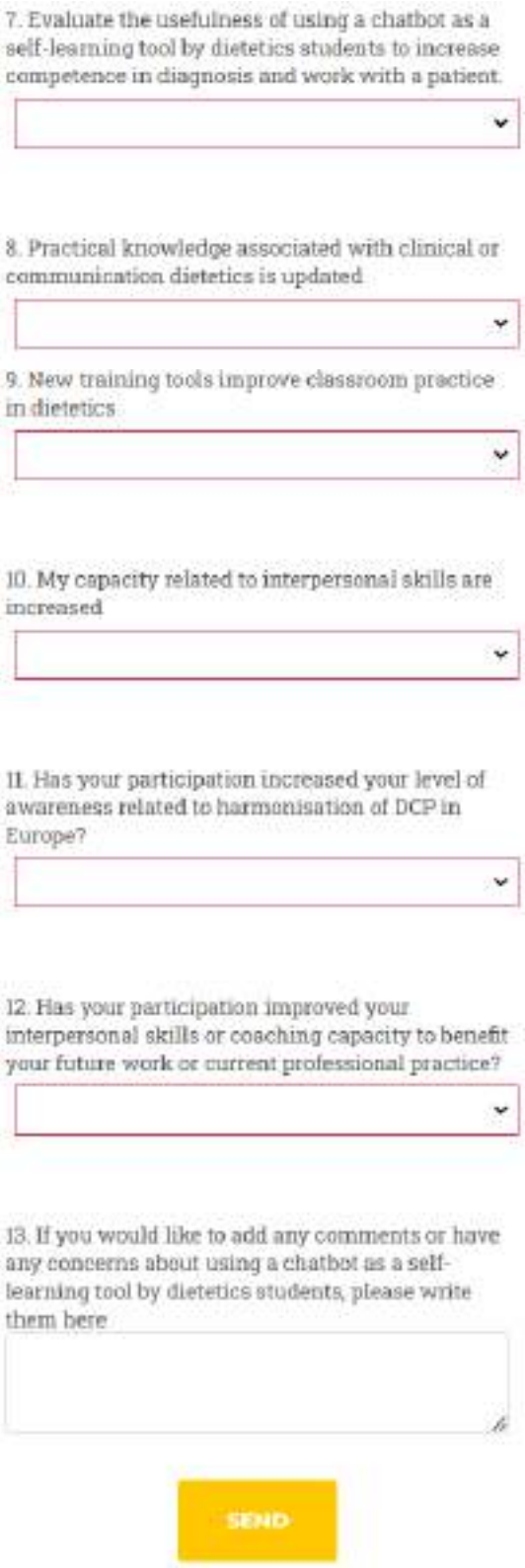
4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

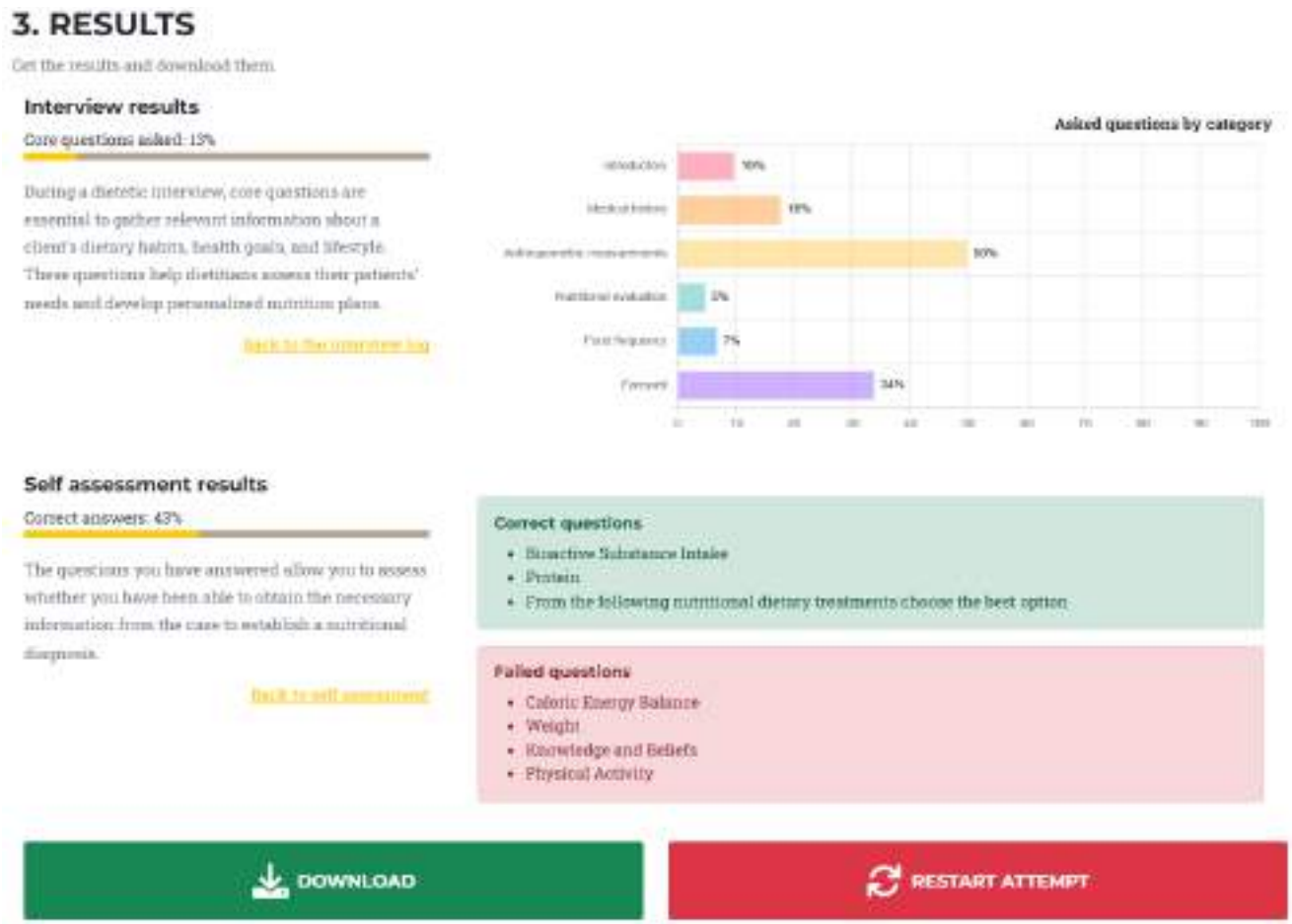
6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?



Figuur 14: Eindonderzoek

2.6. Resultaten van het interview en de zelfevaluatie

Tot slot ontvangt de deelnemer de resultaten van het interview en van de zelfevaluatievragenlijst (Figuur 15).



Figuur 15: Resultaten van het interview en de zelfevaluatie

De interviewresultaten zijn onderverdeeld in de belangrijkste categorieën informatie die voor elk geval zijn opgenomen:

- Inleidend;
- Medische geschiedenis;
- Antropometrische metingen;
- Voedingsevaluatie;
- Eetfrequentie;
- Afscheid.

Door het percentage vragen in elke categorie te raadplegen, leert de deelnemer welke thema's verbeterd moeten worden. Het is ook mogelijk om het interviewlogboek te raadplegen om de interacties te bekijken en te beslissen welke extra vragen in een nieuwe poging gedaan kunnen worden (knop 'Herstart poging').
De resultaten met betrekking tot de zelfbeoordelingsvragenlijst omvatten het totale percentage correcte antwoorden, evenals de identificatie van de specifieke thema's waarvoor de vragen correct of incorrect werden beantwoord. Deze twee groepen resultaten kunnen ook worden gedownload in een pdf-bestand.

Digital Lab for Education in Dietetics combining Experiential Learning and Community Service

Educational Digital Software training manual

2021-1-ES01-KA220-HED-000032074

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February 2025

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Contents

1.Introduction

To facilitate the learner's educational journey and practical experiences, they will have access to two digital tools developed by the research team: a virtual patient chatbot and a virtual clinic.

1.1 A virtual patients' chatbot?

To enhance practical training in Dietetics Education and promote a community/service-learning approach related to nutrition, a digital environment has been created for conducting virtual patients' interviews.

The Educational Digital Software is based on the presentation and interaction with virtual patients and aims helping higher education nutrition/dietetics students and dietitians improving their skills without direct supervision. The digital tool presents different scenarios (real-based cases of patients) in order to generate an experiential learning experience. These scenarios focus themes such as obesity, diabetes or nephropathy, and different scenarios can be developed and included in the software.

In the Educational Digital Software, the learner will be able to interact with virtual patients. Students and dietitians chat with the patients to improve their anamnesis skills focused on the Dietetic Care Process (DCP – see Figure 1).

Figure 1: Dietetic Care Process (DCP)

Conversations have been virtualised in a conversational AI and piloted internally by expert dietitians/ nutritionists, correcting errors and improving their response.

The process is arranged in three major steps (as shown in Figure 2):

1) Interview with a virtual patient (patient anamnesis);
2) Self-assessment using the Nutrition Diagnostic Terminology;
3) Output results.

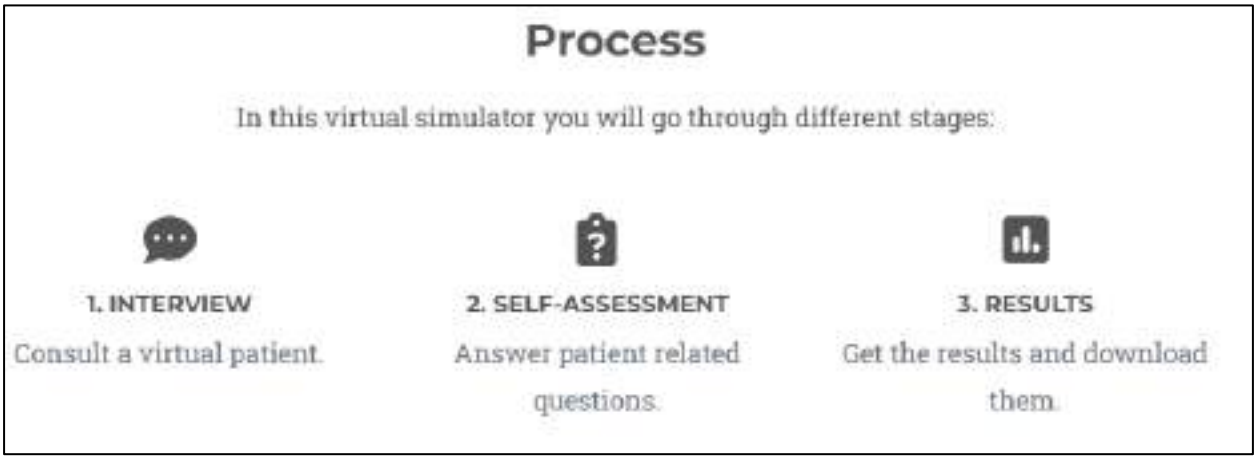


Figure 2: Process used for Educational Digital Software

2.How to use the Educational Digital Software?

A platform has been created to allow the interaction with the virtual patients. It is available at: https://virtual-patient.edietinglab.eu/

Most partner institutions of the project (St. Pölten University, Jan Kochanowski University of Kielce, Faculty of Nutrition and Food Sciences, University of Porto, Universidad Europea del Atlántico and AP Hogeschool Antwerpen) developed virtual patients under different clinical conditions. Each of the virtual patients has distinct diagnosis and will need distinct nutritional intervention.

The aim of this platform is to facilitate the anamnesis training and, subsequently, the identification of the patients' nutritional needs and counselling (more details below).

2.1 Registration and first steps

To interact with the virtual patients, learners need to register in this platform, providing the data required in the register form (as illustrated in Figure 3).

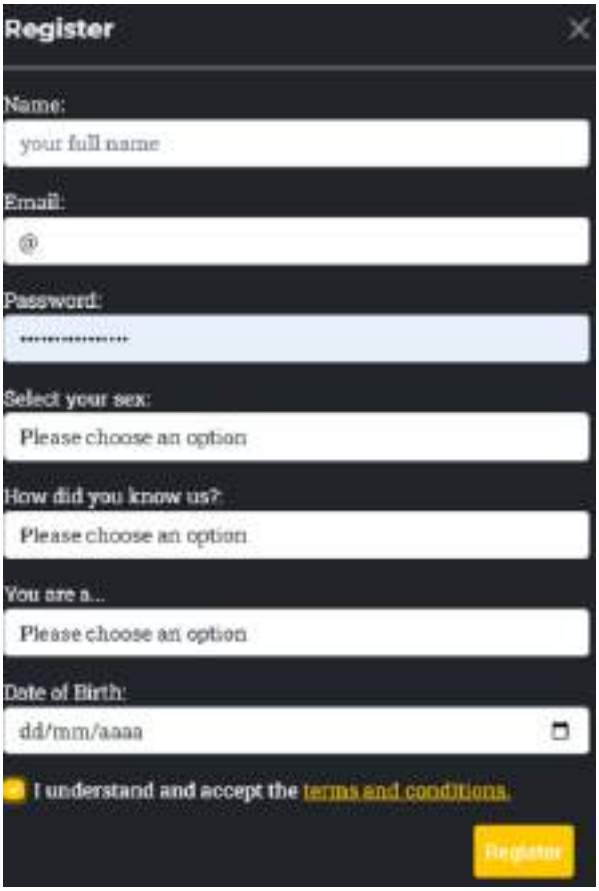


Figure 3: Register form

After signing in, learners will be able to choose among five different virtual patients to start an interview: Karen Pérez, Lore Janssens, João Almeida, Queenie Jenkins and Maria Nowak (Figure 4). The number of virtual patients and clinical cases can be increased or changed according with the identified needs.

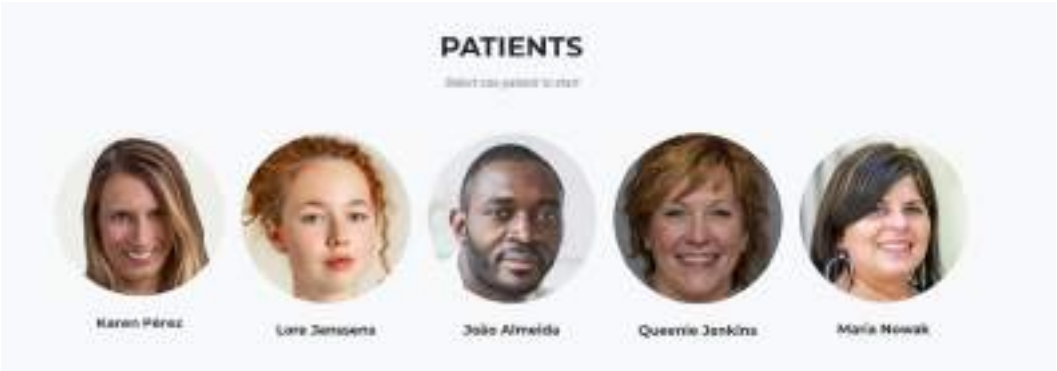


Figure 4: Virtual patients

The interview can be conducted in different languages: English, Deutsch, Spanish, Dutch, Polish and Portuguese (Figure 5).

Figure 5: Language selection

6 After selection of the virtual patient and desired language for the interview, learners are presented the instructions to interact with the chatbot (Figure 6). These instructions can also be consulted anytime during the interview (button “Instructions” below the chatbot window).

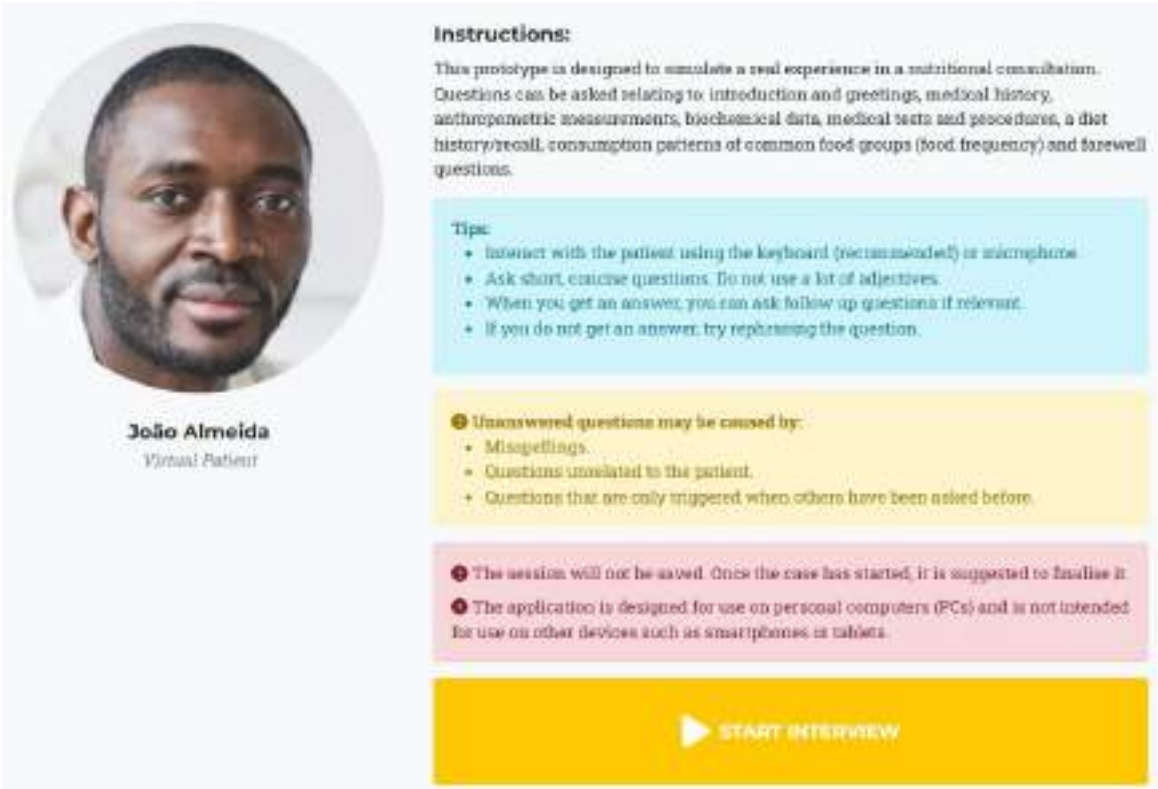
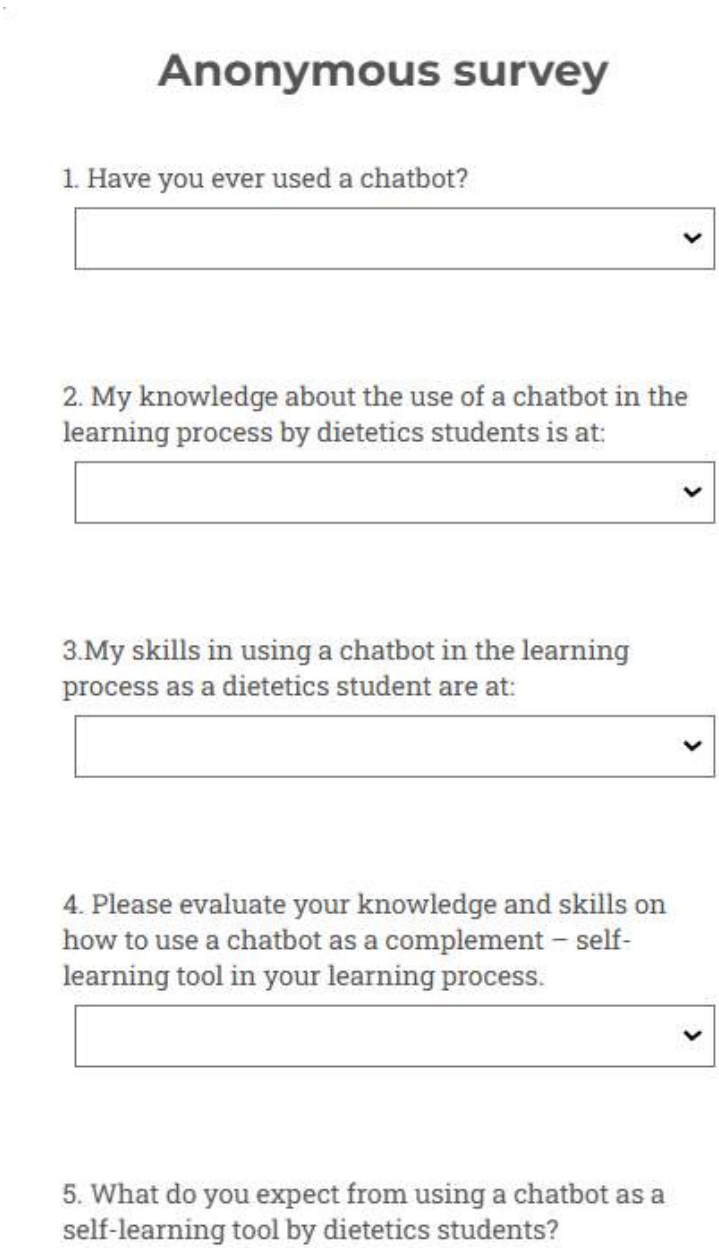


Figure 6: Chatbot instructions

2.2 Initial survey

After selecting the option “Start interview”, a survey is displayed and must be completed before proceeding. This survey asks the participant about prior use of a chatbot, perceptions and expectations about its effectiveness (Figure 7).



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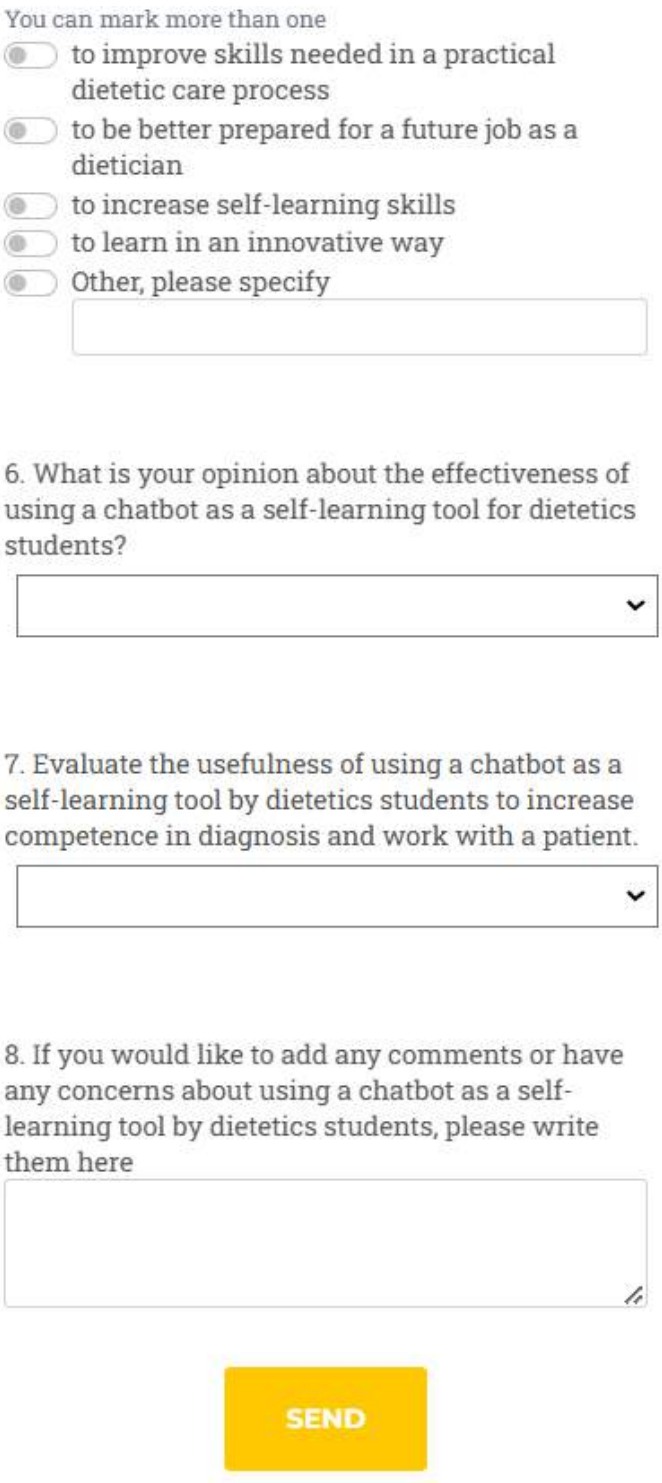
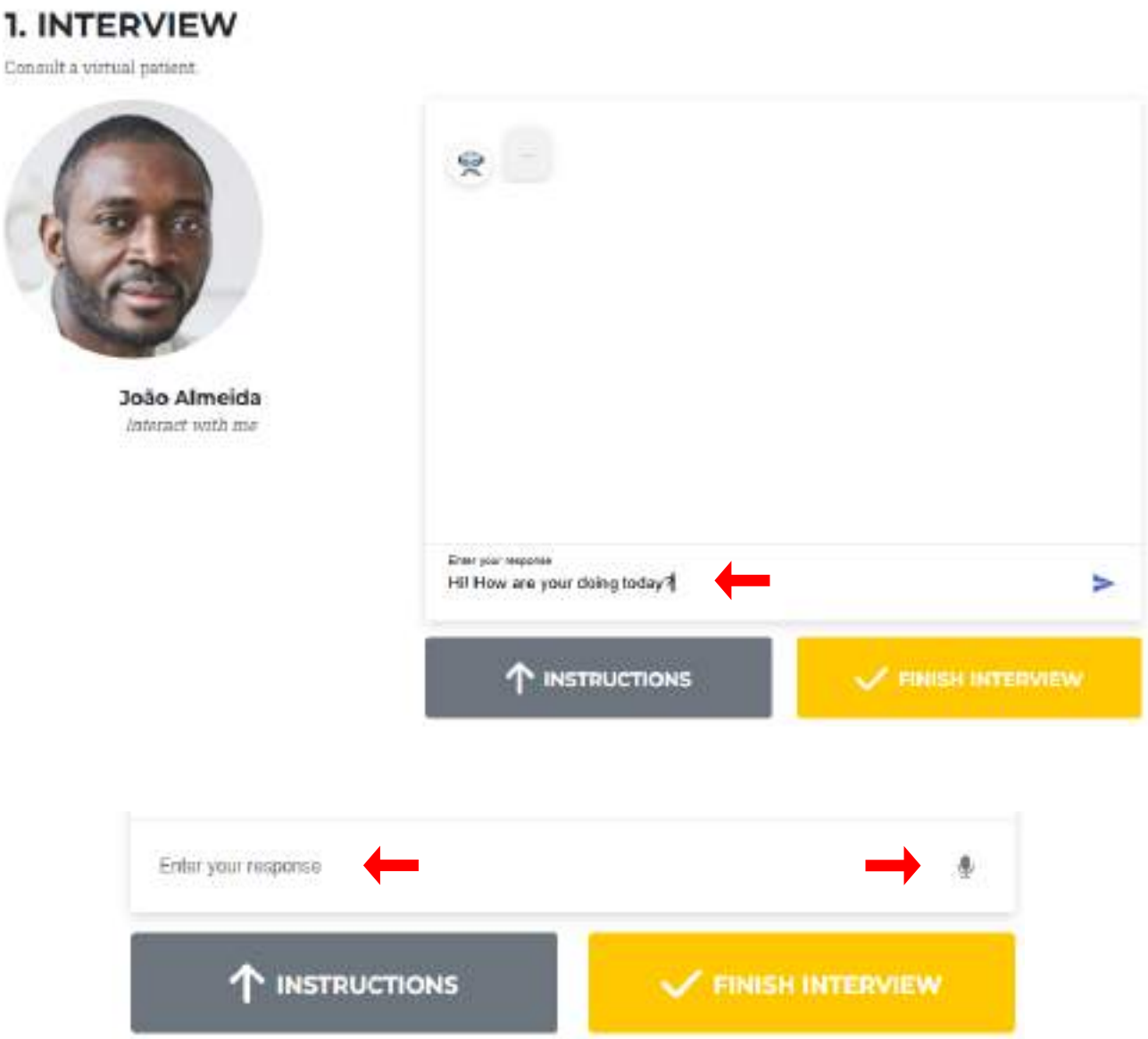


