Advancements in Nutrition Education: From foundational to digital strategies

Nestlé Nutrition Institute Africa

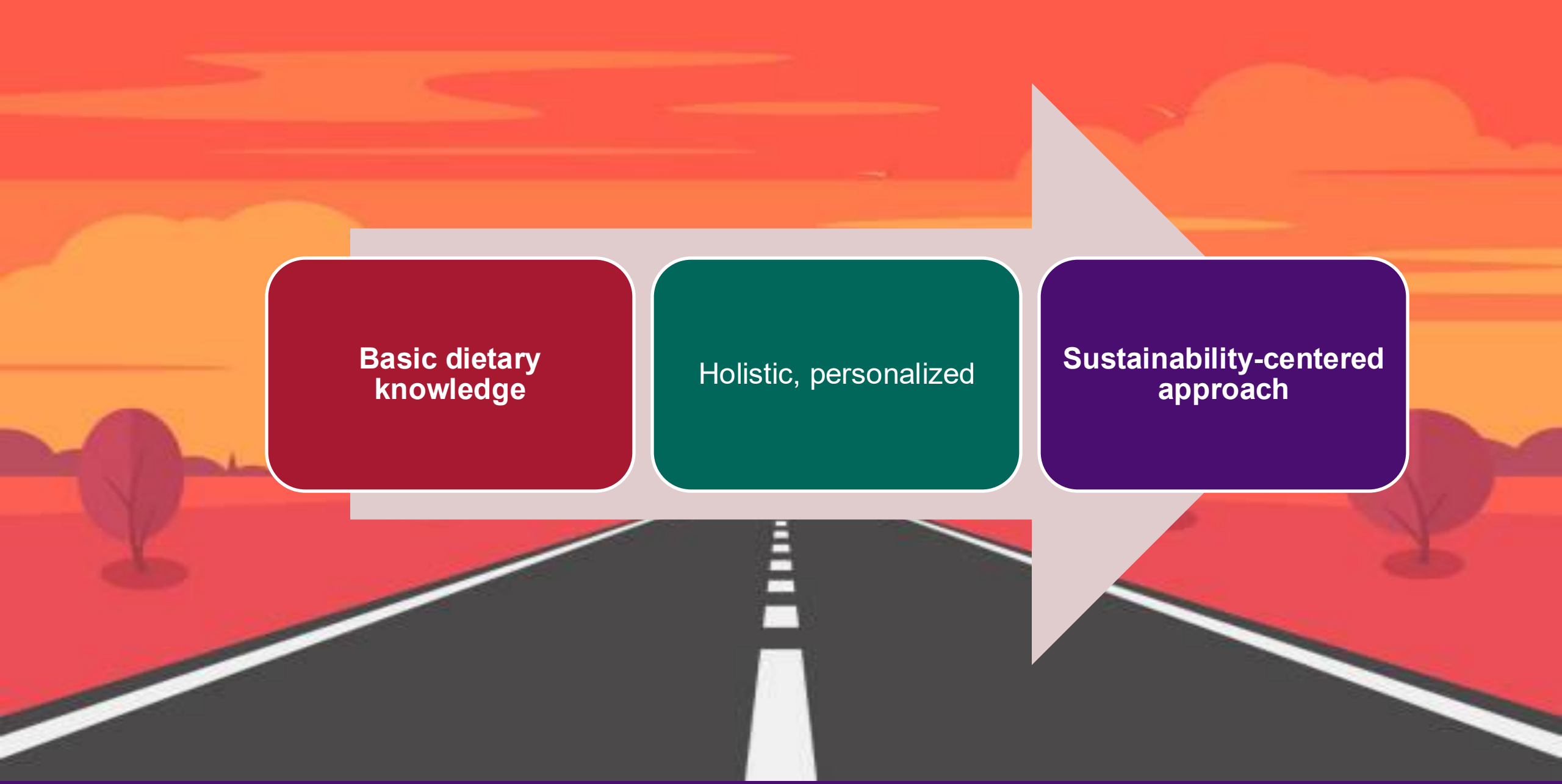
Ntsoaki Lucia Meko PhD (Dietetics) UFS
Department of Dietetics and Nutrition