Figure 7: Initial survey

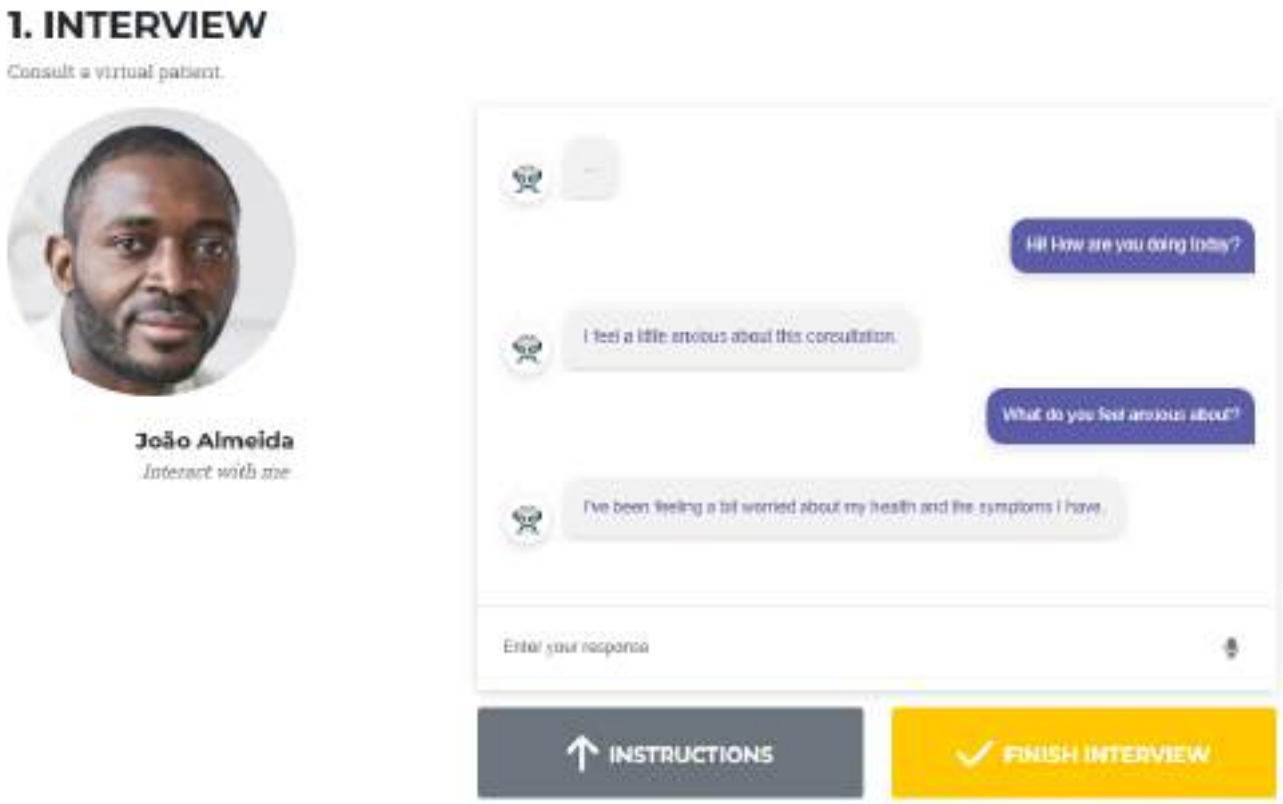
2.3. Chatbot interaction

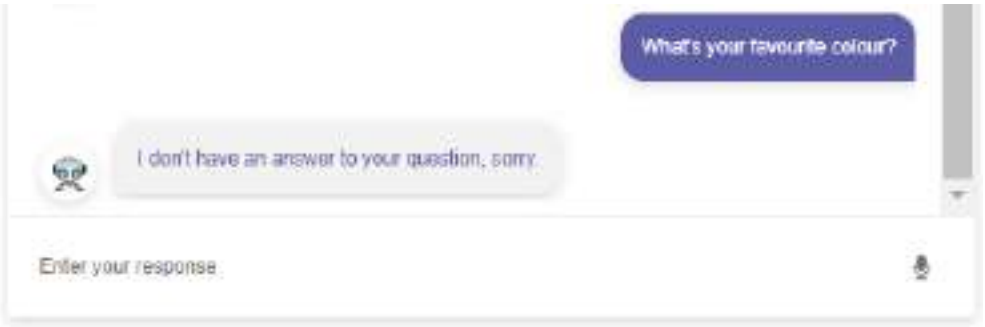
Then, a chatbot will be displayed, allowing the interactions (Figure 8). Leaners can pose an unlimited number of questions in order to gather all the necessary information. The questions can be written or spoken (using the microphone sign, Figure 9).



Figures 8 and 9: Chatbot

The virtual patient will provide answers to the questions posed (Figure 10). If no information is available for a specific question, the virtual patient will provide that information, so that the question can be replaced or rephrased (Figure 11).





Figures 10 and 11: Interaction examples

2.4. Self-assessment

After finishing the interview (yellow button below the chatbot), the user is directed to a self-assessment questionnaire. The questionnaire is specific to the virtual patient selected, and asks multiple choice questions based on the Nutrition Diagnostic Terminology (Figure 12).

Nutrition Diagnostic Terminology

INTAKE NI

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal) balance"

- ❑ Unused NI-1.1
- ❑ Increased energy expenditure NI-1.2
- ❑ Unused NI-1.3
- ❑ Inadequate energy intake NI-1.4
- ❑ Excessive energy intake NI-1.5
- ❑ Predicted suboptimal energy intake NI-1.6
- ❑ Predicted excessive energy intake NI-1.7

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral intake NI-2.1
- ❑ Excessive oral intake NI-2.2
- ❑ Inadequate enteral nutrition infusion NI-2.3
- ❑ Excessive enteral nutrition infusion NI-2.4
- ❑ Less than optimal enteral nutrition NI-2.5
- ❑ Inadequate parenteral nutrition infusion NI-2.6
- ❑ Excessive parenteral nutrition infusion NI-2.7
- ❑ Less than optimal parenteral nutrition NI-2.8
- ❑ Limited food acceptance NI-2.9

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared with patient goal"

- ❑ Inadequate fluid intake NI-3.1
- ❑ Excessive fluid intake NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food components, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake NI-4.1
- ❑ Excessive bioactive substance intake NI-4.2
- ❑ Excessive alcohol intake NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (*specify*) _____ NI-5.1
- ❑ Malnutrition NI-5.2
- ❑ Inadequate protein-energy intake NI-5.3
- ❑ Decreased nutrient needs (*specify*) _____ NI-5.4
- ❑ Imbalance of nutrients NI-5.5

Fat and Cholesterol (5.6)

- ❑ Inadequate fat intake NI-5.6.1
- ❑ Excessive fat intake NI-5.6.2
- ❑ Inappropriate intake of fats (*specify*) _____ NI-5.6.3

Protein (5.7)

- ❑ Inadequate protein intake NI-5.7.1
- ❑ Excessive protein intake NI-5.7.2
- ❑ Inappropriate intake of protein or amino acids (*specify*) _____ NI-5.7.3

Carbohydrate and Fiber (5.8)

- ❑ Inadequate carbohydrate intake NI-5.8.1
- ❑ Excessive carbohydrate intake NI-5.8.2
- ❑ Inappropriate intake of types of carbohydrate (*specify*) _____ NI-5.8.3
- ❑ Inconsistent carbohydrate intake NI-5.8.4
- ❑ Inadequate fiber intake NI-5.8.5
- ❑ Excessive fiber intake NI-5.8.6

Vitamin (5.9)

- ❑ Inadequate vitamin intake NI-5.9.1
  (*specify*) _____
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)
- ❑ Excessive vitamin intake NI-5.9.2
  (*specify*) _____
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)

Mineral (5.10)

- ❑ Inadequate mineral intake NI-5.10.1
  (*specify*) _____
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)
- ❑ Excessive mineral intake NI-5.10.2
  (*specify*) _____
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)

Multi-nutrient (5.11)

- ❑ Predicted suboptimal nutrient intake NI-5.11.1
- ❑ Predicted excessive nutrient intake NI-5.11.2

CLINICAL NC

Defined as "nutritional findings/problems identified that relate to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty NC-1.1
- ❑ Biting/Chewing (masticatory) difficulty NC-1.2
- ❑ Breastfeeding difficulty NC-1.3
- ❑ Altered GI function NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization NC-2.1
- ❑ Altered nutrition-related laboratory values (specify) _____ NC-2.2
- ❑ Food-medication interaction NC-2.3
- ❑ Predicted food-medication interaction NC-2.4

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight NC-3.1
- ❑ Unintentional weight loss NC-3.2
- ❑ Overweight/obesity NC-3.3
- ❑ Unintentional weight gain NC-3.4

BEHAVIORAL-ENVIRONMENTAL NB

Defined as "nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as related, observed or documented"

- ❑ Food- and nutrition-related knowledge deficit NB-1.1
- ❑ Harmful beliefs/attitudesabout food- or nutrition-related topics (use with caution) NB-1.2
- ❑ Not ready for diet/lifestyle change NB-1.3
- ❑ Self-monitoring deficit NB-1.4
- ❑ Disordered eating pattern NB-1.5
- ❑ Limited adherence to nutrition-related recommendations NB-1.6
- ❑ Undesirable food choices NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality-of-life problems as reported, observed, or documented"

- ❑ Physical inactivity NB-2.1
- ❑ Excessive physical activity NB-2.2
- ❑ Inability or lack of desire to manage self-care NB-2.3
- ❑ Impaired ability to prepare foods/meals NB-2.4
- ❑ Poor nutrition quality of life NB-2.5
- ❑ Self-feeding difficulty NB-2.6

Food Safety and Access (3)

Defined as "actual problems with food safety or access to food, water, or nutrition related supplies"

- ❑ Intake of unsafe food NB-3.1
- ❑ Limited access to food or water NB-3.2
- ❑ Limited access to nutrition-related supplies NB-3.3

Figure 12: Nutrition Diagnostic Terminology

The questions are divided in four blocks, which represent the four main divisions of the Nutrition Diagnostic Terminology: Intake, Clinical, Behavioral & Environmental, and Dietary treatments. According to the specific use of the chatbot, additional and more specific questions can be added to assess the collection of specific information and intervention options. Figure 13 presents an example of questions used in this assessment.

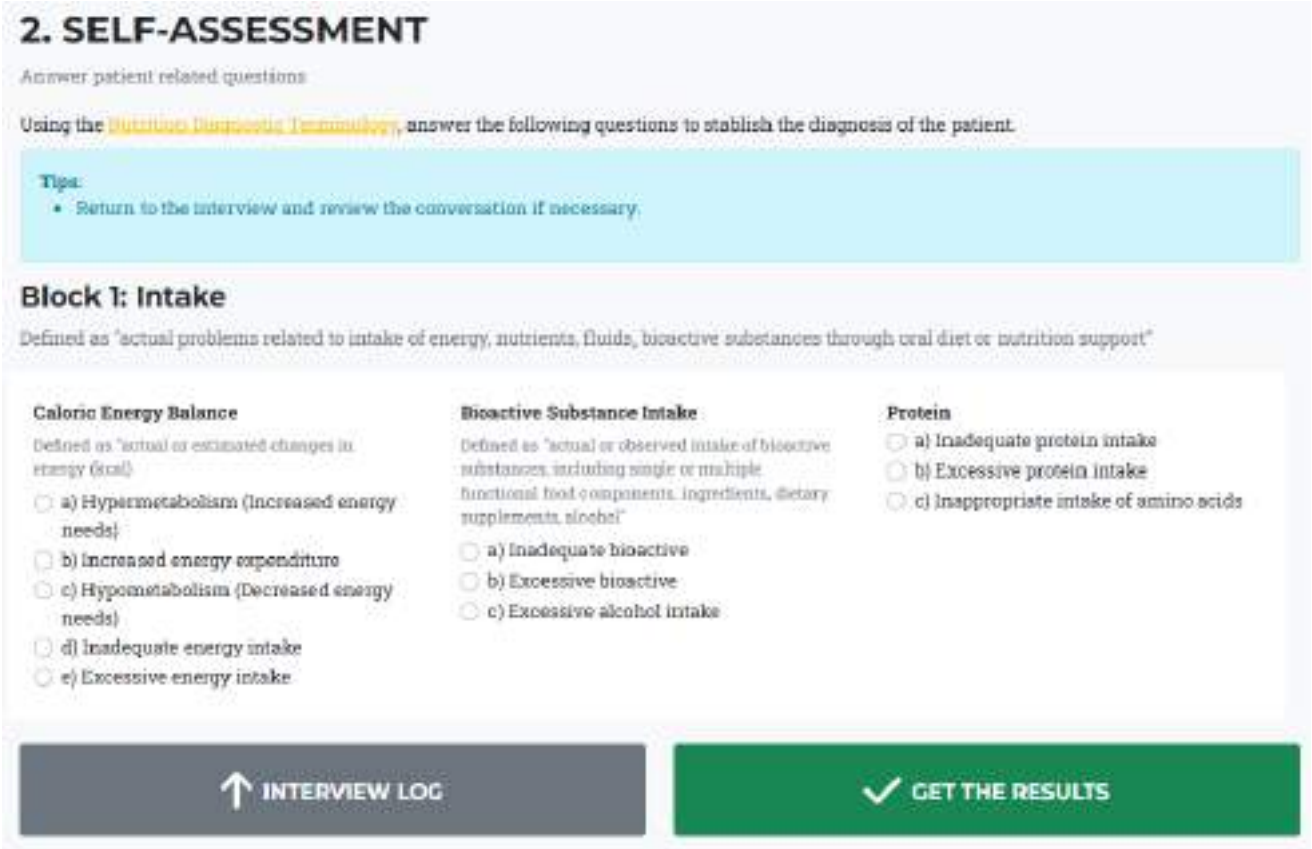


Figure 13: Self-assessment questions

2.5. Final survey

After finishing answering to the questions, the participant selects the “Get the results” button and is requested to answer a second survey addressing the chatbot use and effectiveness (Figure 14), before proceeding to the results.

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3. My skills in using a chatbot in the learning process as a dietetics student are at:

4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?

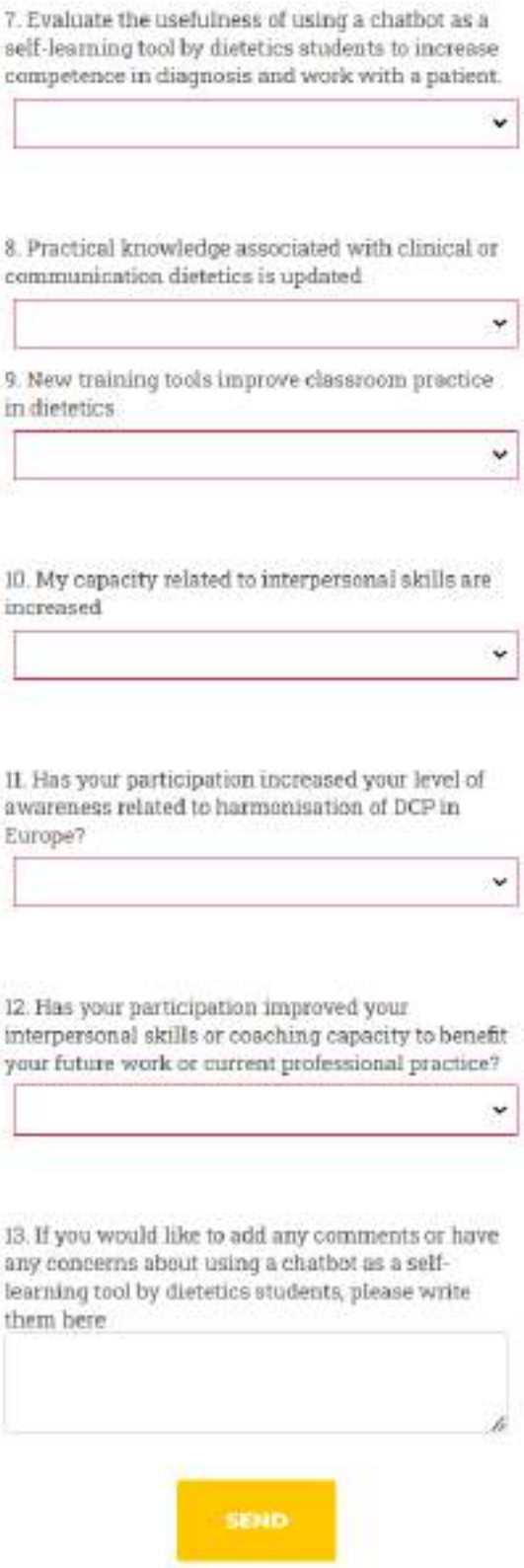


Figure 14: Final survey

2.6. Interview and self-assessment results

Finally, the participant is provided the results of the interview and of the self-assessment questionnaire (Figure 15).

Figure 15: Results of the interview and self-assessment

The interview results are divided into the main categories of information included for each case:

- Introductory;
- Medical history;
- Anthropometric measurements;
- Nutritional evaluation;
- Food frequency;
- Farewell.

Consulting the percentage of questions asked in each category, the participant gets to know which themes to improve. It is also possible to consult the interview log, in order to review the interactions and decide what extra questions could be done in a new attempt ("Restart attempt" button).

The results concerning the self-assessment questionnaire include the overall proportion of correct answers, as well as the identification of the specific themes for which the questions were answered correctly or incorrectly. These two groups of results can also be downloaded in a pdf file.

Co-funded by the Erasmus+ Programme of the European Union

Digitales Labor für die Ausbildung in der Diätetik, das erfahrungsbasiertes Lernen und gemeinnützige Arbeit kombiniert

Schulungshandbuch für digitale Bildungssoftware

1

2021-1-ES01-KA220-HED-000032074

Februar 2025

Co-funded by the Erasmus+ Programme of the European Union

Dieses Projekt wurde mit Unterstützung der Europäischen Kommission finanziert. Diese Veröffentlichung spiegelt ausschließlich die Ansichten des Autors wider. Die Kommission kann nicht für die Verwendung der darin enthaltenen Informationen verantwortlich gemacht werden.

Inhalt

1.Einleitung

Um den Lernenden ihren Bildungsweg und ihre praktischen Erfahrungen zu erleichtern, haben sie Zugriff auf zwei vom Forschungsteam entwickelte digitale Tools: einen virtuellen Patienten-Chatbot und eine virtuelle Klinik.

1.1 Ein virtueller Patienten-Chatbot?

Um die praktische Ausbildung in der Ernährungslehre zu verbessern und einen Community-/Service-Learning-Ansatz im Zusammenhang mit Ernährung zu fördern, wurde eine digitale Umgebung für die Durchführung virtueller Patientengespräche geschaffen.

Die digitale Lernsoftware basiert auf der Präsentation und Interaktion mit virtuellen Patienten und soll Ernährungs-/Diätetikstudenten und Diätassistenten dabei helfen, ihre Fähigkeiten ohne direkte Aufsicht zu verbessern. Das digitale Tool präsentiert verschiedene Szenarien (reale Fälle von Patienten), um eine erfahrungsbasierte Lernerfahrung zu erzeugen. Diese Szenarien konzentrieren sich auf Themen wie Fettleibigkeit, Diabetes oder Nephropathie, und es können verschiedene Szenarien entwickelt und in die Software integriert werden.

In der digitalen Lernsoftware können Lernende mit virtuellen Patienten interagieren. Studierende und Ernährungsberater chatten mit den Patienten, um ihre Anamnesefähigkeiten zu verbessern, die sich auf den diätetischen Betreuungsprozess (DCP – siehe Abbildung 1) konzentrieren.

Figur1: Diätetischer Betreuungsprozess (DCP)

Gespräche wurden in einer Konversations-KI virtualisiert und intern von erfahrenen Diätassistenten/Ernährungswissenschaftlern gesteuert, um Fehler zu korrigieren und ihre Reaktion zu verbessern.

Der Prozess gliedert sich in drei Hauptschritte (siehe Abbildung 2):

1) Interview mit einem virtuellen Patienten (Patientenanamnese);
2) Selbsteinschätzung mit demErnährungsdiagnostische Terminologie;
3) Ausgabeergebnisse.

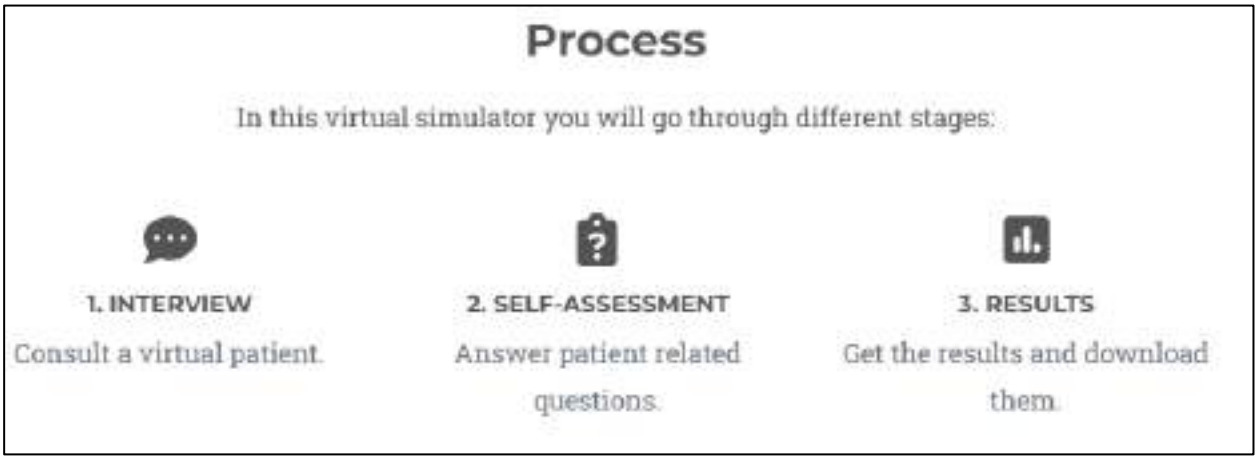


Abbildung 2: Prozess für digitale Lernsoftware

2. Wie verwendet man die digitale Lernsoftware?

Es wurde eine Plattform geschaffen, die die Interaktion mit den virtuellen Patienten ermöglicht. Sie ist verfügbar unter:https://virtual-patient.edietinglab.eu/
Die meisten Partnerinstitutionen des Projekts (Universität St. Pölten, Jan Kochanowski Universität Kielce, Fakultät für Ernährungs- und Lebensmittelwissenschaften, Universität Porto, Universidad Europea del Atlántico und AP Hogeschool Antwerpen) entwickelten virtuelle Patienten unter unterschiedlichen klinischen Bedingungen. Jeder der virtuellen Patienten hat eine eigene Diagnose und benötigt eine eigene Ernährungsintervention.
Ziel dieser Plattform ist es, die Anamneseschulung und in weiterer Folge die Ermittlung des Ernährungsbedarfs der Patienten sowie deren Beratung zu erleichtern (nähere Einzelheiten siehe unten).

2.1 Registrierung und erste Schritte

Um mit den virtuellen Patienten interagieren zu können, müssen sich die Lernenden auf dieser Plattform registrieren und die im Registrierungsformular erforderlichen Daten angeben (siehe Abbildung 3).

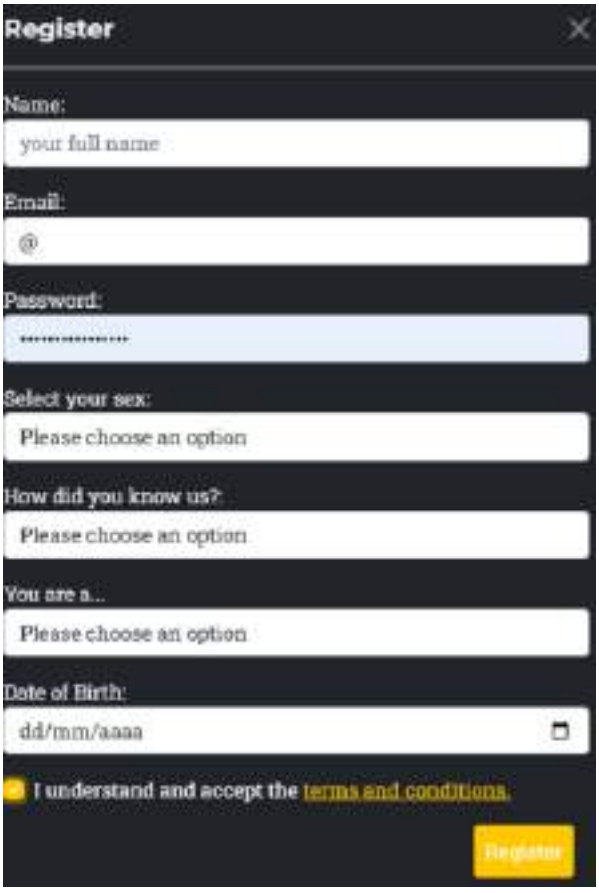


Abbildung 3: Registrierungsformular

Nach der Anmeldung können die Lernenden zwischen fünf verschiedenen virtuellen Patienten wählen, um ein Interview zu starten: Karen Pérez, Lore Janssens, João Almeida, Queenie Jenkins und Maria Nowak (Abbildung 4). Die Anzahl der virtuellen Patienten und klinischen Fälle kann je nach ermitteltem Bedarf erhöht oder geändert werden.

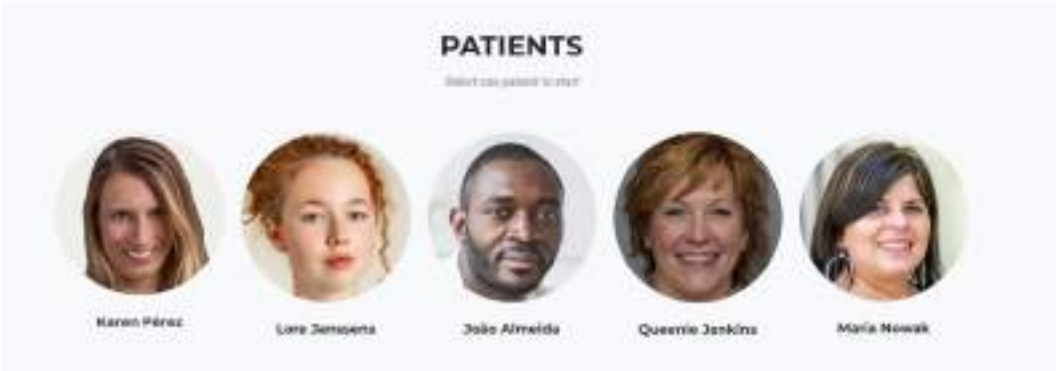


Abbildung 4: Virtuelle Patienten

Das Interview kann in verschiedenen Sprachen durchgeführt werden: Englisch, Deutsch, Spanisch, Niederländisch, Polnisch und Portugiesisch (Abbildung 5).

Abbildung 5: Sprachauswahl

6

Nach Auswahl des virtuellen Patienten und der gewünschten Sprache für das Interview werden den Lernenden Anweisungen zur Interaktion mit dem Chatbot angezeigt (Abbildung 6). Diese Anweisungen können auch jederzeit während des Interviews eingesehen werden (Schaltfläche „Anweisungen“ unter dem Chatbot-Fenster).

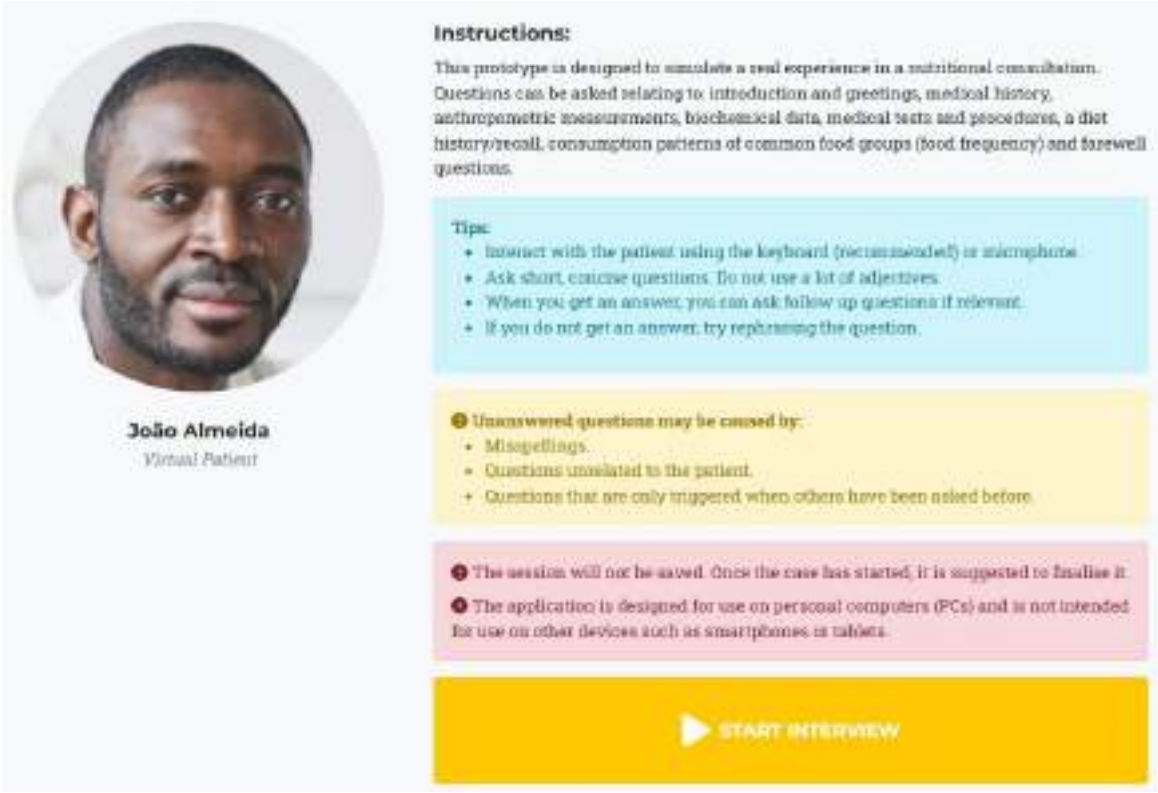


Abbildung 6: Chatbot-Anweisungen

2.2 Erstbefragung

Nach Auswahl der Option „Interview starten“ wird eine Umfrage angezeigt, die vor dem Fortfahren ausgefüllt werden muss. In dieser Umfrage wird der Teilnehmer nach der bisherigen Nutzung eines Chatbots sowie nach Wahrnehmungen und Erwartungen hinsichtlich seiner Wirksamkeit gefragt (Abbildung 7).

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3.My skills in using a chatbot in the learning process as a dietetics student are at:

4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

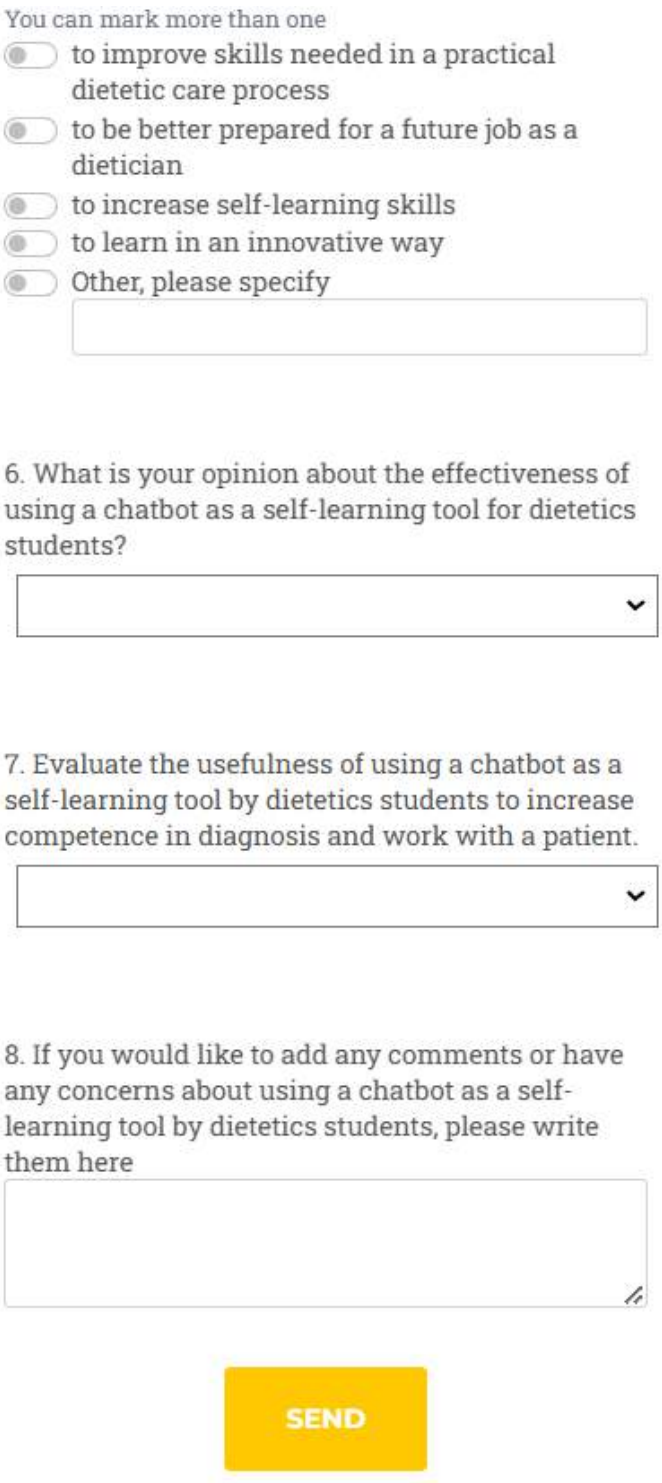
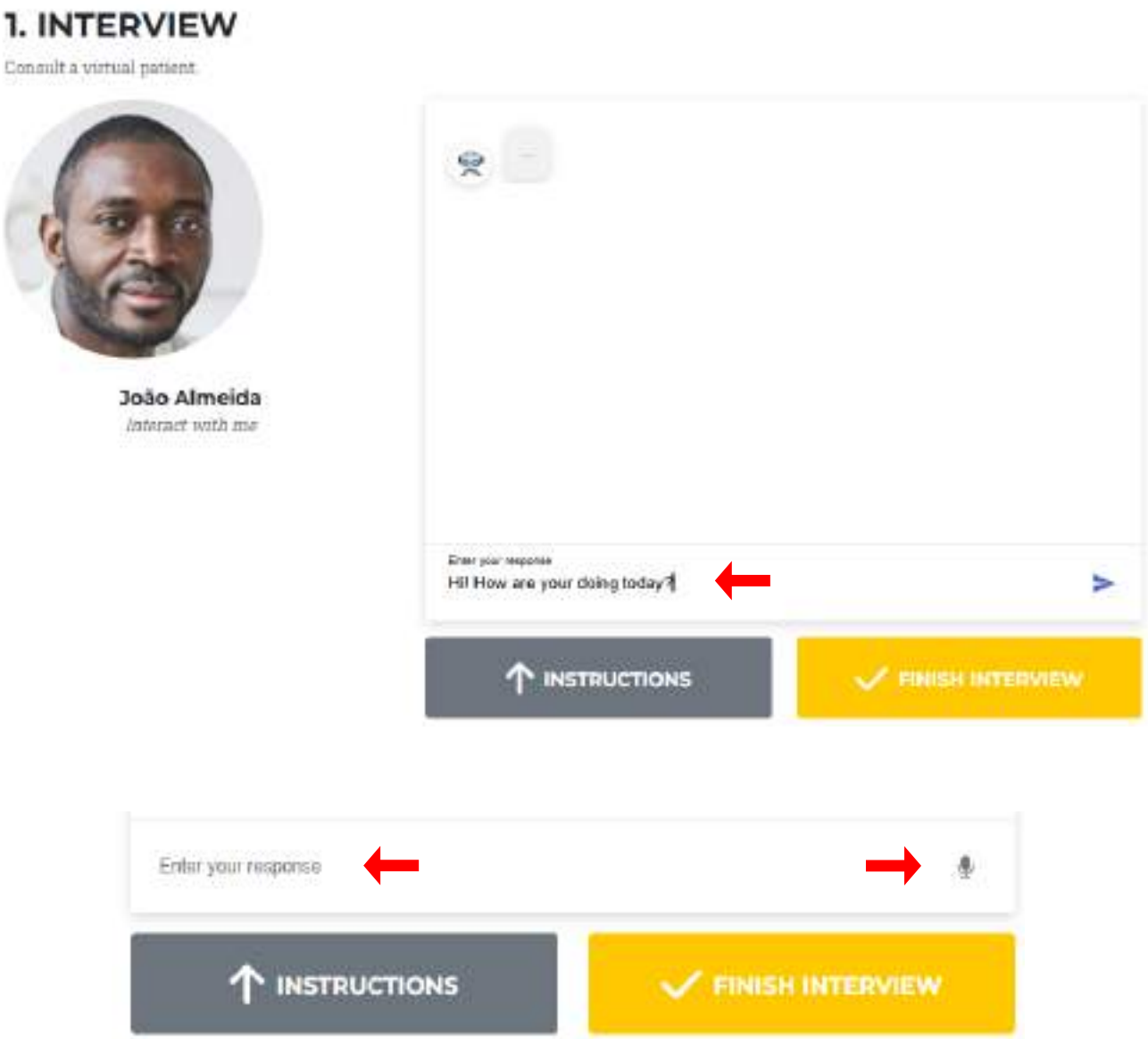


Abbildung 7: Ersterhebung

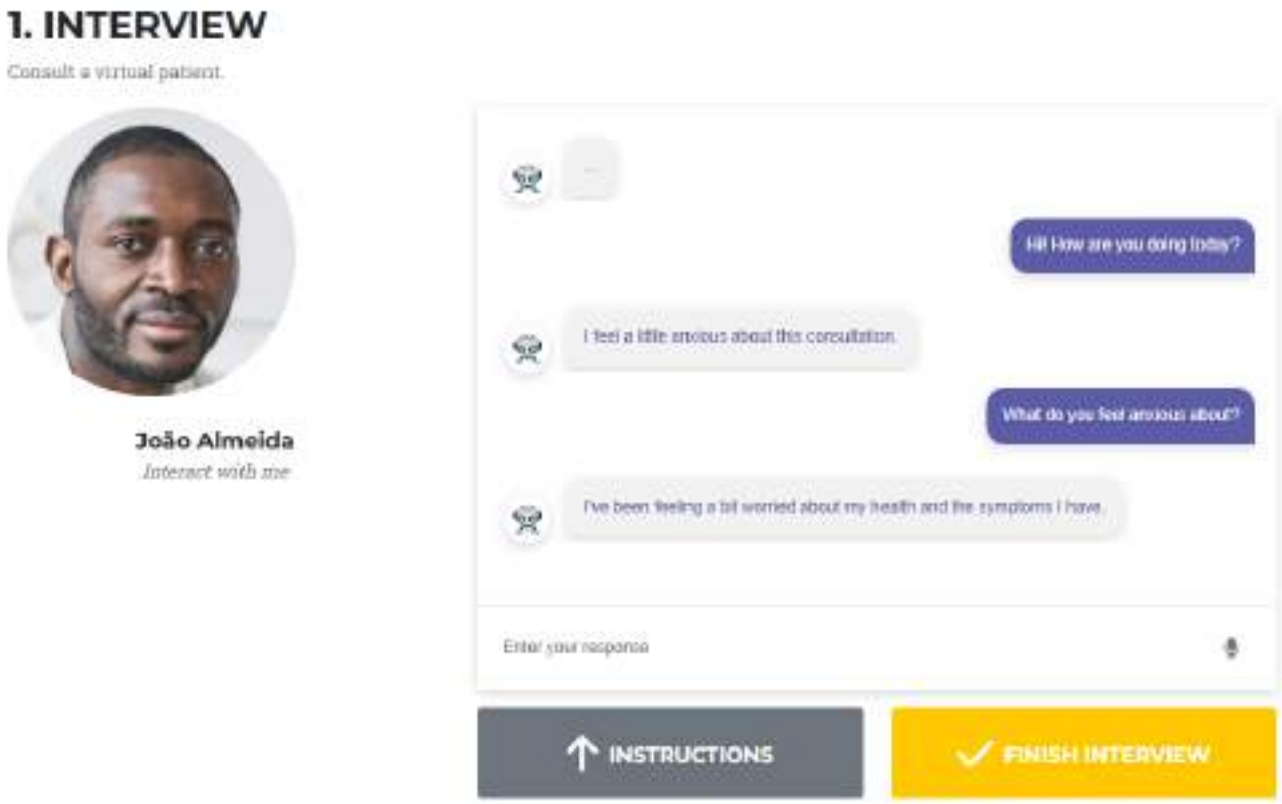
2.3. Chatbot-Interaktion

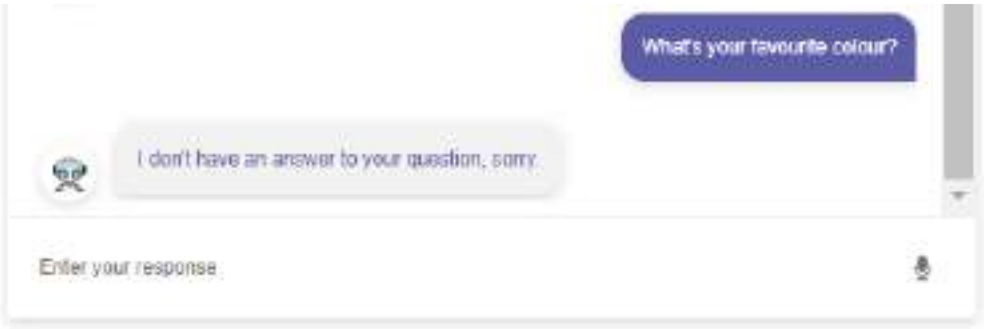
Anschließend wird ein Chatbot angezeigt, der die Interaktion ermöglicht (Abbildung 8). Lernende können eine unbegrenzte Anzahl von Fragen stellen, um alle erforderlichen Informationen zu erhalten. Die Fragen können schriftlich oder mündlich gestellt werden (mithilfe des Mikrofonzeichens, Abbildung 9).



Abbildungen 8 und 9: Chatbot

Der virtuelle Patient gibt Antworten auf die gestellten Fragen (Abbildung 10). Wenn zu einer bestimmten Frage keine Informationen verfügbar sind, gibt der virtuelle Patient diese Informationen an, sodass die Frage ersetzt oder umformuliert werden kann (Abbildung 11).





Abbildungen 10 und 11: Interaktionsbeispiele

2.4. Selbsteinschätzung

Nach Abschluss des Interviews (gelber Button unter dem Chatbot) wird der Benutzer zu einem Selbsteinschätzungsfragebogen weitergeleitet. Der Fragebogen ist spezifisch auf den ausgewählten virtuellen Patienten zugeschnitten und enthält Multiple-Choice-Fragen basierend auf der Terminologie der Ernährungsdiagnostik (Abbildung 12).

Nutrition Diagnostic Terminology

INTAKE — NI

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal) balance"

- ❑ Unused — NI-1.1
- ❑ Increased energy expenditure — NI-1.2
- ❑ Unused — NI-1.3
- ❑ Inadequate energy intake — NI-1.4
- ❑ Excessive energy intake — NI-1.5
- ❑ Predicted suboptimal energy intake — NI-1.6
- ❑ Predicted excessive energy intake — NI-1.7

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral intake — NI-2.1
- ❑ Excessive oral intake — NI-2.2
- ❑ Inadequate enteral nutrition infusion — NI-2.3
- ❑ Excessive enteral nutrition infusion — NI-2.4
- ❑ Less than optimal enteral nutrition — NI-2.5
- ❑ Inadequate parenteral nutrition infusion — NI-2.6
- ❑ Excessive parenteral nutrition infusion — NI-2.7
- ❑ Less than optimal parenteral nutrition — NI-2.8
- ❑ Limited food acceptance — NI-2.9

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared with patient goal"

- ❑ Inadequate fluid intake — NI-3.1
- ❑ Excessive fluid intake — NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food components, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake — NI-4.1
- ❑ Excessive bioactive substance intake — NI-4.2
- ❑ Excessive alcohol intake — NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (*specify*) _____ — NI-5.1
- ❑ Malnutrition — NI-5.2
- ❑ Inadequate protein-energy intake — NI-5.3
- ❑ Decreased nutrient needs (*specify*) _____ — NI-5.4
- ❑ Imbalance of nutrients — NI-5.5

Fat and Cholesterol (5.6)

- ❑ Inadequate fat intake — NI-5.6.1
- ❑ Excessive fat intake — NI-5.6.2
- ❑ Inappropriate intake of fats (*specify*) _____ — NI-5.6.3

Protein (5.7)

- ❑ Inadequate protein intake — NI-5.7.1
- ❑ Excessive protein intake — NI-5.7.2
- ❑ Inappropriate intake of protein or amino acids (*specify*) _____ — NI-5.7.3

Carbohydrate and Fiber (5.8)

- ❑ Inadequate carbohydrate intake — NI-5.8.1
- ❑ Excessive carbohydrate intake — NI-5.8.2
- ❑ Inappropriate intake of types of carbohydrate (*specify*) _____ — NI-5.8.3
- ❑ Inconsistent carbohydrate intake — NI-5.8.4
- ❑ Inadequate fiber intake — NI-5.8.5
- ❑ Excessive fiber intake — NI-5.8.6

Vitamin (5.9)

- ❑ Inadequate vitamin intake (*specify*) _____ — NI-5.9.1
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)
- ❑ Excessive vitamin intake (*specify*) _____ — NI-5.9.2
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)

Mineral (5.10)

- ❑ Inadequate mineral intake (*specify*) _____ — NI-5.10.1
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)
- ❑ Excessive mineral intake (*specify*) _____ — NI-5.10.2
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)

Multi-nutrient (5.11)

- ❑ Predicted suboptimal nutrient intake — NI-5.11.1
- ❑ Predicted excessive nutrient intake — NI-5.11.2

CLINICAL — NC

Defined as "nutritional findings/problems identified that relate to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty — NC-1.1
- ❑ Biting/Chewing (masticatory) difficulty — NC-1.2
- ❑ Breastfeeding difficulty — NC-1.3
- ❑ Altered GI function — NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization — NC-2.1
- ❑ Altered nutrition-related laboratory values (specify) _____ — NC-2.2
- ❑ Food-medication interaction — NC-2.3
- ❑ Predicted food-medication interaction — NC-2.4

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight — NC-3.1
- ❑ Unintentional weight loss — NC-3.2
- ❑ Overweight/obesity — NC-3.3
- ❑ Unintentional weight gain — NC-3.4

BEHAVIORAL-ENVIRONMENTAL — NB

Defined as "nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as related, observed or documented"

- ❑ Food- and nutrition-related knowledge deficit — NB-1.1
- ❑ Harmful beliefs/attitudes about food- or nutrition-related topics (use with caution) — NB-1.2
- ❑ Not ready for diet/lifestyle change — NB-1.3
- ❑ Self-monitoring deficit — NB-1.4
- ❑ Disordered eating pattern — NB-1.5
- ❑ Limited adherence to nutrition-related recommendations — NB-1.6
- ❑ Undesirable food choices — NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality-of-life problems as reported, observed, or documented"

- ❑ Physical inactivity — NB-2.1
- ❑ Excessive physical activity — NB-2.2
- ❑ Inability or lack of desire to manage self-care — NB-2.3
- ❑ Impaired ability to prepare foods/meals — NB-2.4
- ❑ Poor nutrition quality of life — NB-2.5
- ❑ Self-feeding difficulty — NB-2.6

Food Safety and Access (3)

Defined as "actual problems with food safety or access to food, water, or nutrition related supplies"

- ❑ Intake of unsafe food — NB-3.1
- ❑ Limited access to food or water — NB-3.2
- ❑ Limited access to nutrition-related supplies — NB-3.3

Abbildung 12: Terminologie der Ernährungsdiagnostik

Die Fragen sind in vier Blöcke unterteilt, die die vier Hauptbereiche der Ernährungsdiagnostikterminologie darstellen: Aufnahme, klinische, verhaltensbezogene und umweltbezogene sowie diätetische Behandlungen. Je nach spezifischem Einsatz des Chatbots können zusätzliche und spezifischere Fragen hinzugefügt werden, um die Erfassung spezifischer Informationen und Interventionsmöglichkeiten zu bewerten. Abbildung 13 zeigt ein Beispiel für Fragen, die bei dieser Bewertung verwendet werden.

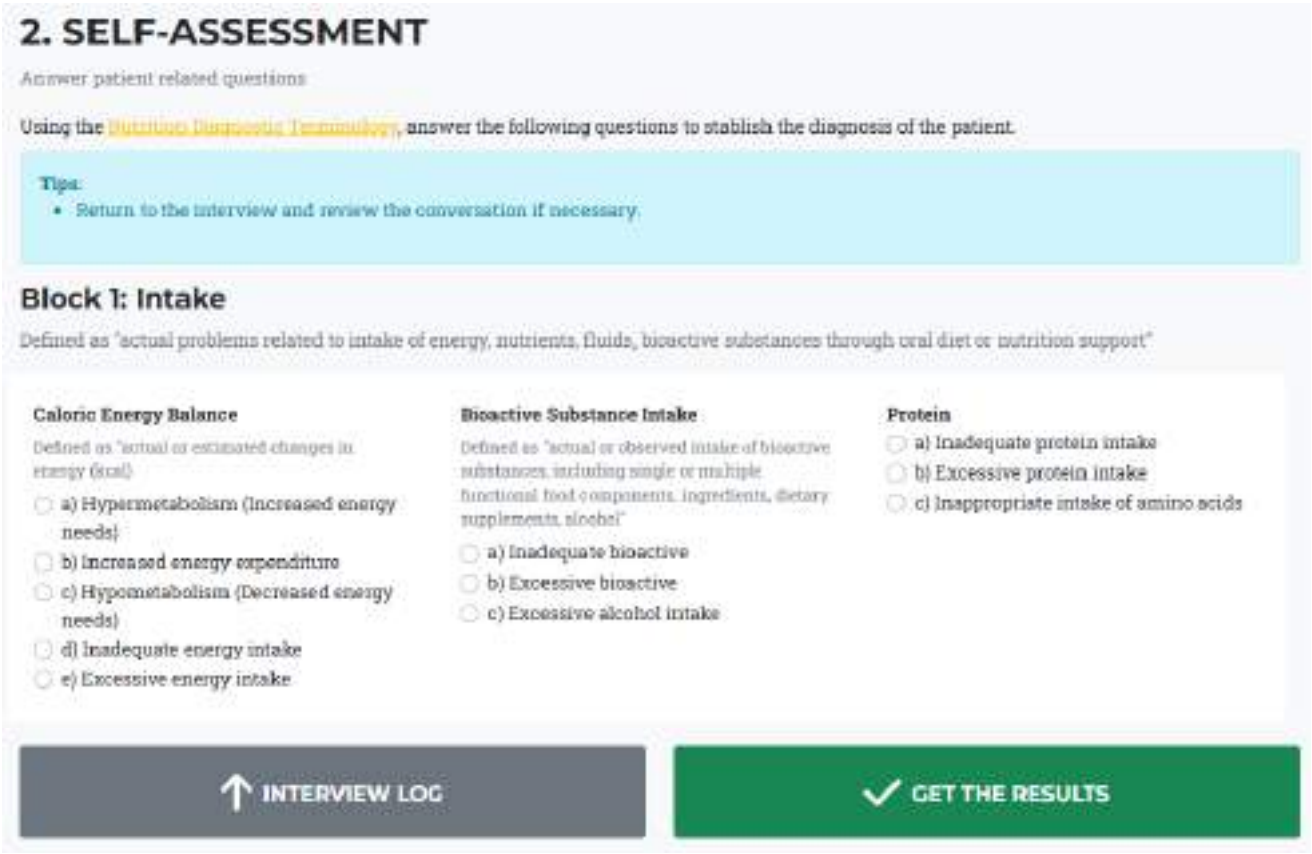


Abbildung 13: Fragen zur Selbsteinschätzung

2.5. Abschließende Umfrage

Nachdem der Teilnehmer alle Fragen beantwortet hat, wählt er die Schaltfläche „Ergebnisse abrufen“ aus und wird gebeten, an einer zweiten Umfrage zur Nutzung und Wirksamkeit des Chatbots teilzunehmen (Abbildung 14), bevor er mit den Ergebnissen fortfährt.

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3. My skills in using a chatbot in the learning process as a dietetics student are at:

4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?