For healthcare professionals only

HEALTH SCIENCES UFS

Overview

- Transformation in nutrition education over the last 5 decades
- Mirroring the evolution of
  - **societal values**
  - **technological innovation**
  - **global health perspectives**


Basic dietary knowledge
Holistic, personalized
Sustainability-centered approach

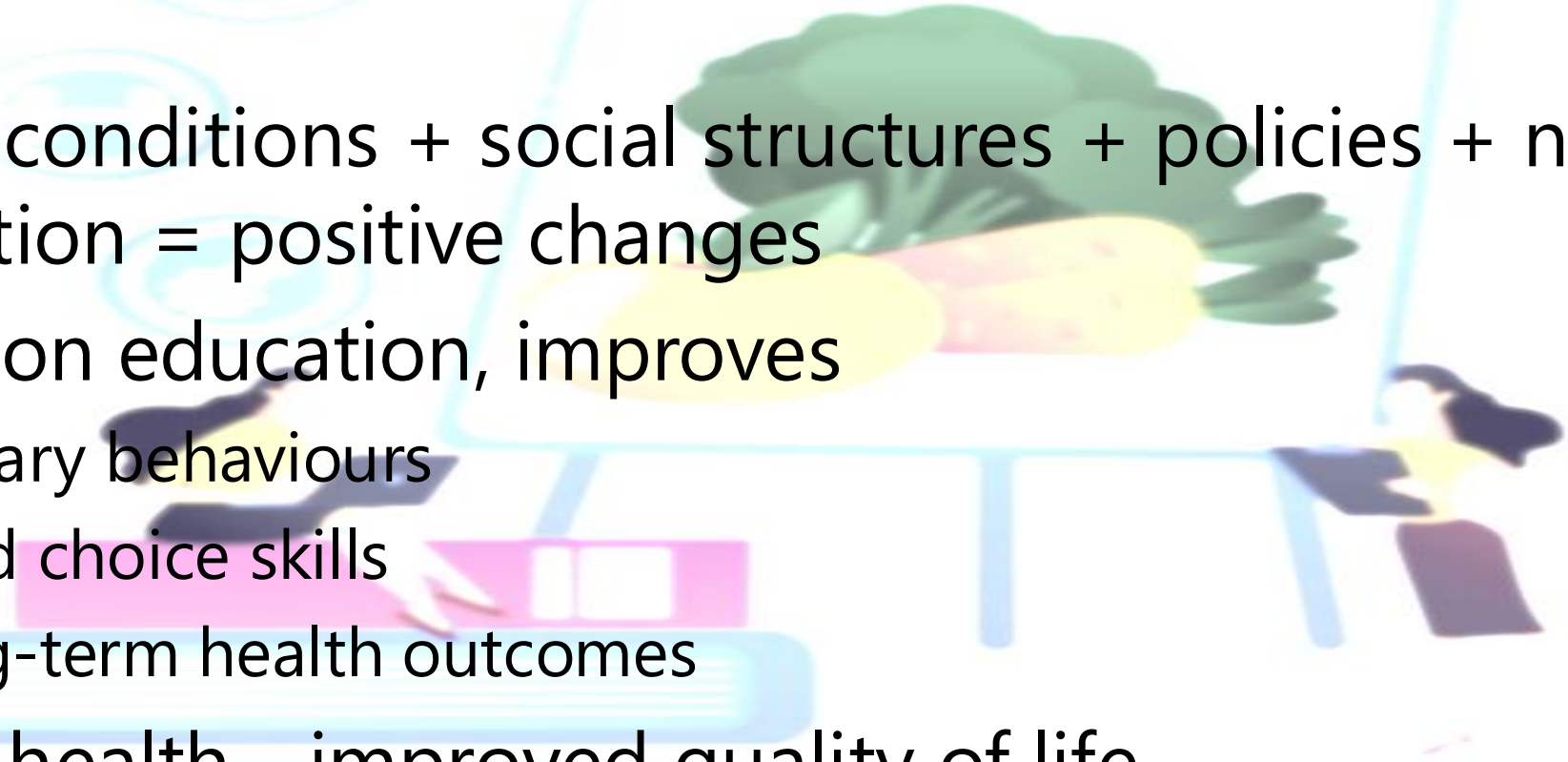
Why is nutrition education needed?