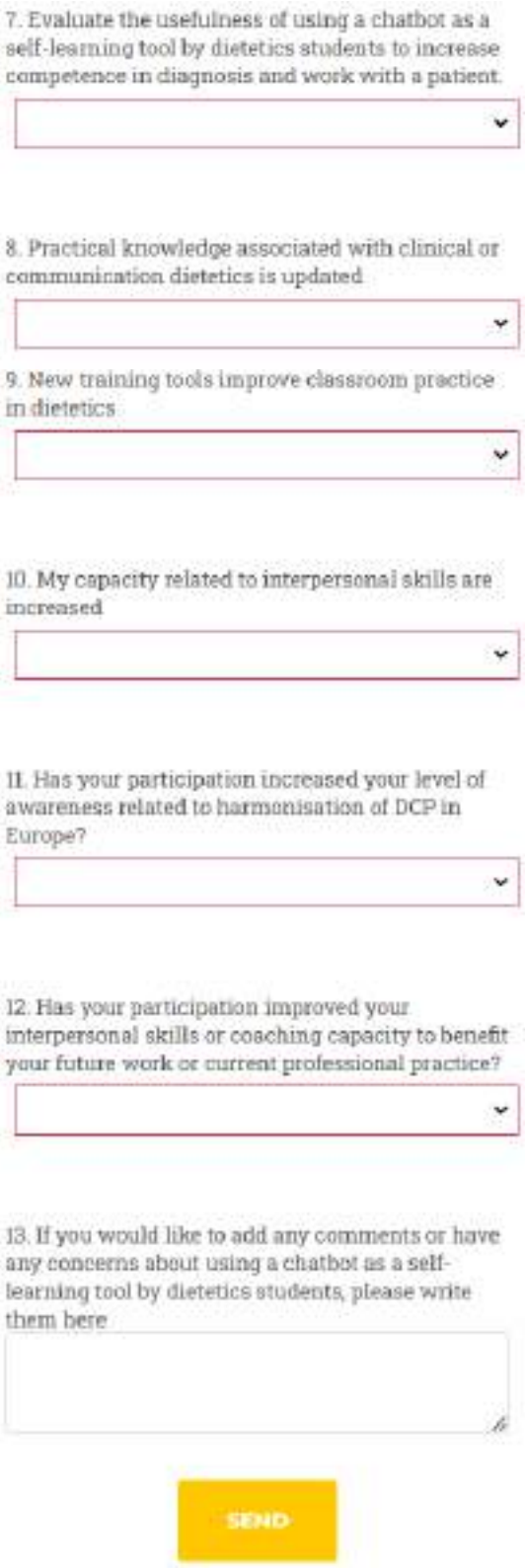


Abbildung 14: Abschlussbefragung

2.6. Ergebnisse des Interviews und der Selbsteinschätzung

Abschließend werden dem Teilnehmer die Ergebnisse des Interviews und des Selbsteinschätzungsfragebogens mitgeteilt (Abbildung 15).

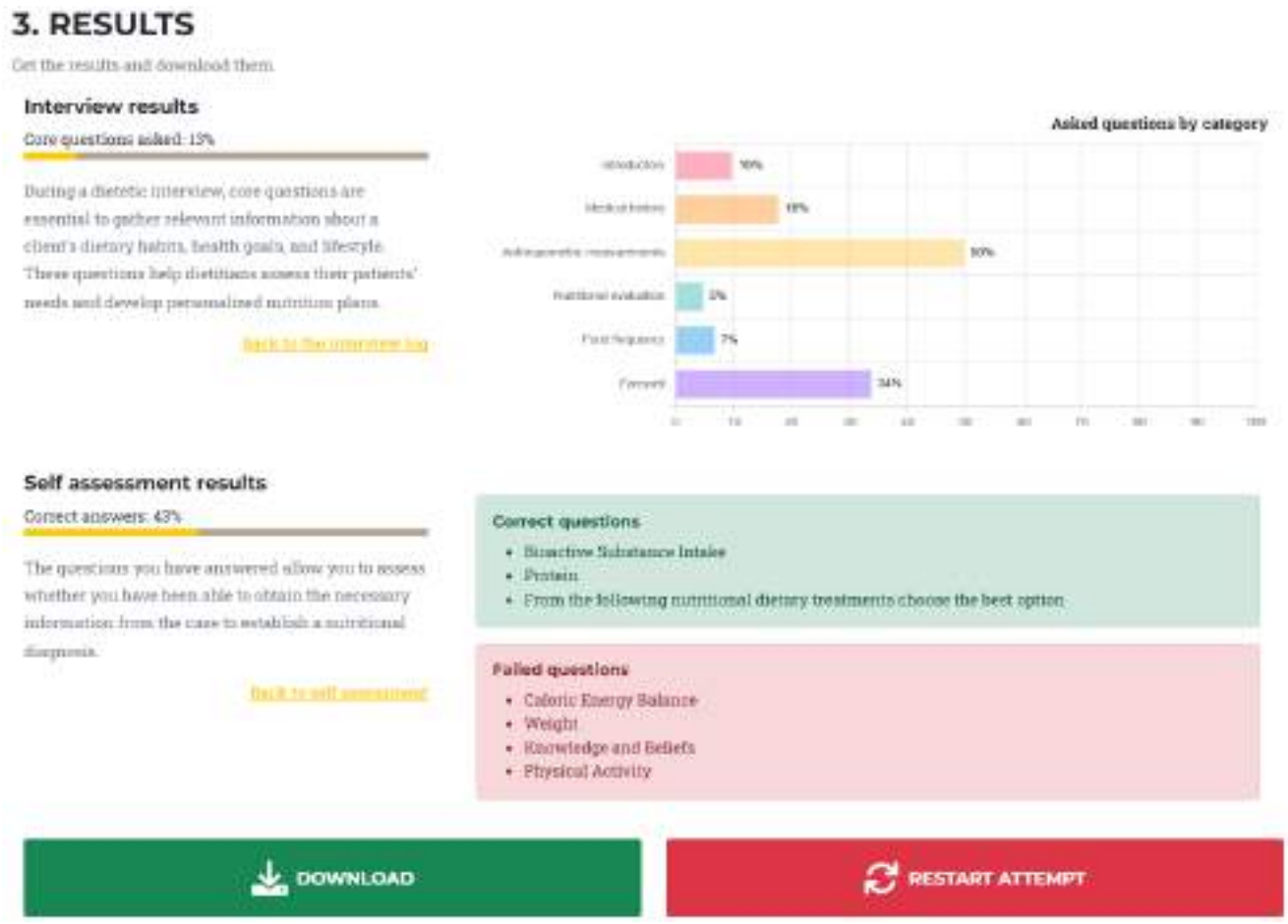


Abbildung 15: Ergebnisse des Interviews und der Selbsteinschätzung

Die Interviewergebnisse werden in die wichtigsten Informationskategorien jedes Falles unterteilt:

- Einleitend;
- Krankengeschichte;
- Anthropometrische Messungen;
- Ernährungsphysiologische Bewertung;
- Häufigkeit der Nahrungsaufnahme;
- Lebewohl.

Durch die Einsicht in den Prozentsatz der in jeder Kategorie gestellten Fragen erfährt der Teilnehmer, welche Themen verbessert werden müssen. Es ist auch möglich, das Interviewprotokoll einzusehen, um die Interaktionen zu überprüfen und zu entscheiden, welche zusätzlichen Fragen bei einem neuen Versuch gestellt werden könnten (Schaltfläche „Versuch neu starten“).

Die Ergebnisse des Selbsteinschätzungsfragebogens umfassen den Gesamtanteil der richtigen Antworten sowie die Identifizierung der spezifischen Themen, zu denen die Fragen richtig oder falsch beantwortet wurden. Diese beiden Ergebnisgruppen können auch als PDF-Datei heruntergeladen werden.

Co-funded by the Erasmus+ Programme of the European Union

DIETing_LAB
Digital Lab for Education in Dietetics

Cyfrowe Laboratorium Edukacji Dietetycznej łączące naukę przez doświadczenie i służbę społeczną

Podręcznik szkoleniowy dotyczący oprogramowania edukacyjnego cyfrowego

2021-1-ES01-KA220-HED-000032074

Luty 2025

Co-funded by the Erasmus+ Programme of the European Union

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Universidad Europea del Atlántico

Zawartość

1.Wprowadzenie

Aby ułatwić uczestnikom proces edukacji i zdobywanie praktycznych doświadczeń, będą oni mieli dostęp do dwóch narzędzi cyfrowych opracowanych przez zespół badawczy: wirtualnego czatbota dla pacjentów i wirtualnej kliniki.

1.1 Wirtualny chatbot dla pacjentów?

Aby udoskonalić praktyczne szkolenie z zakresu dietetyki i promować podejście społeczne/usługowe w zakresie żywienia, stworzono środowisko cyfrowe do przeprowadzania wirtualnych wywiadów z pacjentami.

Oprogramowanie edukacyjne Digital opiera się na prezentacji i interakcji z wirtualnymi pacjentami i ma na celu pomoc studentom żywienia/dietetyki i dietetykom w doskonaleniu umiejętności bez bezpośredniego nadzoru. Narzędzie cyfrowe przedstawia różne scenariusze (przypadki pacjentów oparte na rzeczywistych danych), aby wygenerować doświadczenie uczenia się przez doświadczenie. Scenariusze te koncentrują się na takich tematach, jak otyłość, cukrzyca lub nefropatia, a różne scenariusze można opracować i uwzględnić w oprogramowaniu.

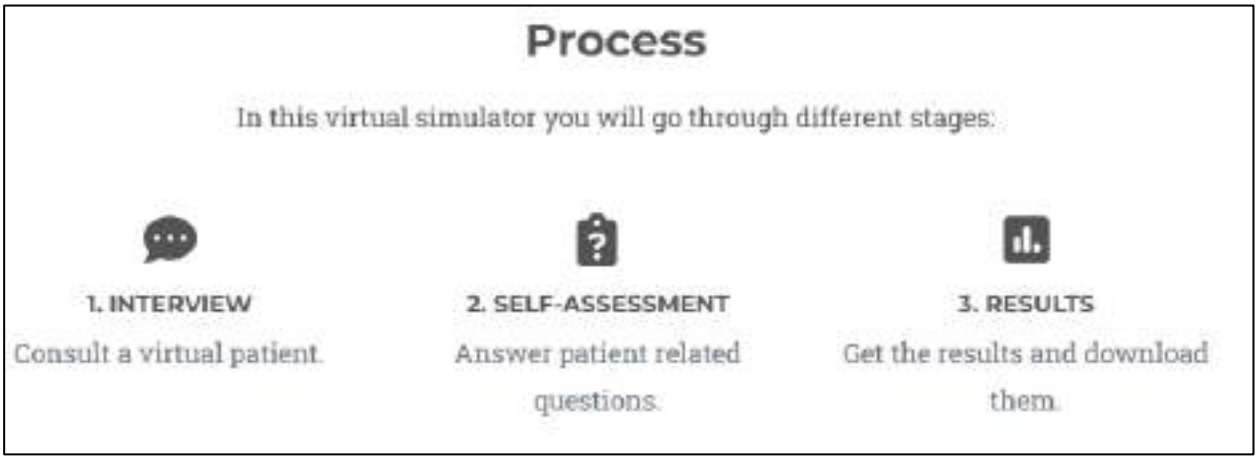
W oprogramowaniu Educational Digital uczący się będzie mógł wchodzić w interakcje z wirtualnymi pacjentami. Studenci i dietetycy rozmawiają z pacjentami, aby poprawić swoje umiejętności anamnezy, skupiając się na procesie opieki dietetycznej (DCP – patrz rysunek 1).

Postać1:Proces opieki dietetycznej (DCP)

Rozmowy zostały zwirtualizowane w konwersacyjnej sztucznej inteligencji i pilotowane wewnętrznie przez ekspertów dietetyki/specjalistów ds. żywienia, korygujących błędy i udoskonalających swoje reakcje.

Proces ten składa się z trzech głównych etapów (przedstawionych na rysunku 2):

1) Wywiad z pacjentem wirtualnym (wywiad lekarski);
2) Samoocena przy użyciuTerminologia diagnostyki żywieniowej;
3) Wyniki wyjściowe.



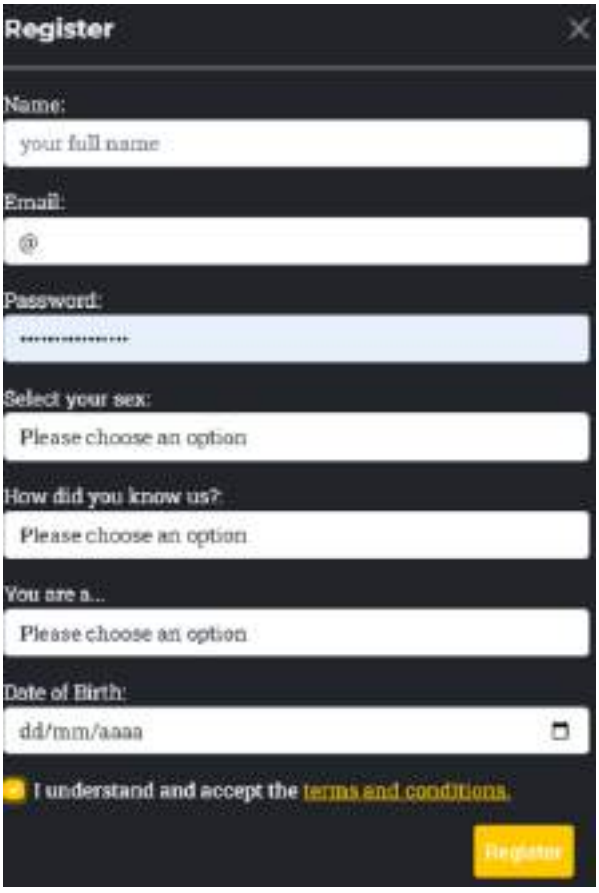
Rysunek 2: Proces używany w przypadku oprogramowania edukacyjnego w wersji cyfrowej

2. Jak korzystać z oprogramowania edukacyjnego w wersji cyfrowej?

Stworzono platformę umożliwiającą interakcję z wirtualnymi pacjentami. Jest ona dostępna pod adresem:https://virtual-pacjent.edietinglab.eu/
Większość instytucji partnerskich projektu (Uniwersytet St. Pölten, Uniwersytet Jana Kochanowskiego w Kielcach, Wydział Żywienia i Nauk o Żywności, Uniwersytet w Porto, Universidad Europea del Atlántico i AP Hogeschool Antwerpen) opracowała wirtualnych pacjentów w różnych warunkach klinicznych. Każdy z wirtualnych pacjentów ma inną diagnozę i będzie wymagał innej interwencji żywieniowej.
Celem tej platformy jest ułatwienie szkolenia w zakresie anamnezy, a następnie identyfikacji potrzeb żywieniowych pacjentów oraz udzielania porad (więcej szczegółów poniżej).

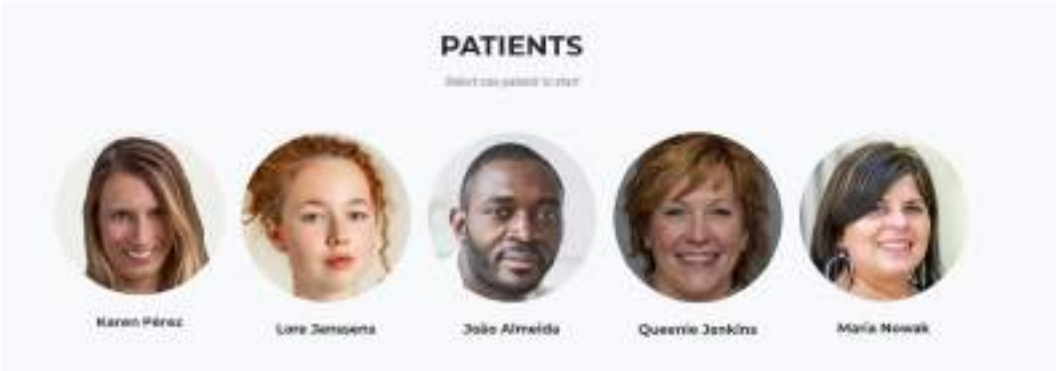
2.1 Rejestracja i pierwsze kroki

Aby nawiązać interakcję z wirtualnymi pacjentami, uczestnicy muszą zarejestrować się na platformie, podając dane wymagane w formularzu rejestracyjnym (jak pokazano na rysunku 3).



Rysunek 3: Formularz rejestracyjny

Po zalogowaniu się, uczniowie będą mogli wybrać spośród pięciu różnych wirtualnych pacjentów, aby rozpocząć wywiad: Karen Pérez, Lore Janssens, João Almeida, Queenie Jenkins i Maria Nowak (rysunek 4). Liczbę wirtualnych pacjentów i przypadków klinicznych można zwiększyć lub zmienić zgodnie ze zidentyfikowanymi potrzebami.



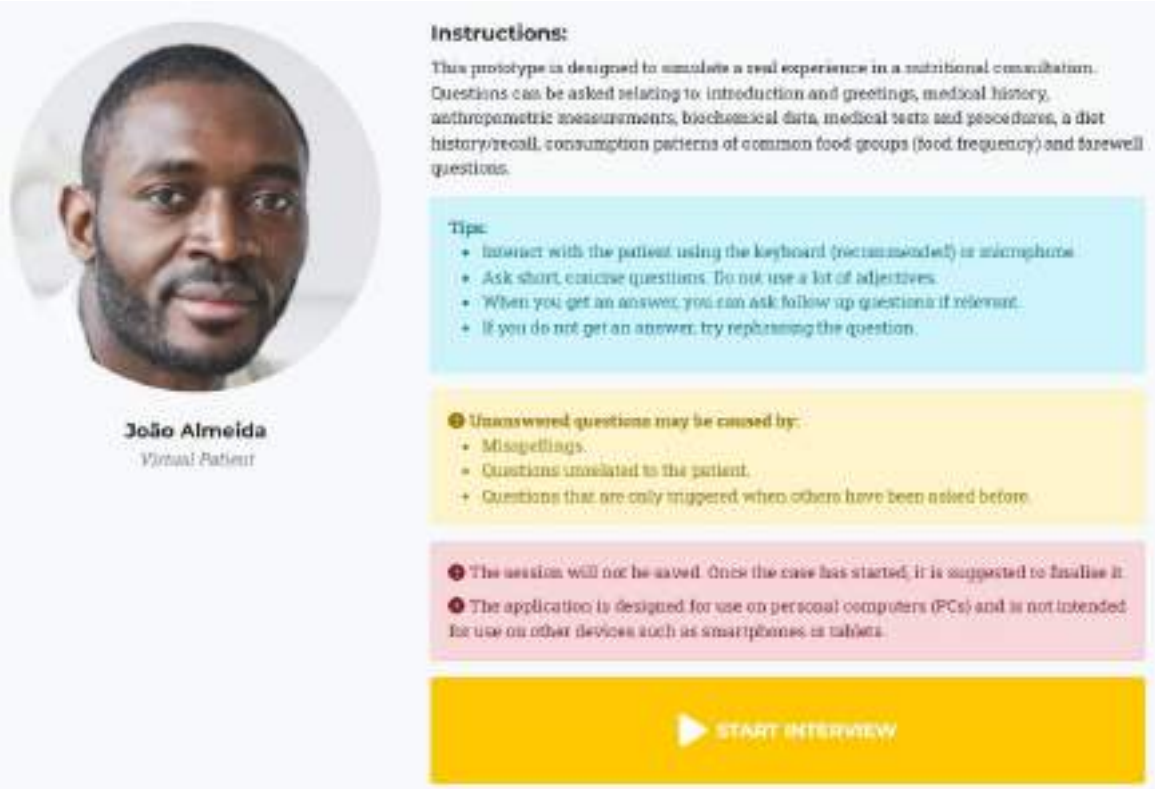
Rysunek 4: Wirtualni pacjenci

Wywiad może być przeprowadzony w różnych językach: angielskim, niemieckim, hiszpańskim, holenderskim, polskim i portugalskim (rysunek 5).

Rysunek 5: Wybór języka

6

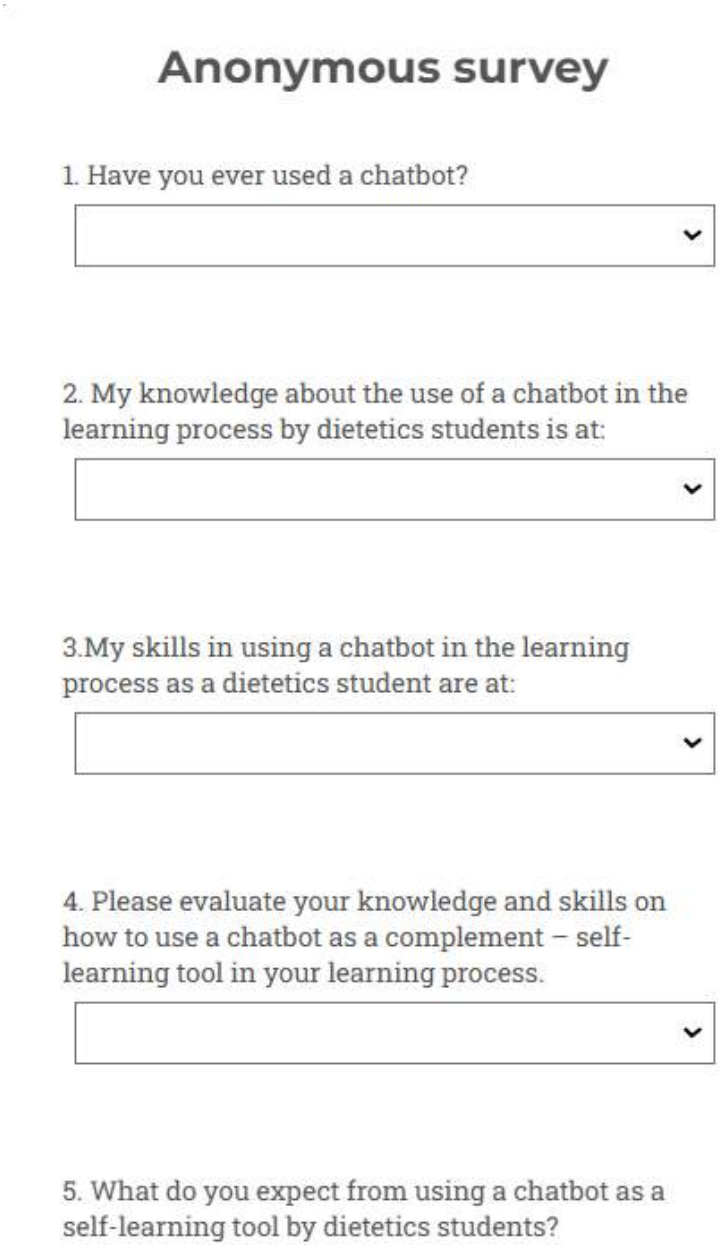
Po wybraniu wirtualnego pacjenta i pożądanego języka wywiadu, uczniom przedstawiane są instrukcje dotyczące interakcji z chatbotem (rysunek 6). Instrukcje te można również przeglądać w dowolnym momencie podczas wywiadu (przycisk „Instrukcje” poniżej okna chatbota).



Rysunek 6: Instrukcje dla chatbota

2.2 Badanie wstępne

Po wybraniu opcji „Rozpocznij wywiad" wyświetla się ankieta, którą należy wypełnić przed kontynuowaniem. Ankieta ta pyta uczestnika o wcześniejsze korzystanie z chatbota, jego postrzeganie i oczekiwania dotyczące jego skuteczności (Rysunek 7).



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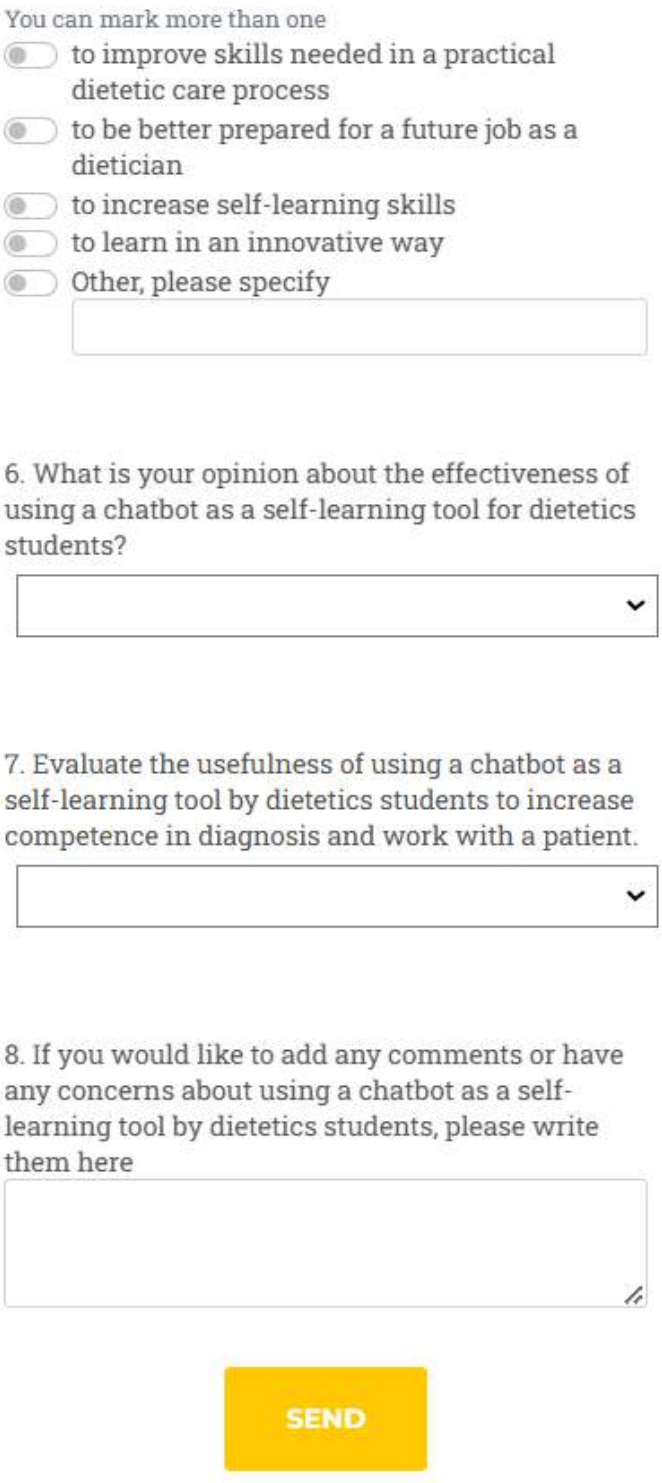
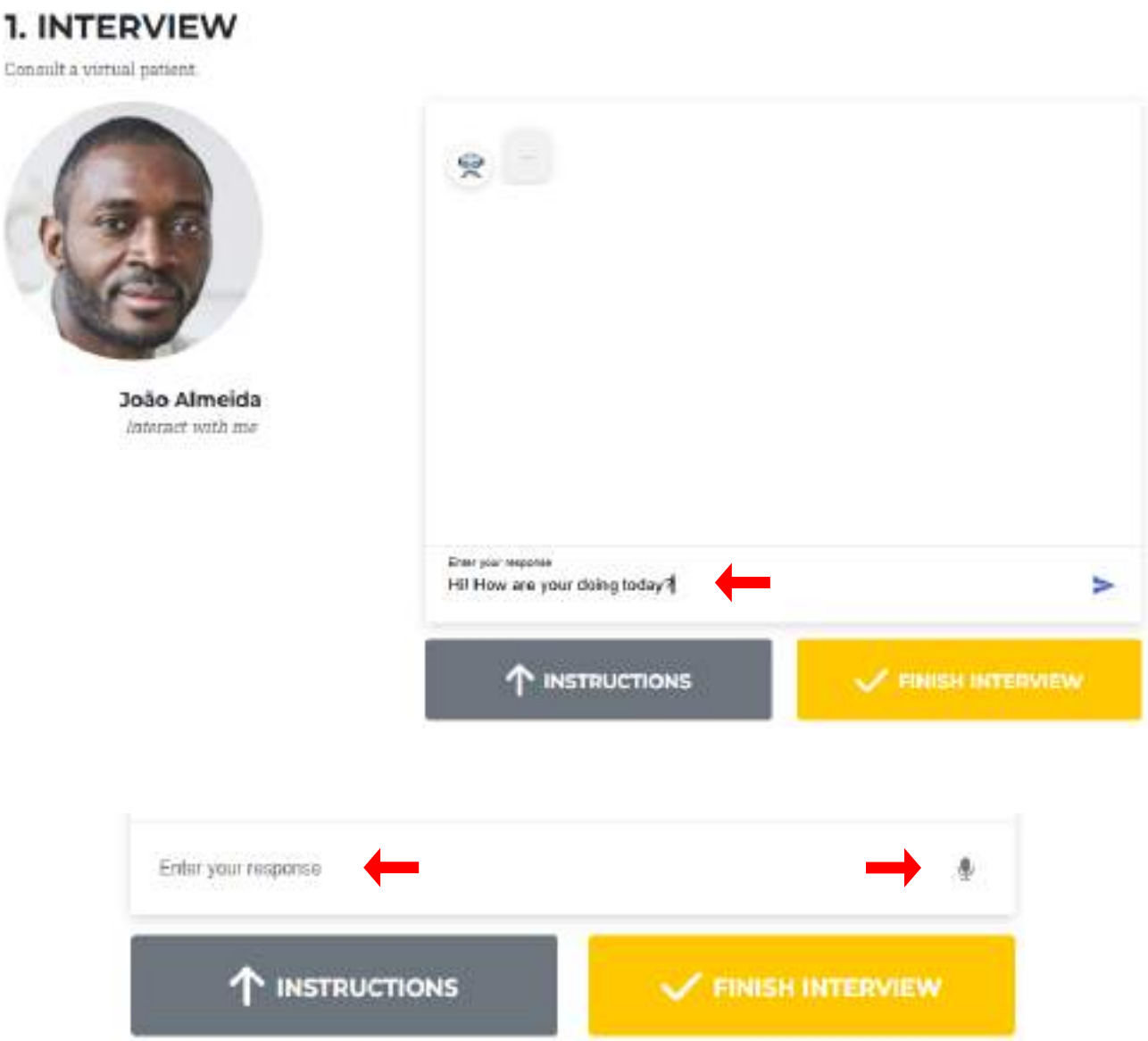


Rysunek 7: Badanie wstępne

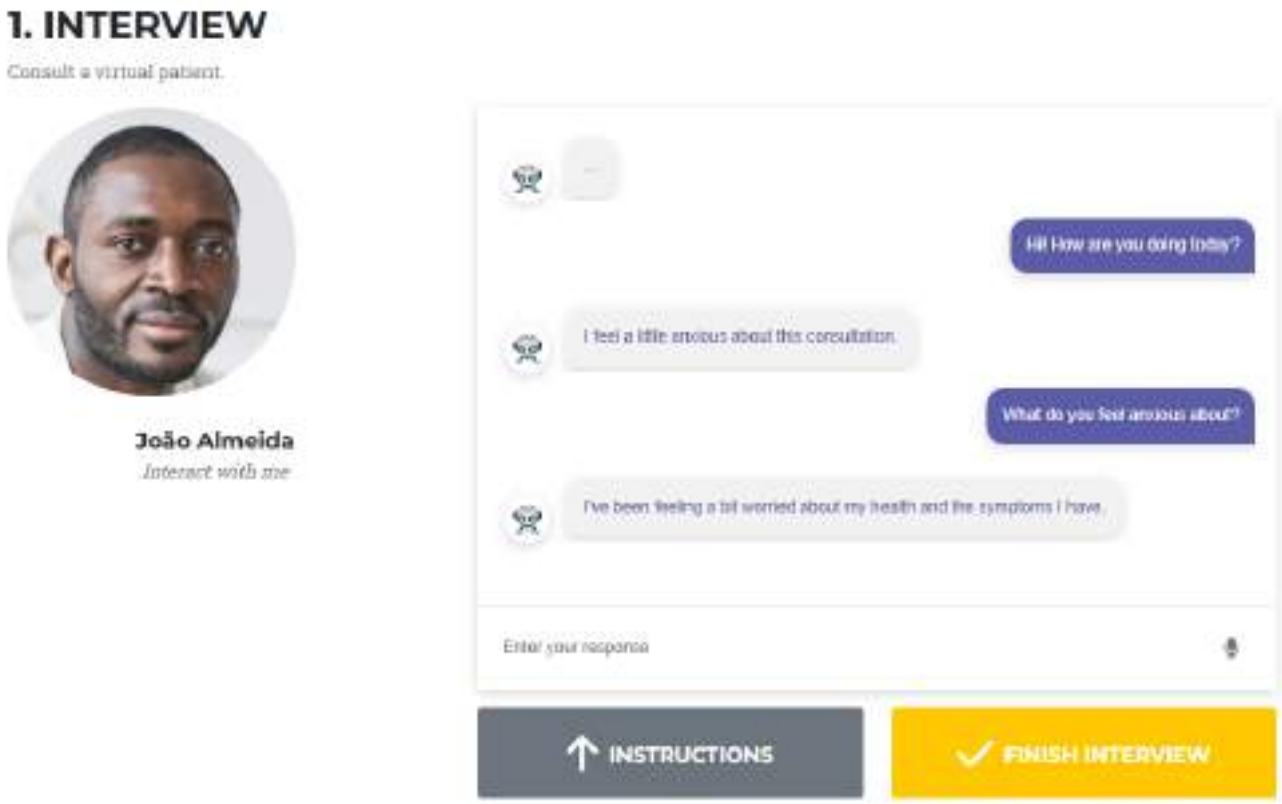
2.3. Interakcja z chatbotem

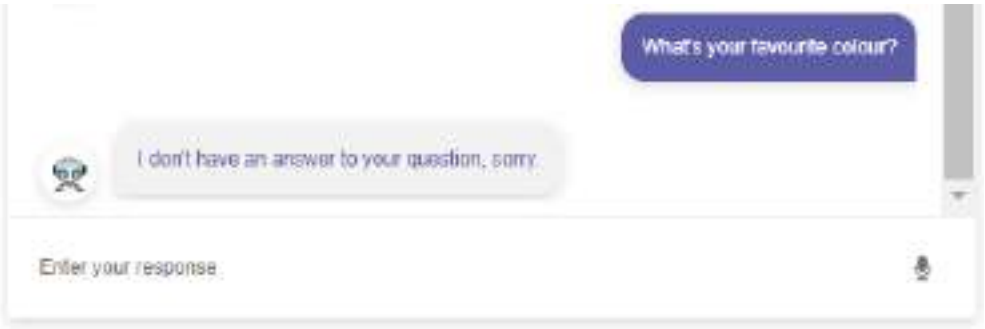
Następnie zostanie wyświetlony chatbot, umożliwiający interakcje (rysunek 8). Leaners mogą zadawać nieograniczoną liczbę pytań, aby zebrać wszystkie niezbędne informacje. Pytania mogą być pisane lub mówione (używając znaku mikrofonu, rysunek 9).



Rysunki 8 i 9: Chatbot

Wirtualny pacjent udzieli odpowiedzi na zadane pytania (Rysunek 10). Jeśli nie ma dostępnych informacji na konkretne pytanie, wirtualny pacjent udzieli tych informacji, tak aby pytanie można było zastąpić lub sformułować na nowo (Rysunek 11).





Rysunki 10 i 11: Przykłady interakcji

2.4. Samoocena

Po zakończeniu wywiadu (żółty przycisk pod chatbotem) użytkownik zostaje przekierowany do kwestionariusza samooceny. Kwestionariusz jest specyficzny dla wybranego wirtualnego pacjenta i zadaje pytania wielokrotnego wyboru oparte na terminologii diagnostyki żywieniowej (rysunek 12).

Nutrition Diagnostic Terminology

INTAKE — NI

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal) balance"

- ❑ Unused — NI-1.1
- ❑ Increased energy expenditure — NI-1.2
- ❑ Unused — NI-1.3
- ❑ Inadequate energy intake — NI-1.4
- ❑ Excessive energy intake — NI-1.5
- ❑ Predicted suboptimal energy intake — NI-1.6
- ❑ Predicted excessive energy intake — NI-1.7

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral intake — NI-2.1
- ❑ Excessive oral intake — NI-2.2
- ❑ Inadequate enteral nutrition infusion — NI-2.3
- ❑ Excessive enteral nutrition infusion — NI-2.4
- ❑ Less than optimal enteral nutrition — NI-2.5
- ❑ Inadequate parenteral nutrition infusion — NI-2.6
- ❑ Excessive parenteral nutrition infusion — NI-2.7
- ❑ Less than optimal parenteral nutrition — NI-2.8
- ❑ Limited food acceptance — NI-2.9

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared with patient goal"

- ❑ Inadequate fluid intake — NI-3.1
- ❑ Excessive fluid intake — NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food components, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake — NI-4.1
- ❑ Excessive bioactive substance intake — NI-4.2
- ❑ Excessive alcohol intake — NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (*specify*) _____ — NI-5.1
- ❑ Malnutrition — NI-5.2
- ❑ Inadequate protein-energy intake — NI-5.3
- ❑ Decreased nutrient needs (*specify*) _____ — NI-5.4
- ❑ Imbalance of nutrients — NI-5.5

Fat and Cholesterol (5.6)

- ❑ Inadequate fat intake — NI-5.6.1
- ❑ Excessive fat intake — NI-5.6.2
- ❑ Inappropriate intake of fats (*specify*) _____ — NI-5.6.3

Protein (5.7)

- ❑ Inadequate protein intake — NI-5.7.1
- ❑ Excessive protein intake — NI-5.7.2
- ❑ Inappropriate intake of protein or amino acids (*specify*) _____ — NI-5.7.3

Carbohydrate and Fiber (5.8)

- ❑ Inadequate carbohydrate intake — NI-5.8.1
- ❑ Excessive carbohydrate intake — NI-5.8.2
- ❑ Inappropriate intake of types of carbohydrate (*specify*) _____ — NI-5.8.3
- ❑ Inconsistent carbohydrate intake — NI-5.8.4
- ❑ Inadequate fiber intake — NI-5.8.5
- ❑ Excessive fiber intake — NI-5.8.6

Vitamin (5.9)

- ❑ Inadequate vitamin intake (*specify*) _____ — NI-5.9.1
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)
- ❑ Excessive vitamin intake (*specify*) _____ — NI-5.9.2
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)

Mineral (5.10)

- ❑ Inadequate mineral intake (*specify*) _____ — NI-5.10.1
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)
- ❑ Excessive mineral intake (*specify*) _____ — NI-5.10.2
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)

Multi-nutrient (5.11)

- ❑ Predicted suboptimal nutrient intake — NI-5.11.1
- ❑ Predicted excessive nutrient intake — NI-5.11.2

CLINICAL — NC

Defined as "nutritional findings/problems identified that relate to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty — NC-1.1
- ❑ Biting/Chewing (masticatory) difficulty — NC-1.2
- ❑ Breastfeeding difficulty — NC-1.3
- ❑ Altered GI function — NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization — NC-2.1
- ❑ Altered nutrition-related laboratory values (specify) _____ — NC-2.2
- ❑ Food-medication interaction — NC-2.3
- ❑ Predicted food-medication interaction — NC-2.4

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight — NC-3.1
- ❑ Unintentional weight loss — NC-3.2
- ❑ Overweight/obesity — NC-3.3
- ❑ Unintentional weight gain — NC-3.4

BEHAVIORAL-ENVIRONMENTAL — NB

Defined as "nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as related, observed or documented"

- ❑ Food- and nutrition-related knowledge deficit — NB-1.1
- ❑ Harmful beliefs/attitudes about food- or nutrition-related topics (use with caution) — NB-1.2
- ❑ Not ready for diet/lifestyle change — NB-1.3
- ❑ Self-monitoring deficit — NB-1.4
- ❑ Disordered eating pattern — NB-1.5
- ❑ Limited adherence to nutrition-related recommendations — NB-1.6
- ❑ Undesirable food choices — NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality-of-life problems as reported, observed, or documented"

- ❑ Physical inactivity — NB-2.1
- ❑ Excessive physical activity — NB-2.2
- ❑ Inability or lack of desire to manage self-care — NB-2.3
- ❑ Impaired ability to prepare foods/meals — NB-2.4
- ❑ Poor nutrition quality of life — NB-2.5
- ❑ Self-feeding difficulty — NB-2.6

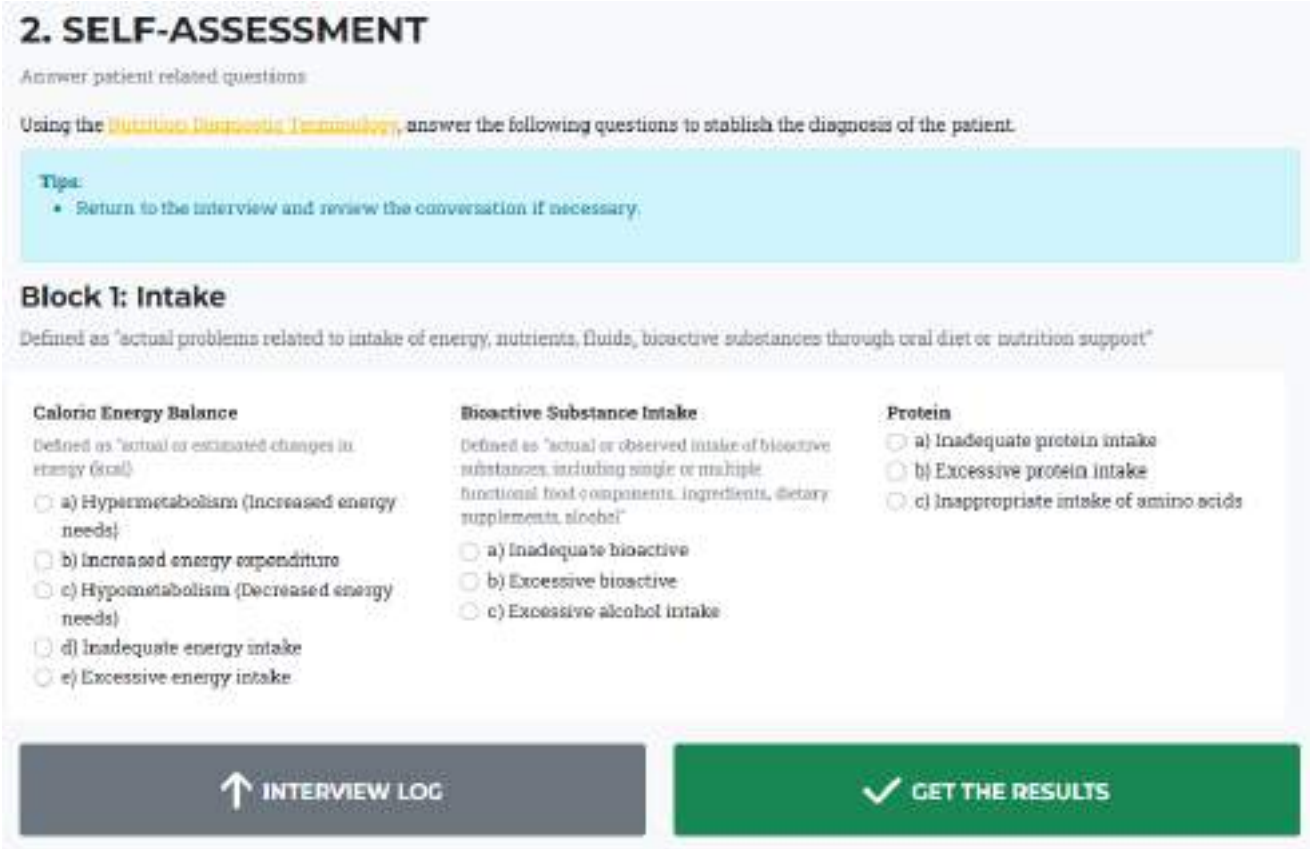
Food Safety and Access (3)

Defined as "actual problems with food safety or access to food, water, or nutrition related supplies"

- ❑ Intake of unsafe food — NB-3.1
- ❑ Limited access to food or water — NB-3.2
- ❑ Limited access to nutrition-related supplies — NB-3.3

Rycina 12: Terminologia diagnostyki żywieniowej

Pytania są podzielone na cztery bloki, które reprezentują cztery główne działy terminologii diagnostyki żywieniowej: Przyjmowanie, Kliniczne, Behawioralne i środowiskowe oraz Leczenie dietetyczne. Zgodnie ze szczególnym zastosowaniem chatbota, można dodać dodatkowe i bardziej szczegółowe pytania, aby ocenić zbieranie konkretnych informacji i opcji interwencji. Rysunek 13 przedstawia przykład pytań użytych w tej ocenie.



Rysunek 13: Pytania do samooceny

2.5. Badanie końcowe

Po udzieleniu odpowiedzi na pytania uczestnik wybiera przycisk „Pobierz wyniki” i zostaje poproszony o wypełnienie drugiej ankiety dotyczącej korzystania z chatbota i jego skuteczności (rysunek 14), zanim przejdzie do wyników.

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3. My skills in using a chatbot in the learning process as a dietetics student are at:

4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?

7. Evaluate the usefulness of using a chatbot as a self-learning tool by dietetics students to increase competence in diagnosis and work with a patient.

8. Practical knowledge associated with clinical or communication dietetics is updated

9. New training tools improve classroom practice in dietetics

10. My capacity related to interpersonal skills are increased

11. Has your participation increased your level of awareness related to harmonisation of DCP in Europe?

12. Has your participation improved your interpersonal skills or coaching capacity to benefit your future work or current professional practice?

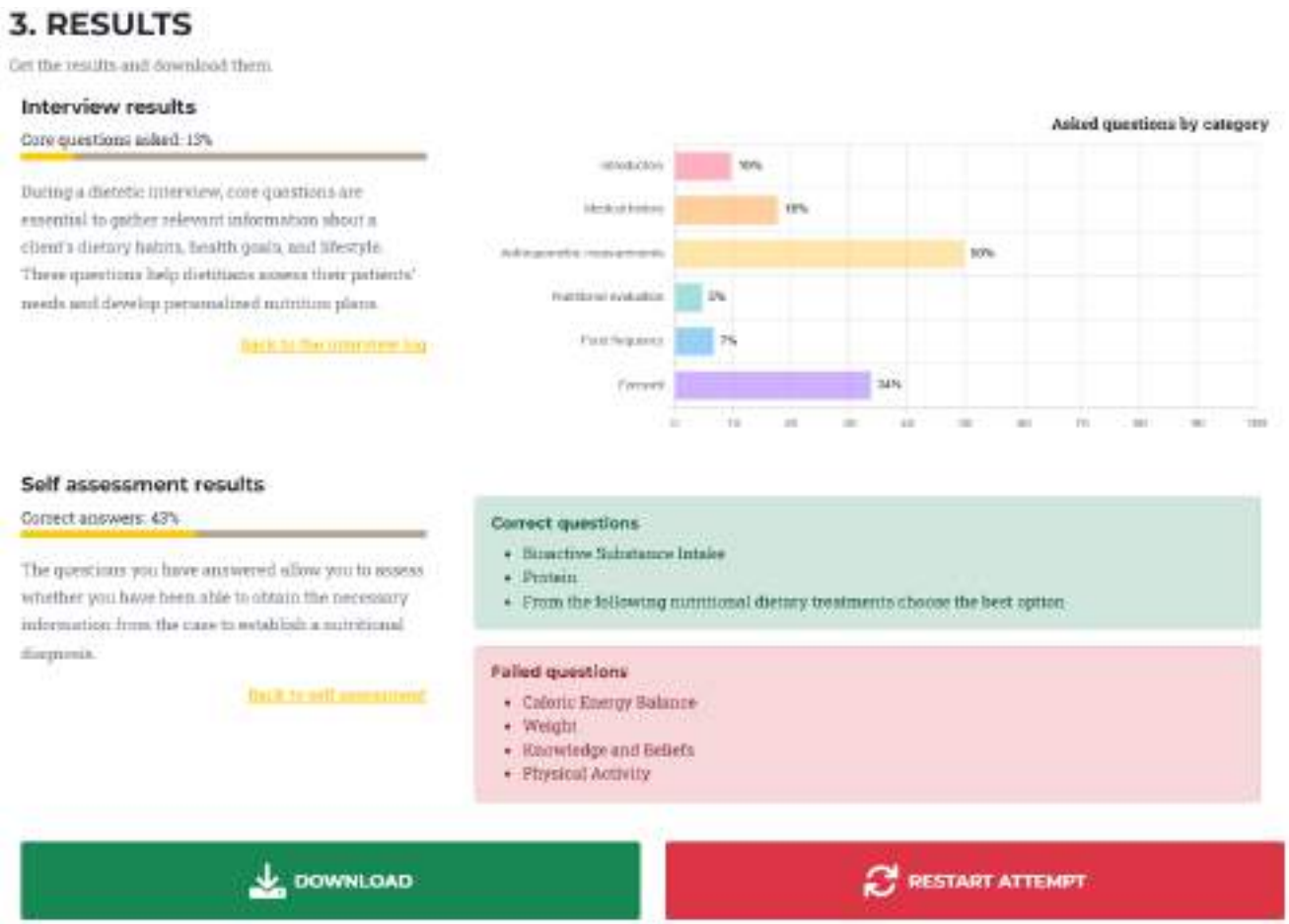
13. If you would like to add any comments or have any concerns about using a chatbot as a self-learning tool by dietetics students, please write them here

SEND

Rysunek 14: Badanie końcowe

2.6. Wyniki wywiadu i samooceny

Na koniec uczestnikowi przedstawiane są wyniki wywiadu i kwestionariusza samooceny (rysunek 15).



Rysunek 15: Wyniki wywiadu i samooceny

Wyniki wywiadu podzielono na główne kategorie informacji uwzględnionych w każdym przypadku:

- Wprowadzający;
- Historia medyczna;
- Pomiary antropometryczne;
- Ocena wartości odżywczej;
- Częstotliwość spożywania posiłków;
- Pożegnanie.

Konsultując procent pytań zadawanych w każdej kategorii, uczestnik dowiaduje się, które tematy należy poprawić. Możliwe jest również zapoznanie się z dziennikiem wywiadu, aby przejrzeć interakcje i zdecydować, jakie dodatkowe pytania można zadać w nowej próbie (przycisk „Ponownie spróbuj"). Wyniki dotyczące kwestionariusza samooceny obejmują ogólny udział poprawnych odpowiedzi, a także identyfikację konkretnych tematów, na które pytania udzielono prawidłowych lub nieprawidłowych odpowiedzi. Te dwie grupy wyników można również pobrać w pliku pdf.

Co-funded by the Erasmus+ Programme of the European Union

DIETing_LAB
Digital Lab for Education in Dietetics

Laboratório Digital de Educação em Dietética combinando Aprendizagem Experiencial e Serviço Comunitário

Manual de formação de software digital educativo

2021-1-ES01-KA220-HED-000032074

Fevereiro de 2025

Co-funded by the Erasmus+ Programme of the European Union

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AP UNIVERSITY OF APPLIED SCIENCES AND ARTS ANTWERP
Universidad Europea del Atlántico
U.PORTO FACULDADE DE CIÊNCIAS DA NUTRIÇÃO E ALIMENTAÇÃO UNIVERSIDADE DO PORTO
UVa

Conteúdo

1.Introdução

Para facilitar o percurso educativo e as experiências práticas dos alunos, estes terão acesso a duas ferramentas digitais desenvolvidas pela equipa de investigação: um chatbot de paciente virtual e uma clínica virtual.

1.1 Um chatbot para pacientes virtuais?

Para melhorar a formação prática em Educação Dietética e promover uma abordagem de aprendizagem comunitária/serviço relacionada com a nutrição, foi criado um ambiente digital para realizar entrevistas virtuais com os pacientes.

O Software Digital Educativo baseia-se na apresentação e interação com pacientes virtuais e tem como objetivo ajudar os estudantes do ensino superior em nutrição/dieta e os nutricionistas a melhorar as suas competências sem supervisão direta. A ferramenta digital apresenta diferentes cenários (casos reais de doentes) para gerar uma experiência de aprendizagem vivencial. Estes cenários focam temas como a obesidade, a diabetes ou a nefropatia, sendo que diferentes cenários podem ser desenvolvidos e incluídos no software.

No Software Digital Educativo, o aluno poderá interagir com pacientes virtuais. Os estudantes e os nutricionistas conversam com os doentes para melhorar as suas competências de anamnese focadas no Processo de Cuidados Dietéticos (PCD – ver Figura 1).

Número1: Processo de Cuidados Dietéticos (DCP)

As conversas foram virtualizadas numa IA conversacional e pilotadas internamente por nutricionistas/dietistas especialistas, corrigindo erros e melhorando as suas respostas.

O processo está organizado em três etapas principais (conforme Figura 2):

1) Entrevista com doente virtual (anamnese do doente);
2) Autoavaliação utilizando oTerminologia de Diagnóstico Nutricional;
3) Resultados de saída.

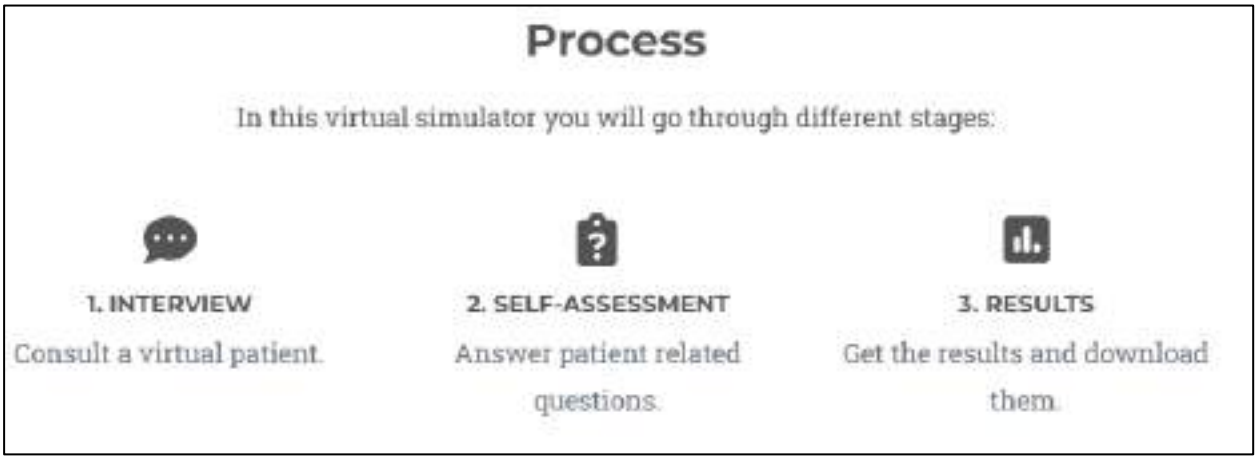


Figura 2: Processo utilizado para o Software Digital Educativo

2.Como utilizar o Software Digital Educativo?