- Current eating patterns are associated with 4 leading causes of death globally:
  - Coronary heart disease
  - Cancers
  - Stroke
  - Type 2 Diabetes

(GBD 2017)

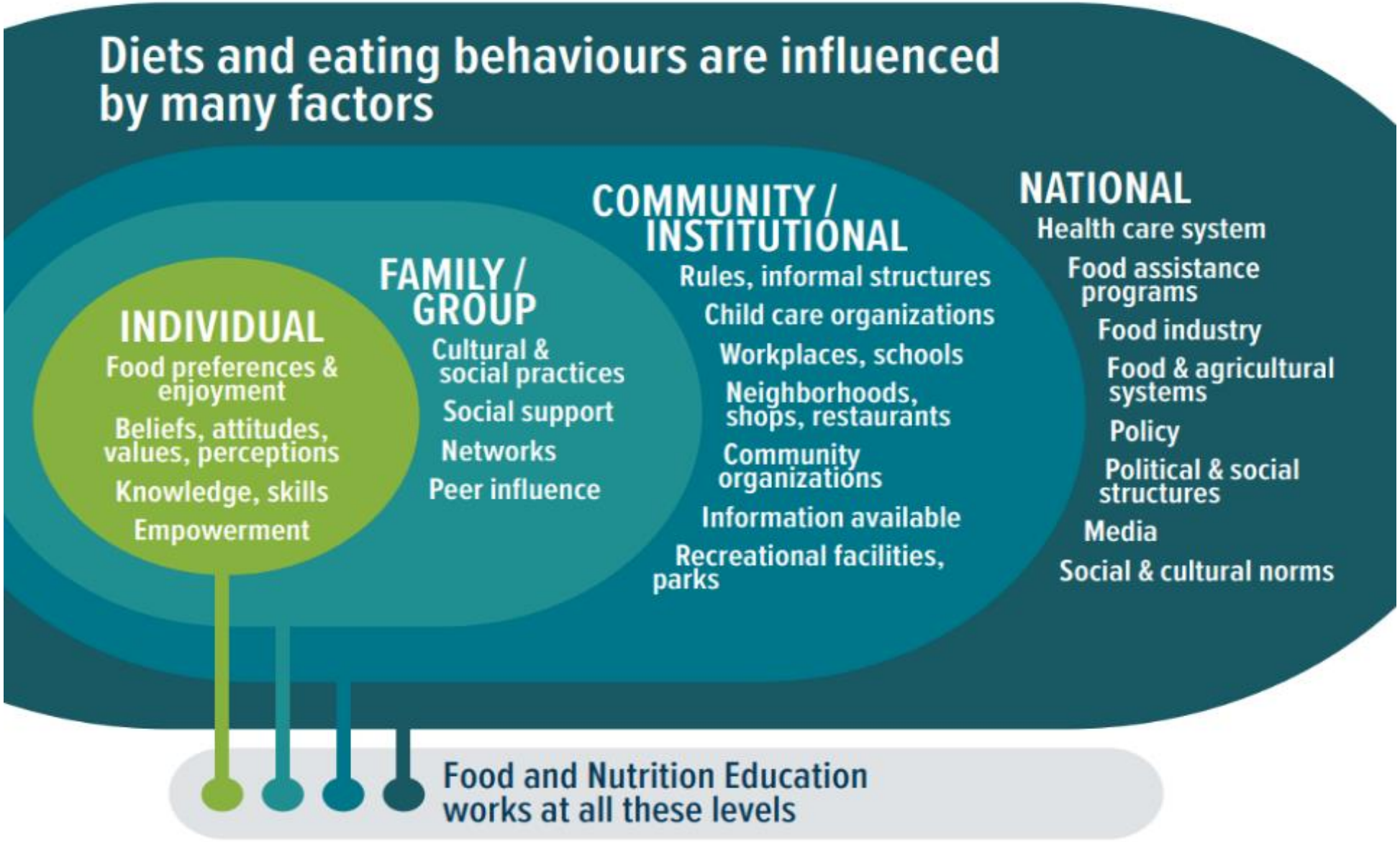
- Malnutrition persists globally across all ages
  - 1.9 billion adults are overweight or obese
  - 2 billion people suffer from micronutrient deficiencies
  - 161 million children under 5 are stunted
  - 795 million people are food insecure