Foi criada uma plataforma para permitir a interação com os pacientes virtuais. Está disponível em:https://virtual-patient.edietinglab.eu/
A maioria das instituições parceiras do projeto (Universidade St. Pölten, Universidade Jan Kochanowski de Kielce, Faculdade de Nutrição e Ciências da Alimentação, Universidade do Porto, Universidad Europea del Atlántico e AP Hogeschool Antwerpen) desenvolveram doentes virtuais sob diferentes condições clínicas. Cada um dos pacientes virtuais tem um diagnóstico diferente e necessitará de uma intervenção nutricional diferente.
O objetivo desta plataforma é facilitar o treino de anamnese e, posteriormente, a identificação das necessidades nutricionais dos doentes e o aconselhamento (mais detalhes abaixo).

2.1 Registo e primeiros passos

Para interagir com os pacientes virtuais, os alunos necessitam de se registar nesta plataforma, fornecendo os dados solicitados no formulário de registo (conforme ilustrado na Figura 3).

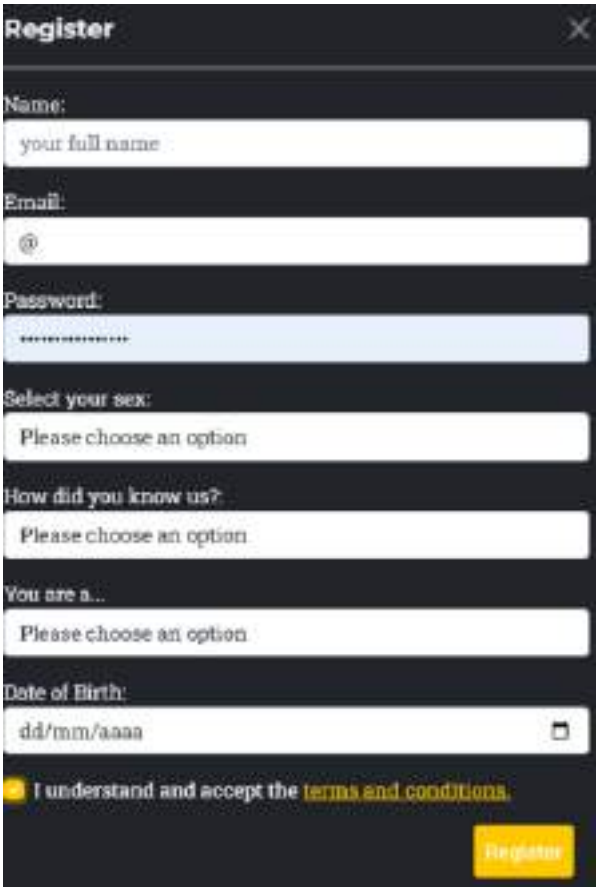


Figura 3: Formulário de registo

Após o login, os alunos poderão escolher entre cinco pacientes virtuais diferentes para iniciar uma entrevista: Karen Pérez, Lore Janssens, João Almeida, Queenie Jenkins e Maria Nowak (Figura 4). O número de pacientes virtuais e de casos clínicos pode ser aumentado ou alterado de acordo com as necessidades identificadas.

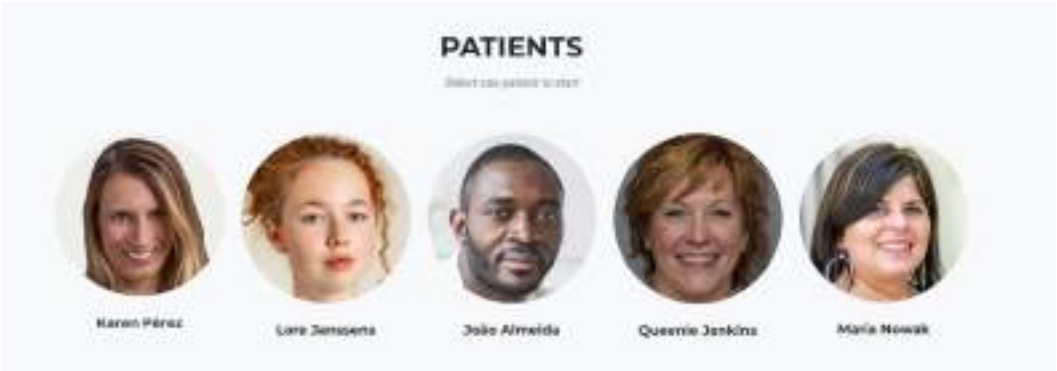


Figura 4: Doentes virtuais

A entrevista pode ser realizada em diferentes línguas: inglês, alemão, espanhol, holandês, polaco e português (Figura 5).

Figura 5: Seleção do idioma

6 Após a seleção do paciente virtual e do idioma pretendido para a entrevista, os alunos recebem as instruções para interagir com o chatbot (Figura 6). Estas instruções também podem ser consultadas em qualquer momento durante a entrevista (botão “Instruções” por baixo da janela do chatbot).

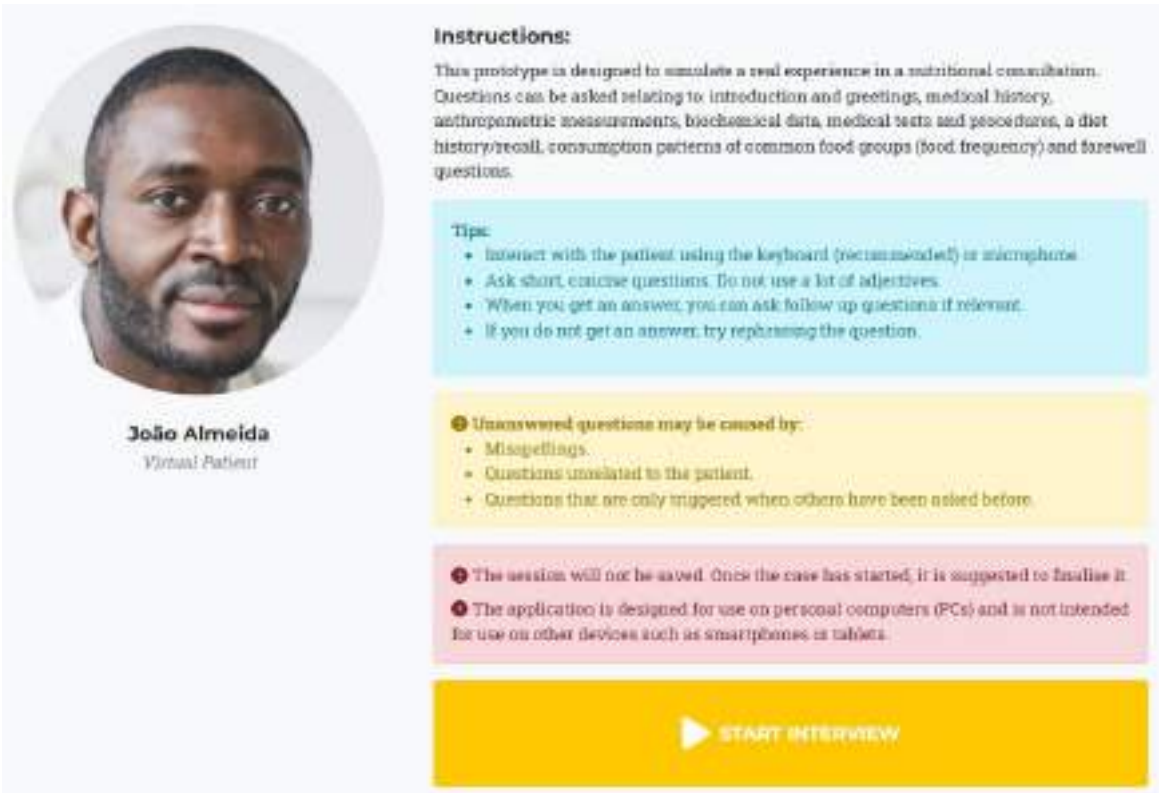
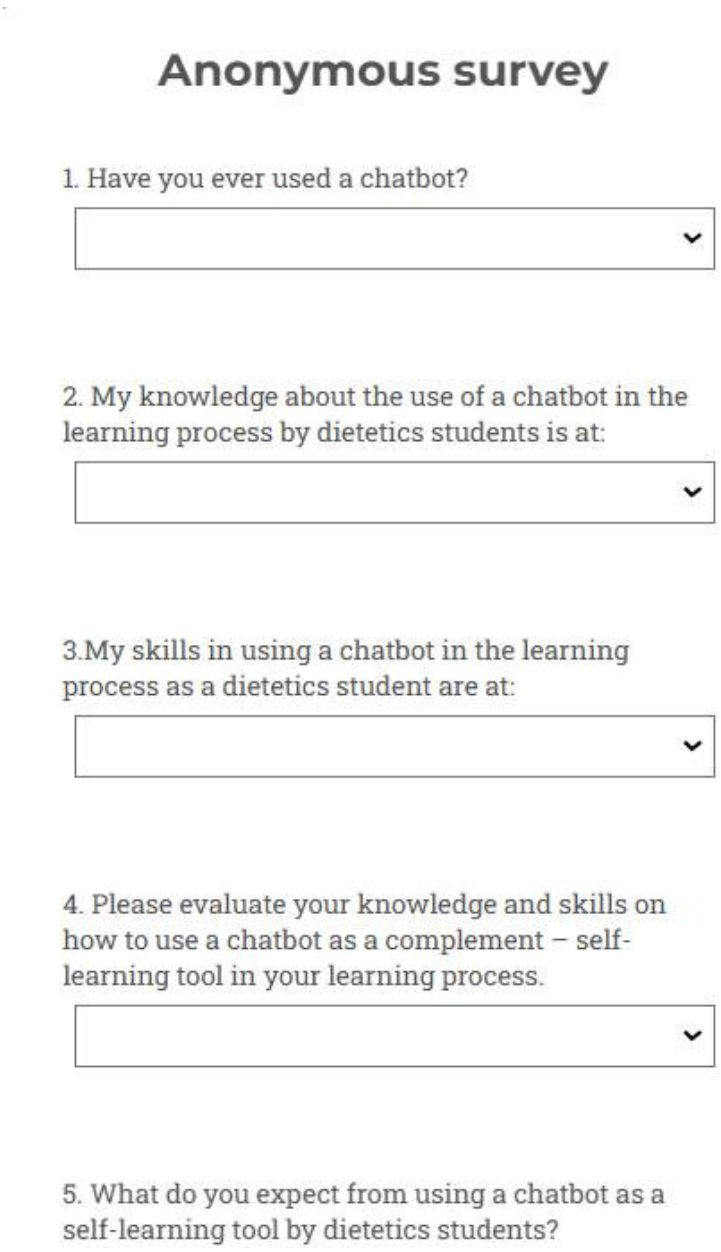


Figura 6: Instruções do chatbot

2.2 Levantamento inicial

Após selecionar a opção “Iniciar entrevista”, é apresentada uma pesquisa e deve ser concluída antes de prosseguir. Este inquérito questiona o participante sobre o uso anterior de um chatbot, perceções e expectativas sobre a sua eficácia (Figura 7).



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You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?

7. Evaluate the usefulness of using a chatbot as a self-learning tool by dietetics students to increase competence in diagnosis and work with a patient.

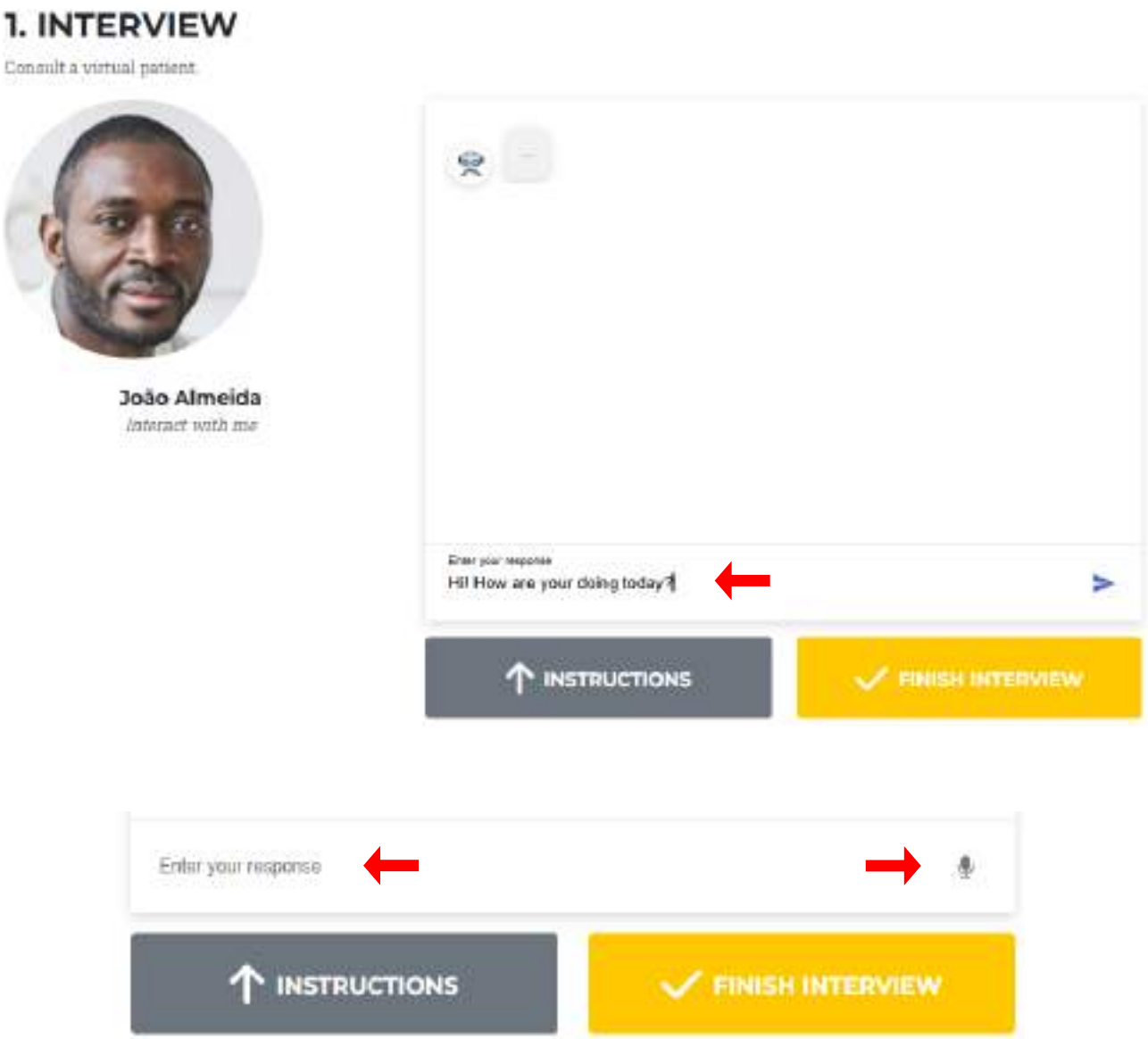
8. If you would like to add any comments or have any concerns about using a chatbot as a self-learning tool by dietetics students, please write them here

SEND

Figura 7: Levantamento inicial

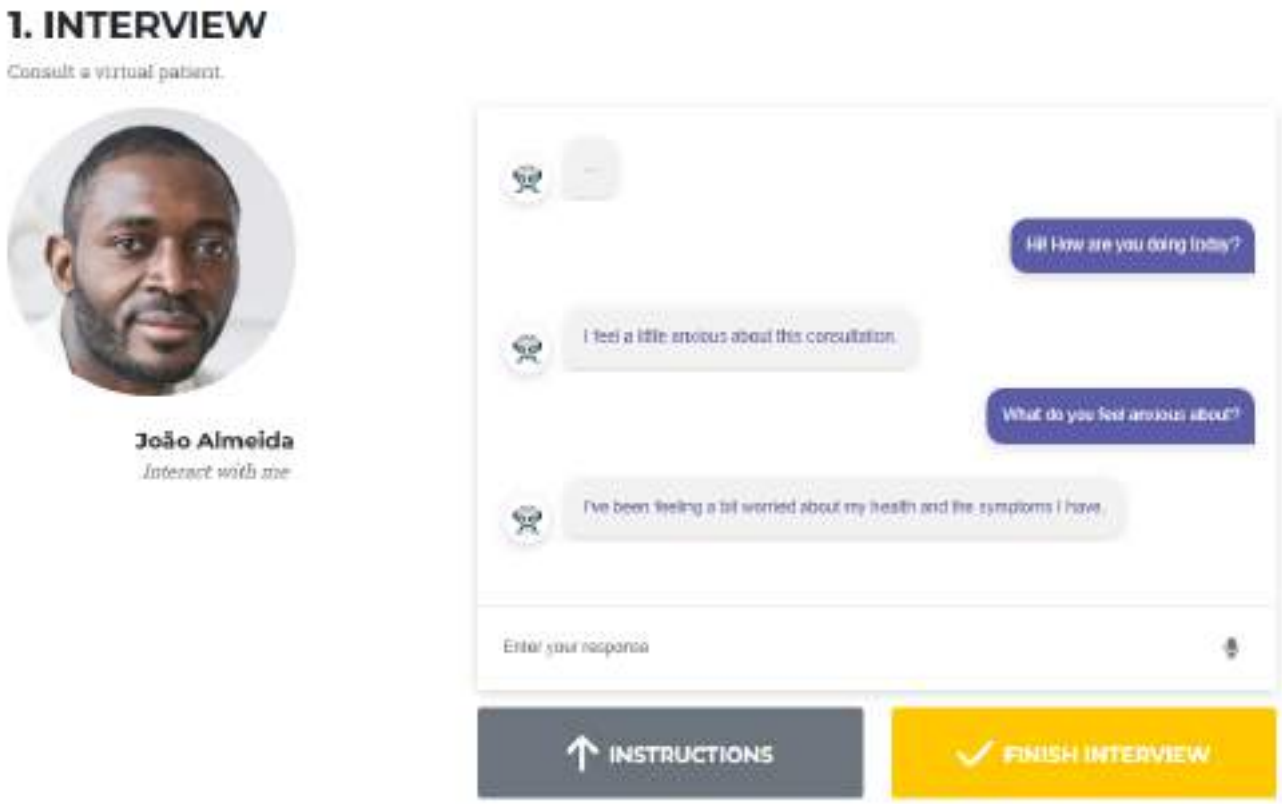
2.3. Interação com chatbot

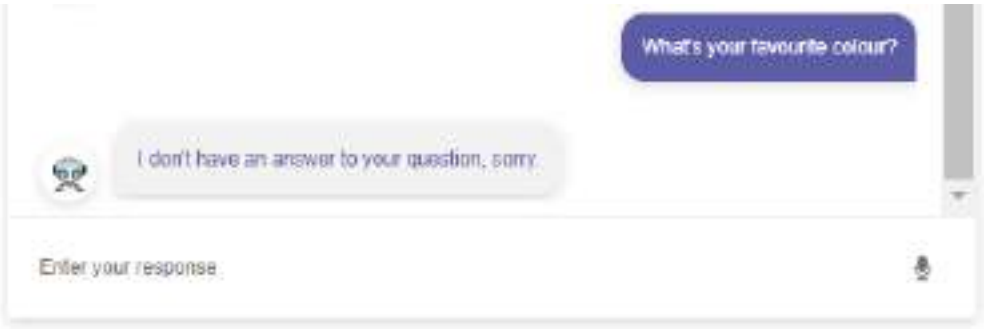
De seguida, será apresentado um chatbot, permitindo as interações (Figura 8). Os alunos podem fazer um número ilimitado de perguntas para reunir todas as informações necessárias. As perguntas podem ser escritas ou faladas (usando o sinal do microfone, Figura 9).



Figuras 8 e 9: Chatbot

O doente virtual fornecerá respostas às questões colocadas (Figura 10). Se não estiver disponível qualquer informação para uma questão específica, o paciente virtual fornecerá essa informação para que a questão possa ser substituída ou reformulada (Figura 11).





Figuras 10 e 11: Exemplos de interação

2.4. Auto-avaliação

Após terminar a entrevista (botão amarelo por baixo do chatbot), o utilizador é direcionado para um questionário de autoavaliação. O questionário é específico para o doente virtual selecionado e coloca questões de escolha múltipla baseadas na Terminologia de Diagnóstico Nutricional (Figura 12).

Nutrition Diagnostic Terminology

INTAKE — NI

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal) balance"

- ❑ Unused — NI-1.1
- ❑ Increased energy expenditure — NI-1.2
- ❑ Unused — NI-1.3
- ❑ Inadequate energy intake — NI-1.4
- ❑ Excessive energy intake — NI-1.5
- ❑ Predicted suboptimal energy intake — NI-1.6
- ❑ Predicted excessive energy intake — NI-1.7

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral intake — NI-2.1
- ❑ Excessive oral intake — NI-2.2
- ❑ Inadequate enteral nutrition infusion — NI-2.3
- ❑ Excessive enteral nutrition infusion — NI-2.4
- ❑ Less than optimal enteral nutrition — NI-2.5
- ❑ Inadequate parenteral nutrition infusion — NI-2.6
- ❑ Excessive parenteral nutrition infusion — NI-2.7
- ❑ Less than optimal parenteral nutrition — NI-2.8
- ❑ Limited food acceptance — NI-2.9

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared with patient goal"

- ❑ Inadequate fluid intake — NI-3.1
- ❑ Excessive fluid intake — NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food components, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake — NI-4.1
- ❑ Excessive bioactive substance intake — NI-4.2
- ❑ Excessive alcohol intake — NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (*specify*) _____ — NI-5.1
- ❑ Malnutrition — NI-5.2
- ❑ Inadequate protein-energy intake — NI-5.3
- ❑ Decreased nutrient needs (*specify*) _____ — NI-5.4
- ❑ Imbalance of nutrients — NI-5.5

Fat and Cholesterol (5.6)

- ❑ Inadequate fat intake — NI-5.6.1
- ❑ Excessive fat intake — NI-5.6.2
- ❑ Inappropriate intake of fats (*specify*) _____ — NI-5.6.3

Protein (5.7)

- ❑ Inadequate protein intake — NI-5.7.1
- ❑ Excessive protein intake — NI-5.7.2
- ❑ Inappropriate intake of protein or amino acids (*specify*) _____ — NI-5.7.3

Carbohydrate and Fiber (5.8)

- ❑ Inadequate carbohydrate intake — NI-5.8.1
- ❑ Excessive carbohydrate intake — NI-5.8.2
- ❑ Inappropriate intake of types of carbohydrate (*specify*) _____ — NI-5.8.3
- ❑ Inconsistent carbohydrate intake — NI-5.8.4
- ❑ Inadequate fiber intake — NI-5.8.5
- ❑ Excessive fiber intake — NI-5.8.6

Vitamin (5.9)

- ❑ Inadequate vitamin intake (*specify*) _____ — NI-5.9.1
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)
- ❑ Excessive vitamin intake (*specify*) _____ — NI-5.9.2
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)

Mineral (5.10)

- ❑ Inadequate mineral intake (*specify*) _____ — NI-5.10.1
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)
- ❑ Excessive mineral intake (*specify*) _____ — NI-5.10.2
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)

Multi-nutrient (5.11)

- ❑ Predicted suboptimal nutrient intake — NI-5.11.1
- ❑ Predicted excessive nutrient intake — NI-5.11.2

CLINICAL — NC

Defined as "nutritional findings/problems identified that relate to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty — NC-1.1
- ❑ Biting/Chewing (masticatory) difficulty — NC-1.2
- ❑ Breastfeeding difficulty — NC-1.3
- ❑ Altered GI function — NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization — NC-2.1
- ❑ Altered nutrition-related laboratory values (specify) _____ — NC-2.2
- ❑ Food-medication interaction — NC-2.3
- ❑ Predicted food-medication interaction — NC-2.4

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight — NC-3.1
- ❑ Unintentional weight loss — NC-3.2
- ❑ Overweight/obesity — NC-3.3
- ❑ Unintentional weight gain — NC-3.4

BEHAVIORAL-ENVIRONMENTAL — NB

Defined as "nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as related, observed or documented"

- ❑ Food- and nutrition-related knowledge deficit — NB-1.1
- ❑ Harmful beliefs/attitudes about food- or nutrition-related topics (use with caution) — NB-1.2
- ❑ Not ready for diet/lifestyle change — NB-1.3
- ❑ Self-monitoring deficit — NB-1.4
- ❑ Disordered eating pattern — NB-1.5
- ❑ Limited adherence to nutrition-related recommendations — NB-1.6
- ❑ Undesirable food choices — NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality-of-life problems as reported, observed, or documented"

- ❑ Physical inactivity — NB-2.1
- ❑ Excessive physical activity — NB-2.2
- ❑ Inability or lack of desire to manage self-care — NB-2.3
- ❑ Impaired ability to prepare foods/meals — NB-2.4
- ❑ Poor nutrition quality of life — NB-2.5
- ❑ Self-feeding difficulty — NB-2.6

Food Safety and Access (3)

Defined as "actual problems with food safety or access to food, water, or nutrition related supplies"

- ❑ Intake of unsafe food — NB-3.1
- ❑ Limited access to food or water — NB-3.2
- ❑ Limited access to nutrition-related supplies — NB-3.3

Figura 12: Terminologia de diagnóstico nutricional

As questões estão divididas em quatro blocos, que representam as quatro principais divisões da Terminologia de Diagnóstico Nutricional: Ingestão, Clínico, Comportamental e Ambiental e Tratamentos Dietéticos. De acordo com a utilização específica do chatbot, podem ser adicionadas questões adicionais e mais específicas para avaliar a recolha de informações específicas e opções de intervenção. A Figura 13 apresenta um exemplo de questões utilizadas nesta avaliação.

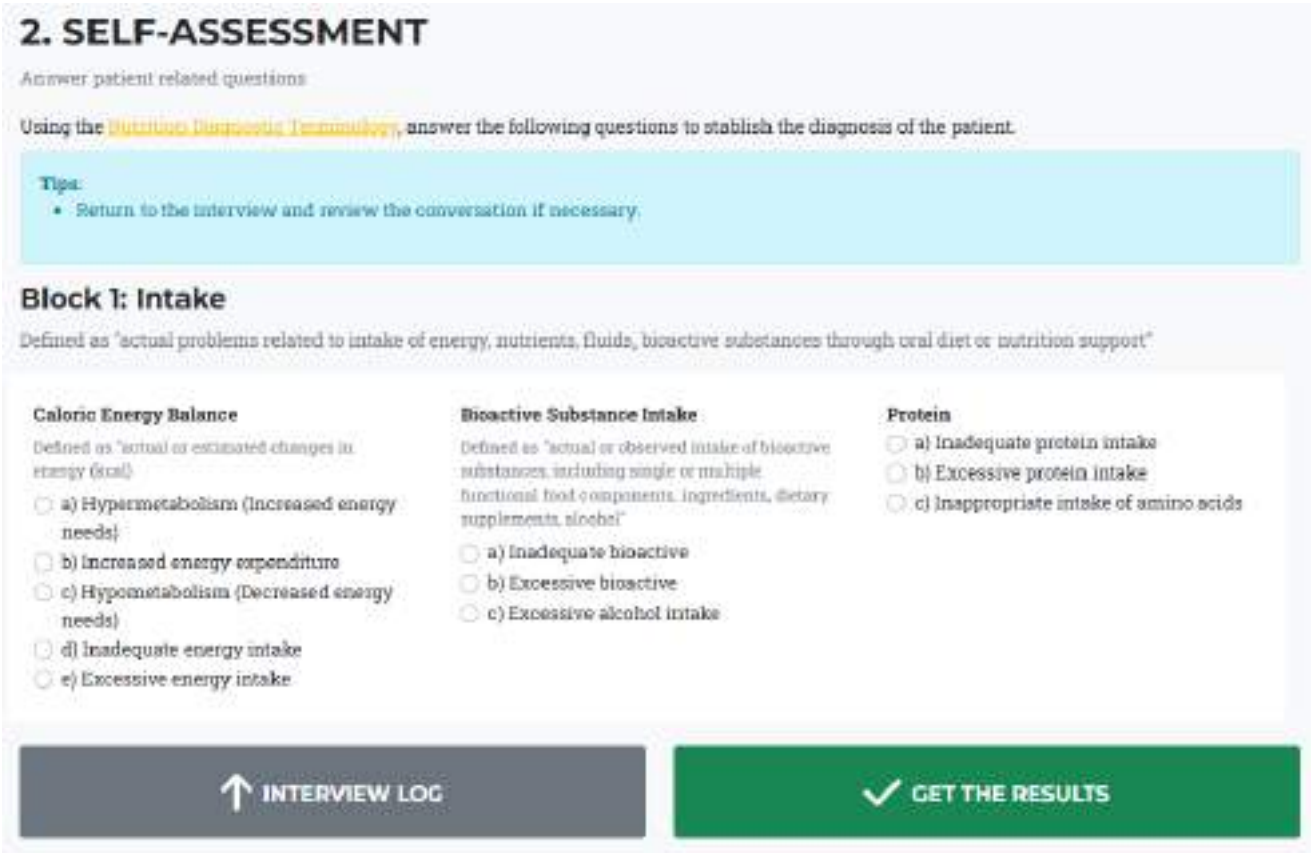


Figura 13: Questões de autoavaliação

2.5. Pesquisa final

Após terminar de responder às questões, o participante seleciona o botão “Obter os resultados” e é-lhe pedido que responda a um segundo inquérito abordando a utilização e eficácia do chatbot (Figura 14), antes de avançar para os resultados.

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3. My skills in using a chatbot in the learning process as a dietetics student are at:

4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?

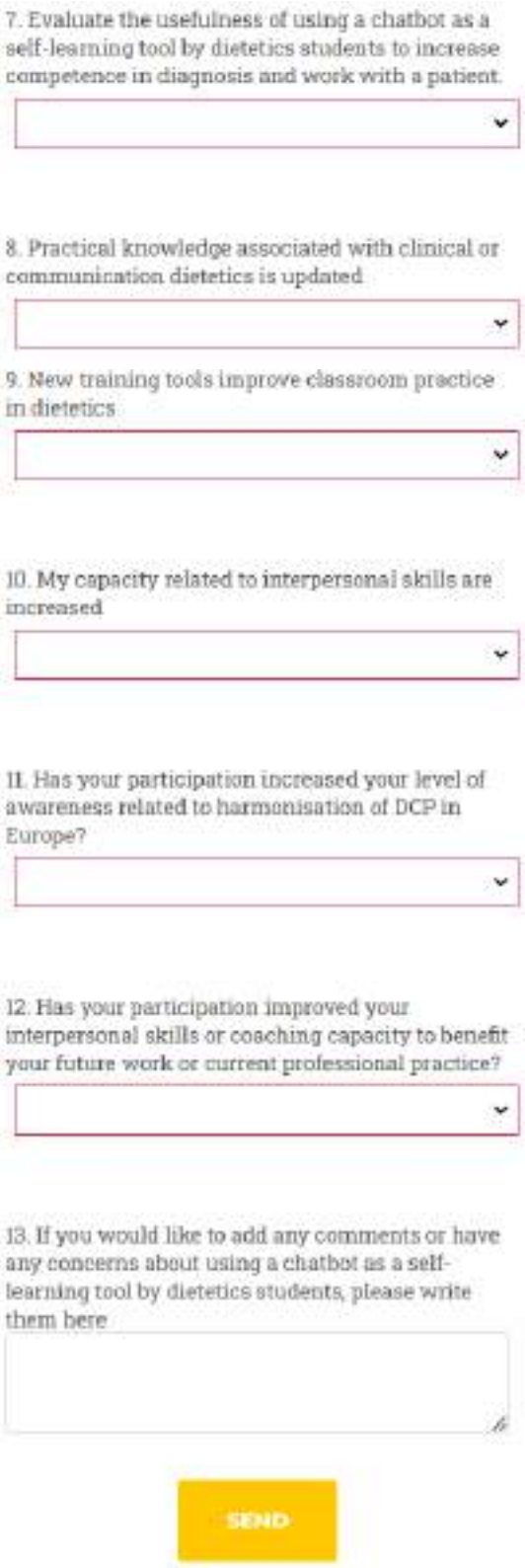


Figura 14: Levantamento final

2.6. Resultados da entrevista e da autoavaliação

Por fim, são fornecidos ao participante os resultados da entrevista e do questionário de autoavaliação (Figura 15).

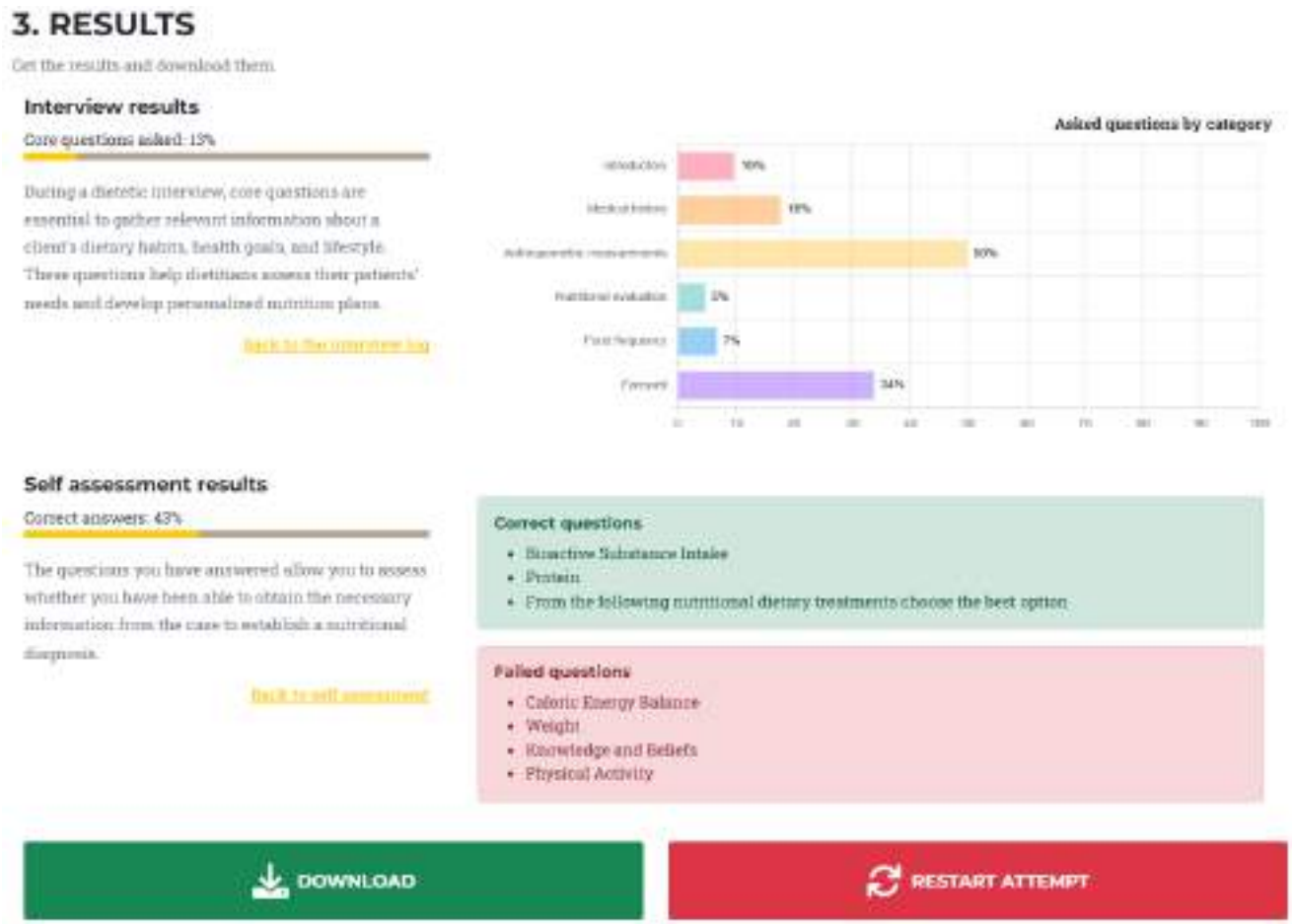


Figura 15: Resultados da entrevista e autoavaliação

Os resultados da entrevista estão divididos nas principais categorias de informação incluídas para cada caso:

- Introdutório;
- Histórico médico;
- Medidas antropométricas;
- Avaliação nutricional;
- Frequência alimentar;
- Adeus.

Consultando a percentagem de questões colocadas em cada categoria, o participante fica a saber quais os temas que precisa de melhorar. É também possível consultar o registo da entrevista, para rever as interações e decidir que perguntas extra podem ser colocadas numa nova tentativa (botão "Reiniciar tentativa").
Os resultados relativos ao questionário de autoavaliação incluem a proporção global de respostas corretas, bem como a identificação dos temas específicos para os quais as questões foram respondidas correta ou incorretamente. Estes dois grupos de resultados também podem ser descarregados para um ficheiro pdf.

Co-funded by the Erasmus+ Programme of the European Union

Laboratorio digital de educación en dietética que combina aprendizaje experiencial y servicio comunitario

Manual de capacitación en software educativo digital

2021-1-ES01-KA220-HED-000032074

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Contenido

1. Introducción

Para facilitar el recorrido educativo y las experiencias prácticas de los estudiantes, estos tendrán acceso a dos herramientas digitales desarrolladas por el equipo de investigación: un chatbot de pacientes virtuales y una clínica virtual.

1.1 ¿Un chatbot para pacientes virtuales?

Para mejorar la formación práctica en Educación Dietética y promover un enfoque de aprendizaje comunitario/servicio relacionado con la nutrición, se ha creado un entorno digital para realizar entrevistas virtuales a pacientes.

El software educativo digital se basa en la presentación e interacción con pacientes virtuales y tiene como objetivo ayudar a los estudiantes de nutrición/dietética y dietistas de educación superior a mejorar sus habilidades sin supervisión directa. La herramienta digital presenta diferentes escenarios (casos reales de pacientes) con el fin de generar una experiencia de aprendizaje experiencial. Estos escenarios se centran en temas como la obesidad, la diabetes o la nefropatía, y se pueden desarrollar diferentes escenarios e incluirlos en el software.

En el Software Educativo Digital, el alumno podrá interactuar con pacientes virtuales. Los estudiantes y los dietistas conversan con los pacientes para mejorar sus habilidades de anamnesis enfocadas en el Proceso de Atención Dietética (PAD – ver Figura 1).

Cifra1:Proceso de Atención Dietética (DCP)

Las conversaciones se han virtualizado en una IA conversacional y han sido pilotadas internamente por dietistas y nutricionistas expertos, corrigiendo errores y mejorando su respuesta.

El proceso se organiza en tres pasos principales (como se muestra en la Figura 2):

1) Entrevista con paciente virtual (anamnesis del paciente);
2) Autoevaluación mediante laTerminología de diagnóstico nutricional;
3) Resultados de salida.

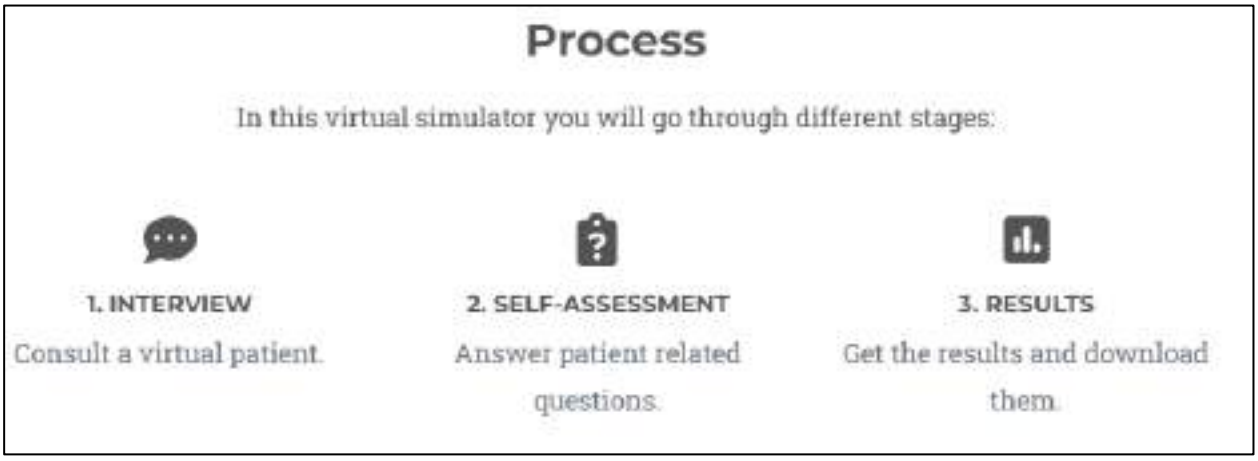


Figura 2: Proceso utilizado para el software educativo digital

2.¿Cómo utilizar el Software Digital Educativo?

Se ha creado una plataforma para permitir la interacción con los pacientes virtuales. Está disponible en:https://virtual-patient.edietinglab.eu/
La mayoría de las instituciones asociadas al proyecto (Universidad de St. Pölten, Universidad Jan Kochanowski de Kielce, Facultad de Nutrición y Ciencias de la Alimentación, Universidad de Oporto, Universidad Europea del Atlántico y AP Hogeschool Antwerpen) desarrollaron pacientes virtuales en diferentes condiciones clínicas. Cada uno de los pacientes virtuales tiene un diagnóstico distinto y necesitará una intervención nutricional distinta.
El objetivo de esta plataforma es facilitar la formación en anamnesis y, posteriormente, la identificación de las necesidades nutricionales de los pacientes y su asesoramiento (más detalles a continuación).

2.1 Registro y primeros pasos

Para interactuar con los pacientes virtuales, los estudiantes deben registrarse en esta plataforma, proporcionando los datos requeridos en el formulario de registro (como se ilustra en la Figura 3).

Figura 3: Formulario de registro

Después de registrarse, los alumnos podrán elegir entre cinco pacientes virtuales diferentes para iniciar una entrevista: Karen Pérez, Lore Janssens, João Almeida, Queenie Jenkins y Maria Nowak (Figura 4). El número de pacientes virtuales y casos clínicos se puede aumentar o modificar según las necesidades identificadas.

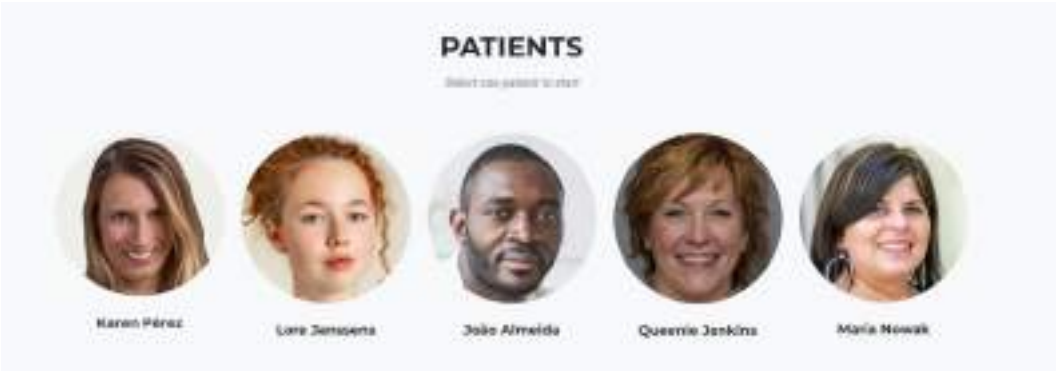


Figura 4: Pacientes virtuales

La entrevista se puede realizar en diferentes idiomas: inglés, alemán, español, holandés, polaco y portugués (Figura 5).

Figura 5: Selección de idioma

6 Tras la selección del paciente virtual y el idioma deseado para la entrevista, se presentan a los alumnos las instrucciones para interactuar con el chatbot (Figura 6). Estas instrucciones también se pueden consultar en cualquier momento durante la entrevista (botón “Instrucciones” debajo de la ventana del chatbot).

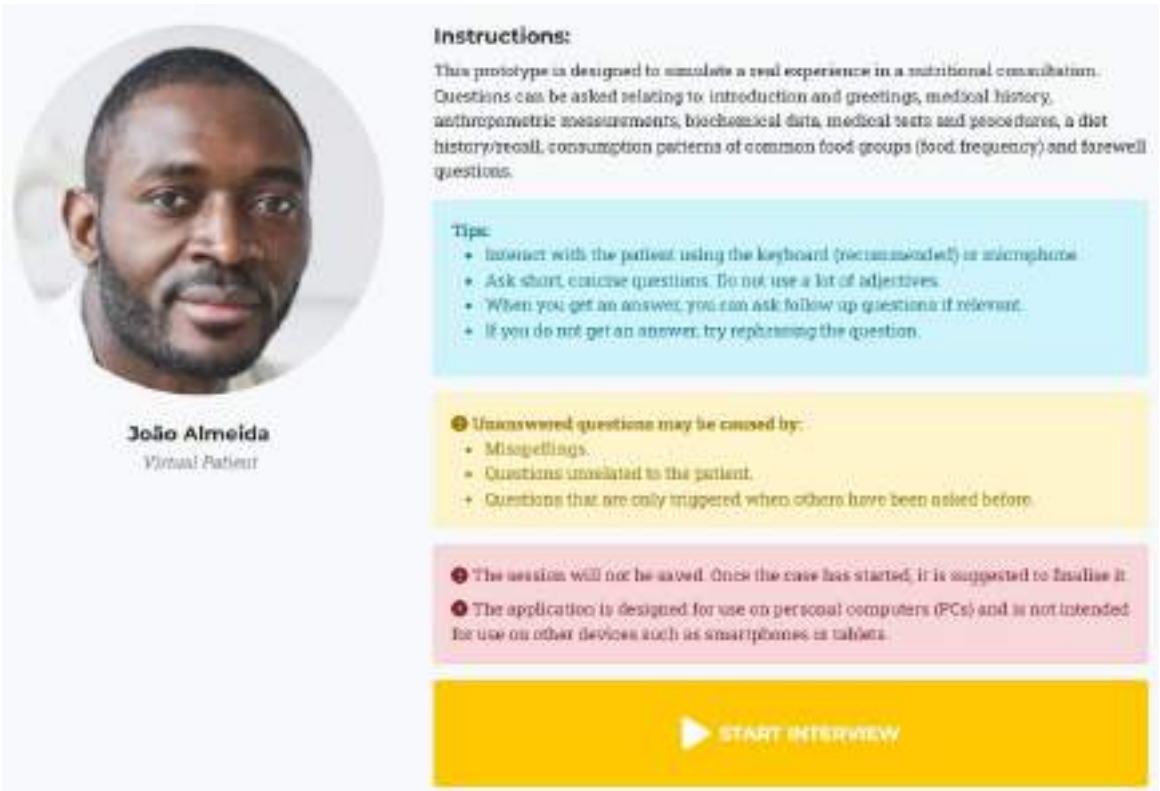
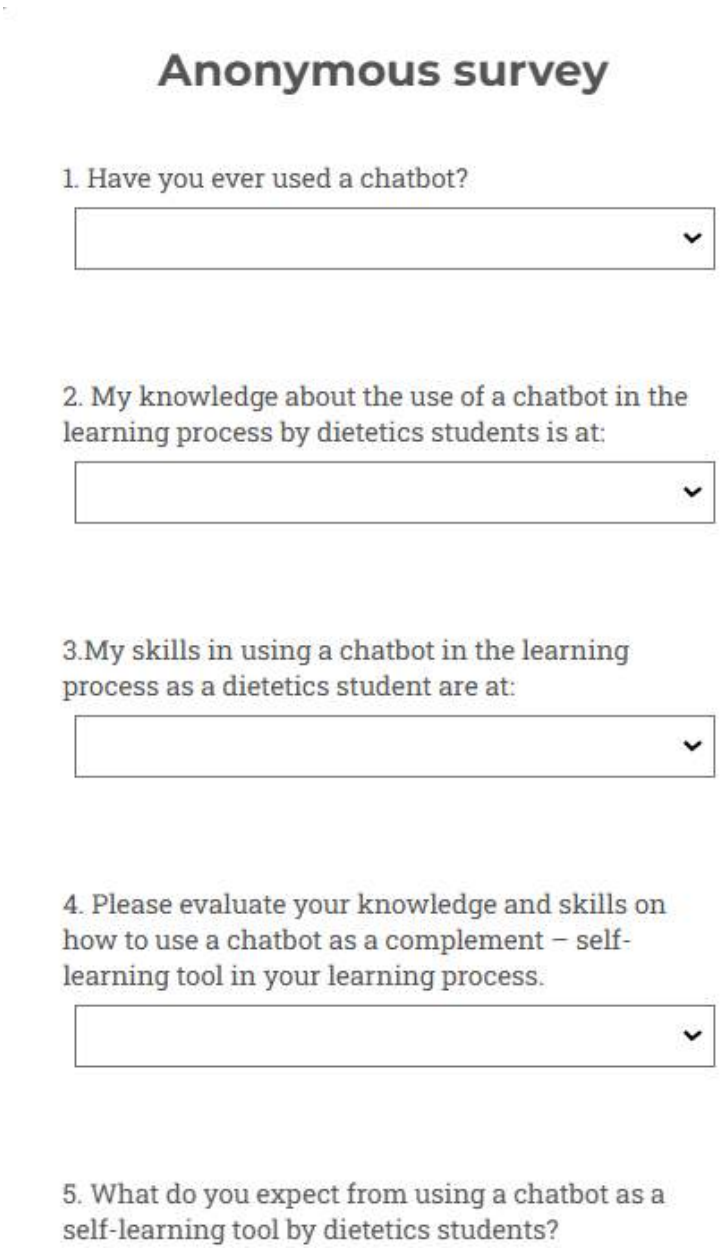


Figura 6: Instrucciones del chatbot

2.2 Encuesta inicial

Tras seleccionar la opción “Iniciar entrevista”, se muestra una encuesta que se debe completar antes de continuar. En esta encuesta se pregunta al participante sobre el uso previo de un chatbot, sus percepciones y expectativas sobre su efectividad (Figura 7).