Why Nutrition Education Matters



- Living conditions + social structures + policies + nutrition education = positive changes
- Nutrition education, improves
  - dietary behaviours
  - food choice skills
  - long-term health outcomes
- Better health - improved quality of life

Contento & Koch 2025


Diets and eating behaviours are influenced by many factors
INDIVIDUAL
Food preferences & enjoyment
Beliefs, attitudes, values, perceptions
Knowledge, skills
Empowerment
FAMILY / GROUP
Cultural & social practices
Social support
Networks
Peer influence
COMMUNITY / INSTITUTIONAL
Rules, informal structures
Child care organizations
Workplaces, schools
Neighborhoods, shops, restaurants
Community organizations
Information available
Recreational facilities, parks
NATIONAL
Health care system
Food assistance programs
Food industry
Food & agricultural systems
Policy
Political & social structures
Media
Social & cultural norms
Food and Nutrition Education works at all these levels

Advancements in nutrition education

Advancements...

ISSN: 2347-467X, Vol. 12, No. (1) 2024, Pg. 01-19

Current Research in Nutrition and Food Science

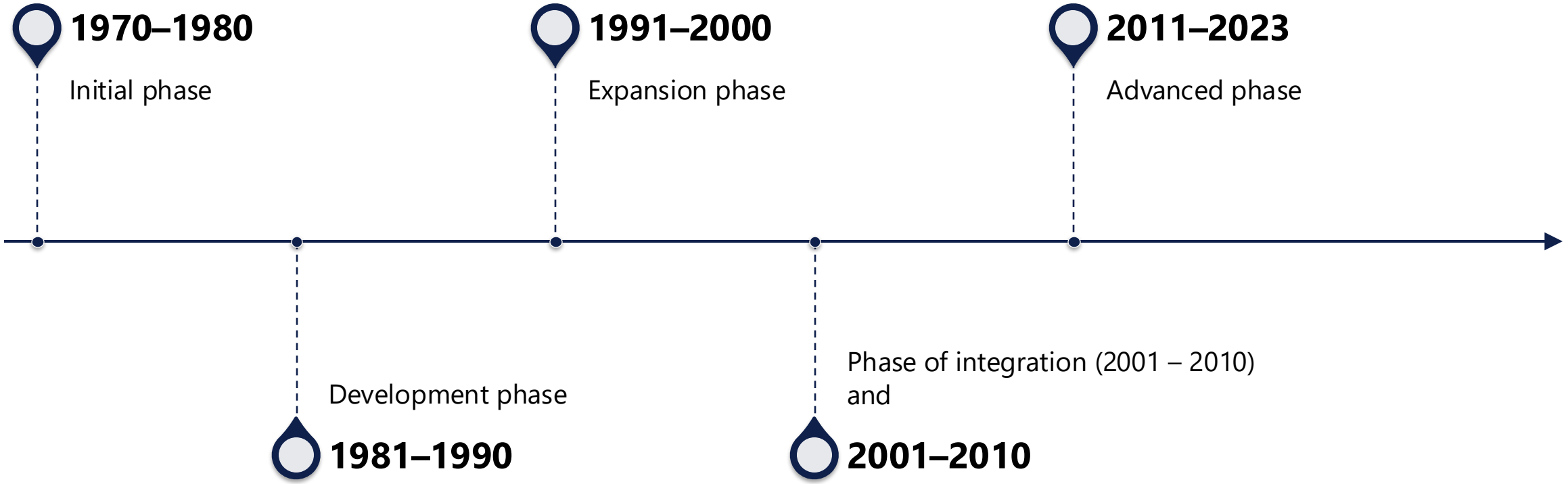
www.foodandnutritionjournal.org

Mapping the Evolution of Nutrition Education: A Scientometric Review from 1970 to 2023, Unveiling Insights Over Half a Century

NORAZMIR MD NOR[1,2*], MOHD IQBAL MOHD NOOR[3,4], ZULKIFLI HALIM[5], MOHD HAIDZIR ABD MANAF[6], SAIFUL ADLI BUKRY[6] and UMMI MOHLISI MOHD ASMAWI[7]

[1]Centre for Nutrition and Dietetics Studies, Universiti Teknologi MARA, Puncak Alam, Malaysia.
[2]Integrative Pharmacogenomics Institute (iPROMISE), Universiti Teknologi MARA, Puncak Alam, Malaysia.
[3]Institute for Biodiversity and Sustainable Development, Universiti Teknologi MARA, Shah Alam, Malaysia.
[4]Faculty of Business Management, Universiti Teknologi MARA Pahang Branch, Raub, Malaysia.
[5]College of Computing Informatics & Mathematics, Universiti Teknologi MARA Pahang Branch, Raub, Malaysia.
[6]Centre for Physiotherapy Studies, Universiti Teknologi MARA, Puncak Alam, Malaysia.
[7]Department of Pathology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh, Malaysia.

Overview – evolved landscape



Nor et al., 2024

Phase 1: foundations