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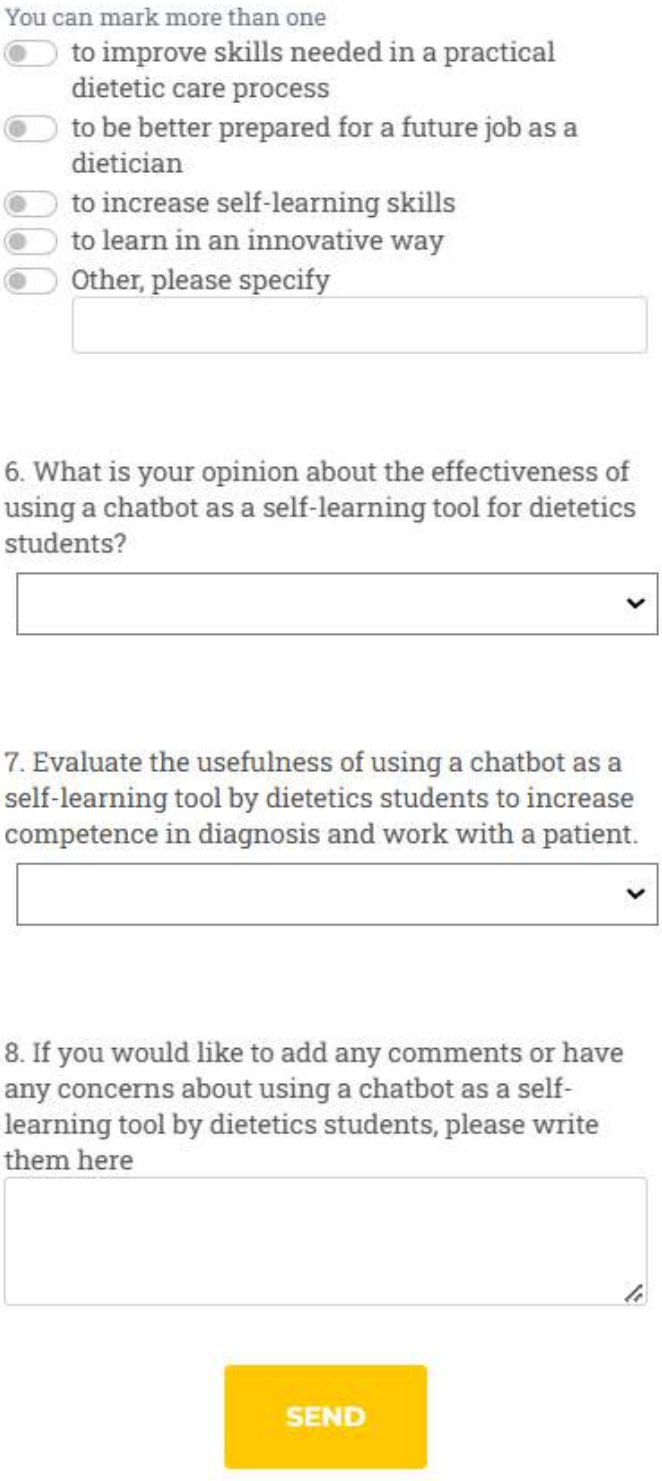
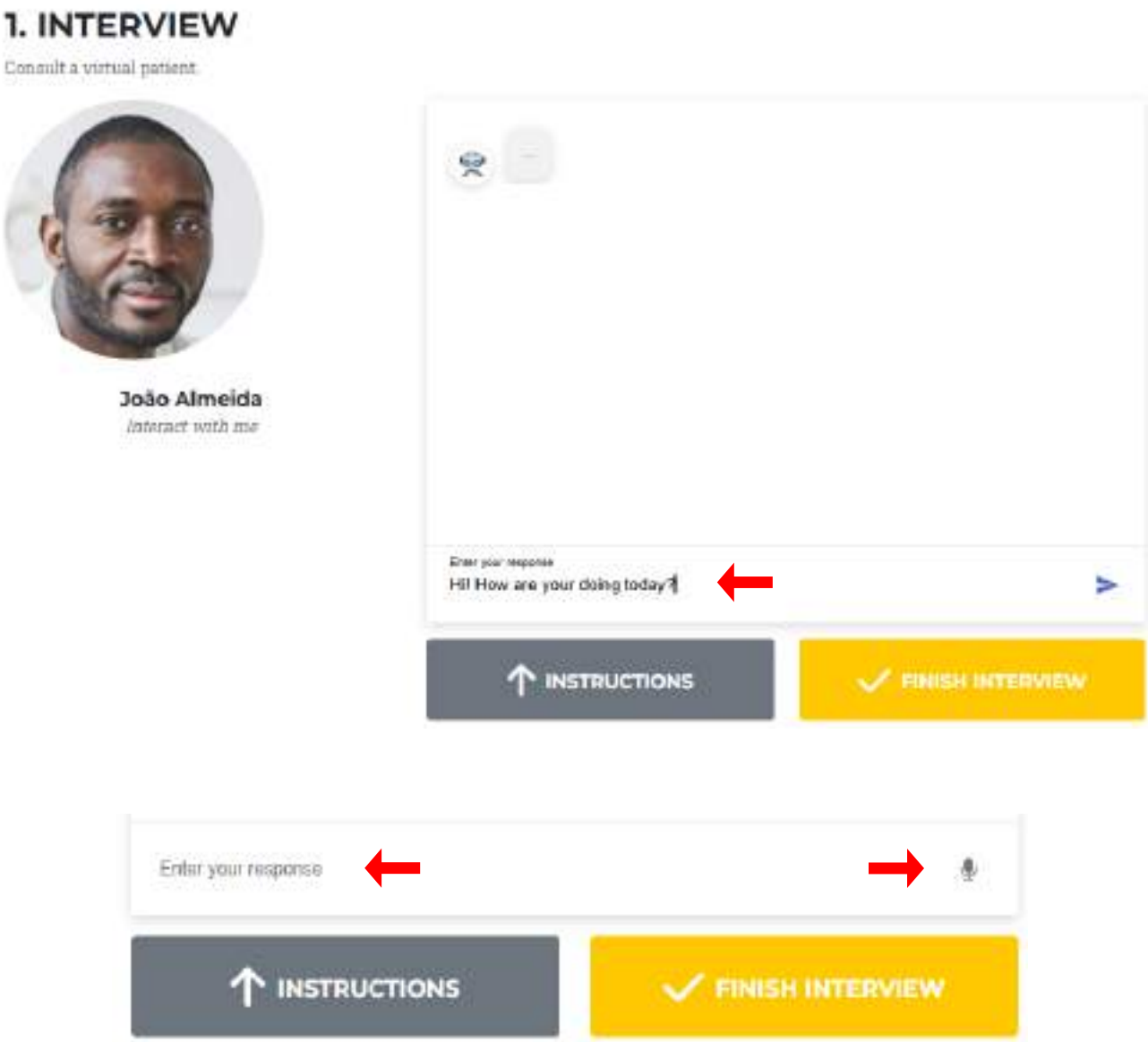


Figura 7: Encuesta inicial

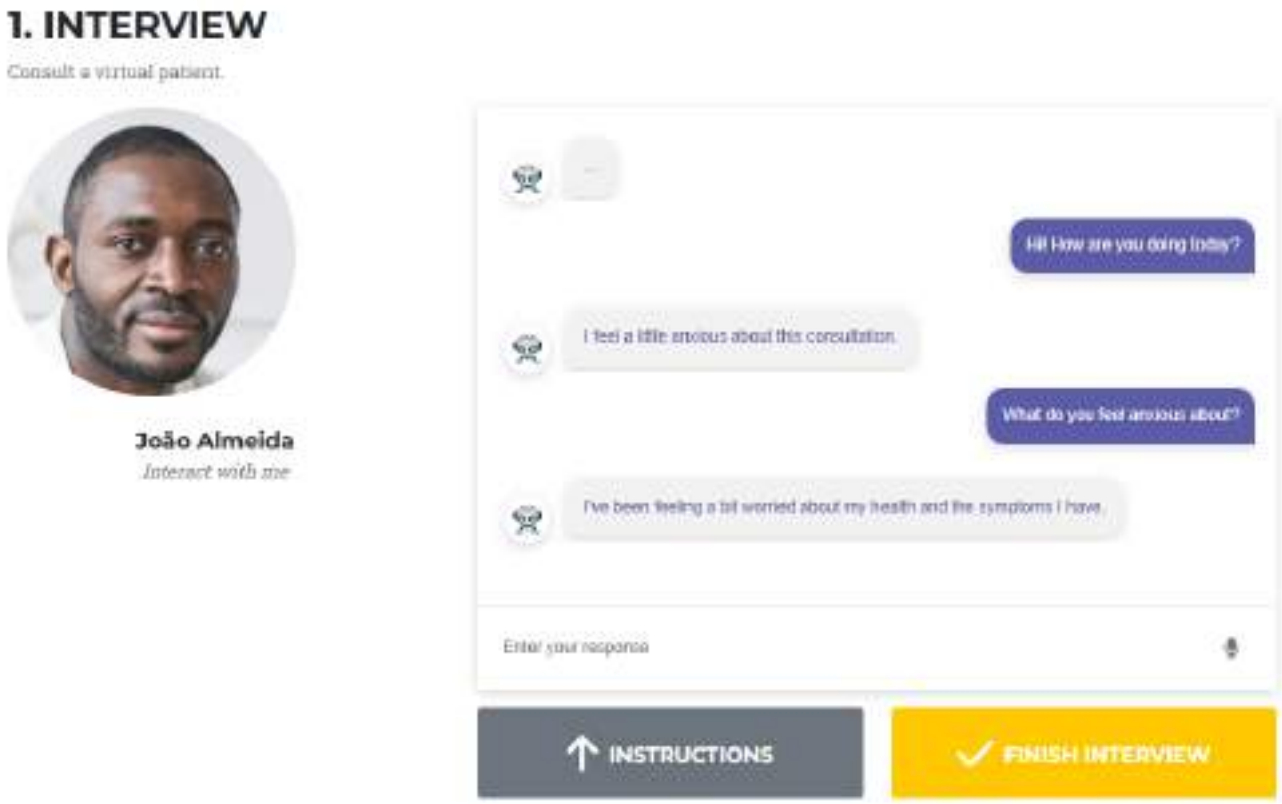
2.3. Interacción con chatbot

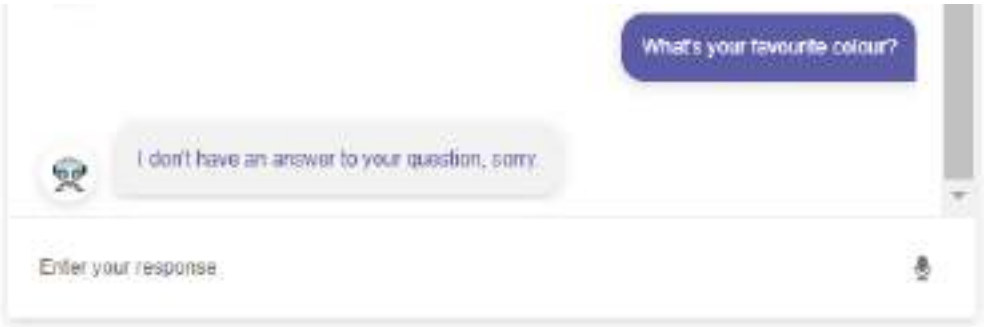
A continuación, se mostrará un chatbot que permitirá la interacción (Figura 8). Los alumnos podrán plantear un número ilimitado de preguntas para reunir toda la información necesaria. Las preguntas pueden ser escritas o habladas (utilizando el símbolo del micrófono, Figura 9).



Figuras 8 y 9: Chatbot

El paciente virtual responderá las preguntas planteadas (Figura 10). Si no hay información disponible para una pregunta específica, el paciente virtual proporcionará esa información, de modo que la pregunta pueda ser reemplazada o reformulada (Figura 11).





Figuras 10 y 11: Ejemplos de interacción

2.4. Autoevaluación

Al finalizar la entrevista (botón amarillo debajo del chatbot), el usuario es dirigido a un cuestionario de autoevaluación. El cuestionario es específico para el paciente virtual seleccionado y plantea preguntas de opción múltiple basadas en la Terminología de Diagnóstico de Nutrición (Figura 12).

Nutrition Diagnostic Terminology

INTAKE — NI

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal) balance"

- ❑ Unused — NI-1.1
- ❑ Increased energy expenditure — NI-1.2
- ❑ Unused — NI-1.3
- ❑ Inadequate energy intake — NI-1.4
- ❑ Excessive energy intake — NI-1.5
- ❑ Predicted suboptimal energy intake — NI-1.6
- ❑ Predicted excessive energy intake — NI-1.7

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral intake — NI-2.1
- ❑ Excessive oral intake — NI-2.2
- ❑ Inadequate enteral nutrition infusion — NI-2.3
- ❑ Excessive enteral nutrition infusion — NI-2.4
- ❑ Less than optimal enteral nutrition — NI-2.5
- ❑ Inadequate parenteral nutrition infusion — NI-2.6
- ❑ Excessive parenteral nutrition infusion — NI-2.7
- ❑ Less than optimal parenteral nutrition — NI-2.8
- ❑ Limited food acceptance — NI-2.9

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared with patient goal"

- ❑ Inadequate fluid intake — NI-3.1
- ❑ Excessive fluid intake — NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food components, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake — NI-4.1
- ❑ Excessive bioactive substance intake — NI-4.2
- ❑ Excessive alcohol intake — NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (*specify*) _____ — NI-5.1
- ❑ Malnutrition — NI-5.2
- ❑ Inadequate protein-energy intake — NI-5.3
- ❑ Decreased nutrient needs (*specify*) _____ — NI-5.4
- ❑ Imbalance of nutrients — NI-5.5

Fat and Cholesterol (5.6)

- ❑ Inadequate fat intake — NI-5.6.1
- ❑ Excessive fat intake — NI-5.6.2
- ❑ Inappropriate intake of fats (*specify*) _____ — NI-5.6.3

Protein (5.7)

- ❑ Inadequate protein intake — NI-5.7.1
- ❑ Excessive protein intake — NI-5.7.2
- ❑ Inappropriate intake of protein or amino acids (*specify*) _____ — NI-5.7.3

Carbohydrate and Fiber (5.8)

- ❑ Inadequate carbohydrate intake — NI-5.8.1
- ❑ Excessive carbohydrate intake — NI-5.8.2
- ❑ Inappropriate intake of types of carbohydrate (*specify*) _____ — NI-5.8.3
- ❑ Inconsistent carbohydrate intake — NI-5.8.4
- ❑ Inadequate fiber intake — NI-5.8.5
- ❑ Excessive fiber intake — NI-5.8.6

Vitamin (5.9)

- ❑ Inadequate vitamin intake — NI-5.9.1
  (*specify*) _____
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)
- ❑ Excessive vitamin intake — NI-5.9.2
  (*specify*) _____
  - ❑ A (1)
  - ❑ C (2)
  - ❑ D (3)
  - ❑ E (4)
  - ❑ K (5)
  - ❑ Thiamin (6)
  - ❑ Riboflavin (7)
  - ❑ Niacin (8)
  - ❑ Folate (9)
  - ❑ B6 (10)
  - ❑ B12 (11)
  - ❑ Other (*specify*) _____ (12)

Mineral (5.10)

- ❑ Inadequate mineral intake — NI-5.10.1
  (*specify*) _____
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)
- ❑ Excessive mineral intake — NI-5.10.2
  (*specify*) _____
  - ❑ Calcium (1)
  - ❑ Chloride (2)
  - ❑ Iron (3)
  - ❑ Magnesium (4)
  - ❑ Potassium (5)
  - ❑ Phosphorus (6)
  - ❑ Sodium (7)
  - ❑ Zinc (8)
  - ❑ Other (*specify*) _____ (9)

Multi-nutrient (5.11)

- ❑ Predicted suboptimal nutrient intake — NI-5.11.1
- ❑ Predicted excessive nutrient intake — NI-5.11.2

CLINICAL — NC

Defined as "nutritional findings/problems identified that relate to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty — NC-1.1
- ❑ Biting/Chewing (masticatory) difficulty — NC-1.2
- ❑ Breastfeeding difficulty — NC-1.3
- ❑ Altered GI function — NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization — NC-2.1
- ❑ Altered nutrition-related laboratory values (specify) _____ — NC-2.2
- ❑ Food-medication interaction — NC-2.3
- ❑ Predicted food-medication interaction — NC-2.4

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight — NC-3.1
- ❑ Unintentional weight loss — NC-3.2
- ❑ Overweight/obesity — NC-3.3
- ❑ Unintentional weight gain — NC-3.4

BEHAVIORAL-ENVIRONMENTAL — NB

Defined as "nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as related, observed or documented"

- ❑ Food- and nutrition-related knowledge deficit — NB-1.1
- ❑ Harmful beliefs/attitudes about food- or nutrition-related topics (use with caution) — NB-1.2
- ❑ Not ready for diet/lifestyle change — NB-1.3
- ❑ Self-monitoring deficit — NB-1.4
- ❑ Disordered eating pattern — NB-1.5
- ❑ Limited adherence to nutrition-related recommendations — NB-1.6
- ❑ Undesirable food choices — NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality-of-life problems as reported, observed, or documented"

- ❑ Physical inactivity — NB-2.1
- ❑ Excessive physical activity — NB-2.2
- ❑ Inability or lack of desire to manage self-care — NB-2.3
- ❑ Impaired ability to prepare foods/meals — NB-2.4
- ❑ Poor nutrition quality of life — NB-2.5
- ❑ Self-feeding difficulty — NB-2.6

Food Safety and Access (3)

Defined as "actual problems with food safety or access to food, water, or nutrition related supplies"

- ❑ Intake of unsafe food — NB-3.1
- ❑ Limited access to food or water — NB-3.2
- ❑ Limited access to nutrition-related supplies — NB-3.3

Figura 12: Terminología de diagnóstico nutricional

Las preguntas se dividen en cuatro bloques, que representan las cuatro divisiones principales de la Terminología Diagnóstica de Nutrición: ingesta, clínica, conductual y ambiental, y tratamientos dietéticos. Según el uso específico del chatbot, se pueden agregar preguntas adicionales y más específicas para evaluar la recopilación de información específica y las opciones de intervención. La Figura 13 presenta un ejemplo de preguntas utilizadas en esta evaluación.

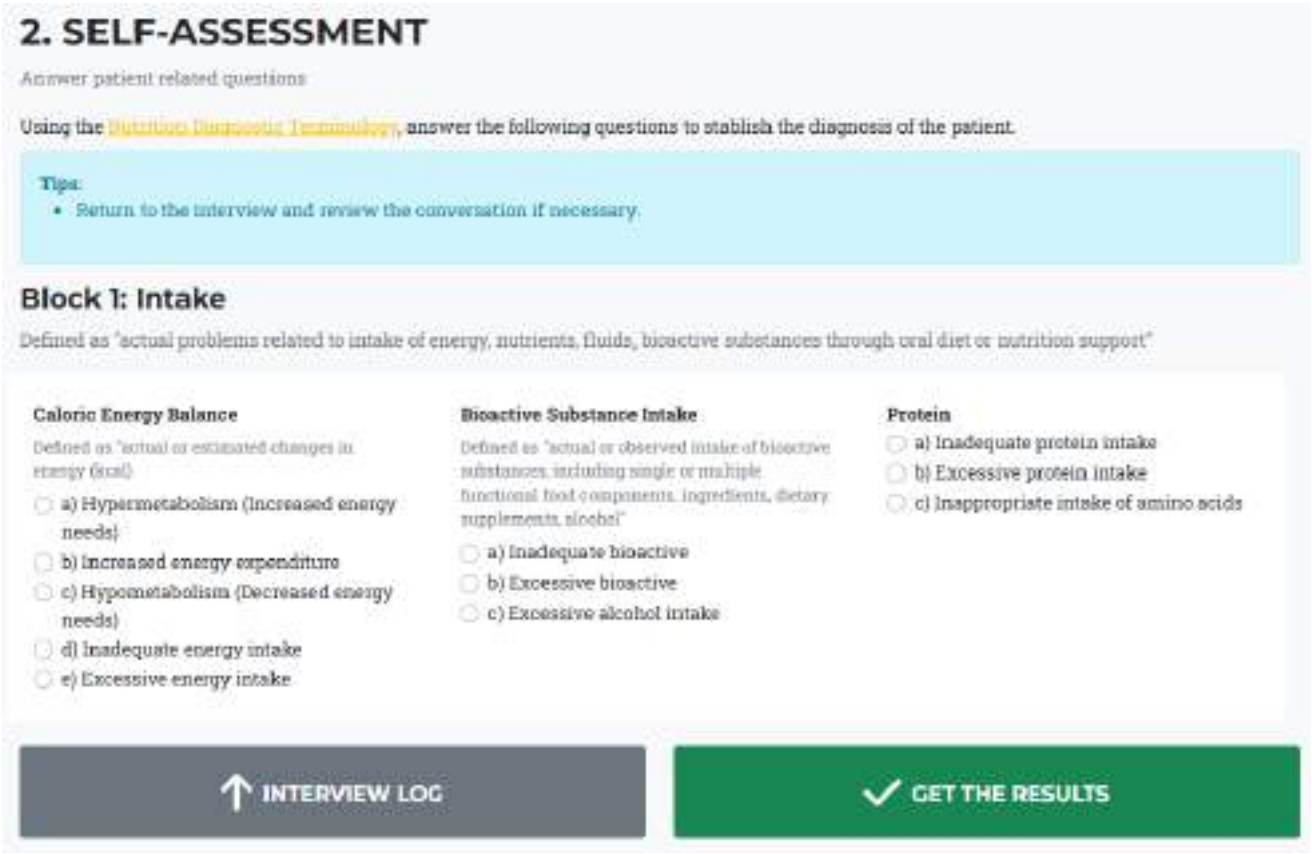


Figura 13: Preguntas de autoevaluación

2.5. Encuesta final

Luego de terminar de responder las preguntas, el participante selecciona el botón “Obtener los resultados” y se le solicita que responda una segunda encuesta que aborda el uso y la efectividad del chatbot (Figura 14), antes de pasar a los resultados.

Anonymous survey

1. Have you ever used a chatbot?

2. My knowledge about the use of a chatbot in the learning process by dietetics students is at:

3. My skills in using a chatbot in the learning process as a dietetics student are at:

4. Please evaluate your knowledge and skills on how to use a chatbot as a complement – self-learning tool in your learning process.

5. What do you expect from using a chatbot as a self-learning tool by dietetics students?

You can mark more than one

- to improve skills needed in a practical dietetic care process
- to be better prepared for a future job as a dietician
- to increase self-learning skills
- to learn in an innovative way
- Other, please specify

6. What is your opinion about the effectiveness of using a chatbot as a self-learning tool for dietetics students?

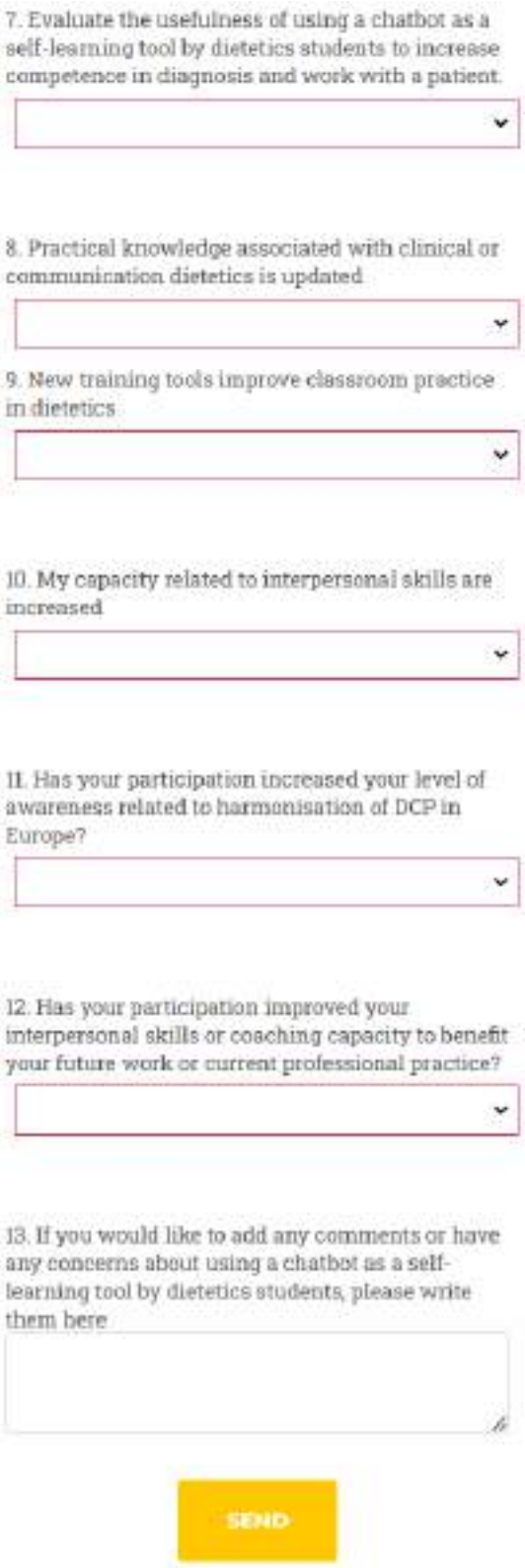


Figura 14: Encuesta final

2.6. Resultados de la entrevista y la autoevaluación

Finalmente, se entregan al participante los resultados de la entrevista y del cuestionario de autoevaluación (Figura 15).

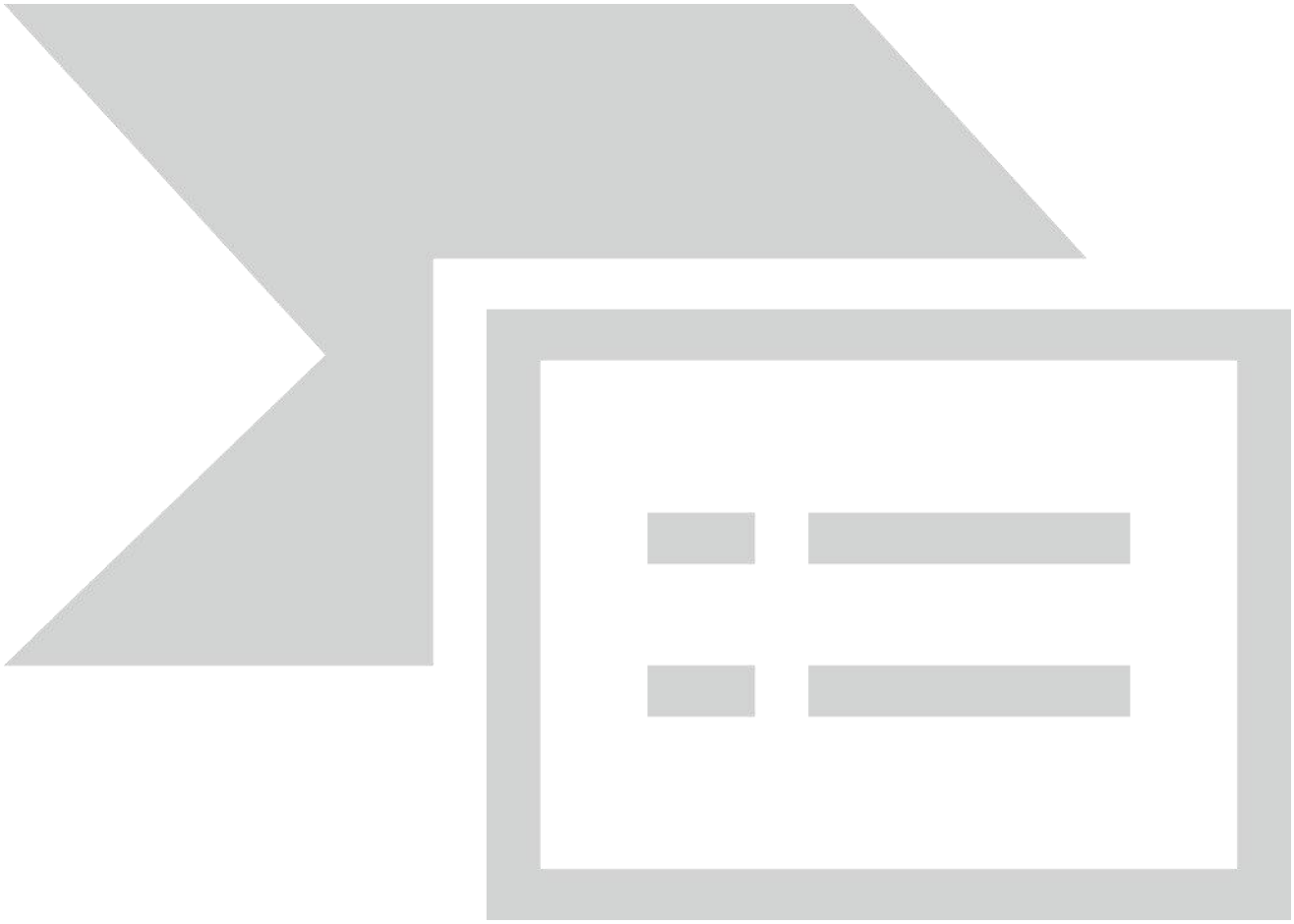


Figura 15: Resultados de la entrevista y autoevaluación

Los resultados de la entrevista se dividen en las principales categorías de información incluidas para cada caso:

- Introductorio;
- Historial médico;
- Medidas antropométricas;
- Evaluación nutricional;
- Frecuencia de alimentación;
- Despedida.

Al consultar el porcentaje de preguntas realizadas en cada categoría, el participante puede saber qué temas mejorar. También es posible consultar el registro de la entrevista para revisar las interacciones y decidir qué preguntas adicionales se podrían realizar en un nuevo intento (botón “Reiniciar intento”).

Los resultados del cuestionario de autoevaluación incluyen la proporción total de respuestas correctas, así como la identificación de los temas específicos en los que se respondió correctamente o incorrectamente a las preguntas. Estos dos grupos de resultados también se pueden descargar en un archivo PDF.