- Initial Phase **(1970–1980)**
- Marked the beginning of structured nutrition education research
- The field was in its emergent stage
  - establishing foundations and principles
- Research was largely aimed at defining the scope and aims

Nor et al., 2024

Phase 2: Growth and Methodological Refinement

- Development Phase **(1981–1990)**

- Hallmarks of this phase include:
  - Development of more **structured methodologies**
  - Increased diversification of research topics
  - A noticeable **growing interest and investment** in nutrition education

Nor et al., 2024

Phase 3: Diversification and Public Health Impact

- Expansion Phase **(1991–2000)**

- Key features of this phase:
  - Broader application of nutrition education across various population groups
  - Deeper investigations into how knowledge influences public health, health outcomes, and behavior
  - Nutrition education establish as a tool for disease prevention and health promotion

Nor et al., 2024

Phase 4: Interdisciplinary expansion

- Integration Phase **(2001–2010)**
- Features of this period include:
  - Integration with **psychology, sociology, public health policy, and behavioral science**
  - Emphasis on social and behavioral determinants
  - Growth of interdisciplinary approaches
  - Expanding complexity

Nor et al., 2024

Phase 5: Technology, data innovation

- Advanced Phase **(2011–2023)**
- Distinguishing characteristics include:
  - Integration of mobile health, data analytics, and personalized tools
  - Use of big data, machine learning, and digital health ecosystems
  - Innovative strategies such as gamification, telehealth, virtual coaching, and digital self-monitoring
  - Robust engagement with contemporary nutrition and public health challenges

Nor et al., 2024

Significance of the Evolution

The segmentation showcases the progressive complexity and accelerating momentum

It highlights how the field has evolved from:

Foundations → Methodological growth → Thematic expansion → Interdisciplinary integration → Technologically advanced, personalized, data-driven models

The pattern reinforces that nutrition education is a dynamic, rapidly evolving discipline responding to societal, scientific, and technological shifts

Nor et al., 2024

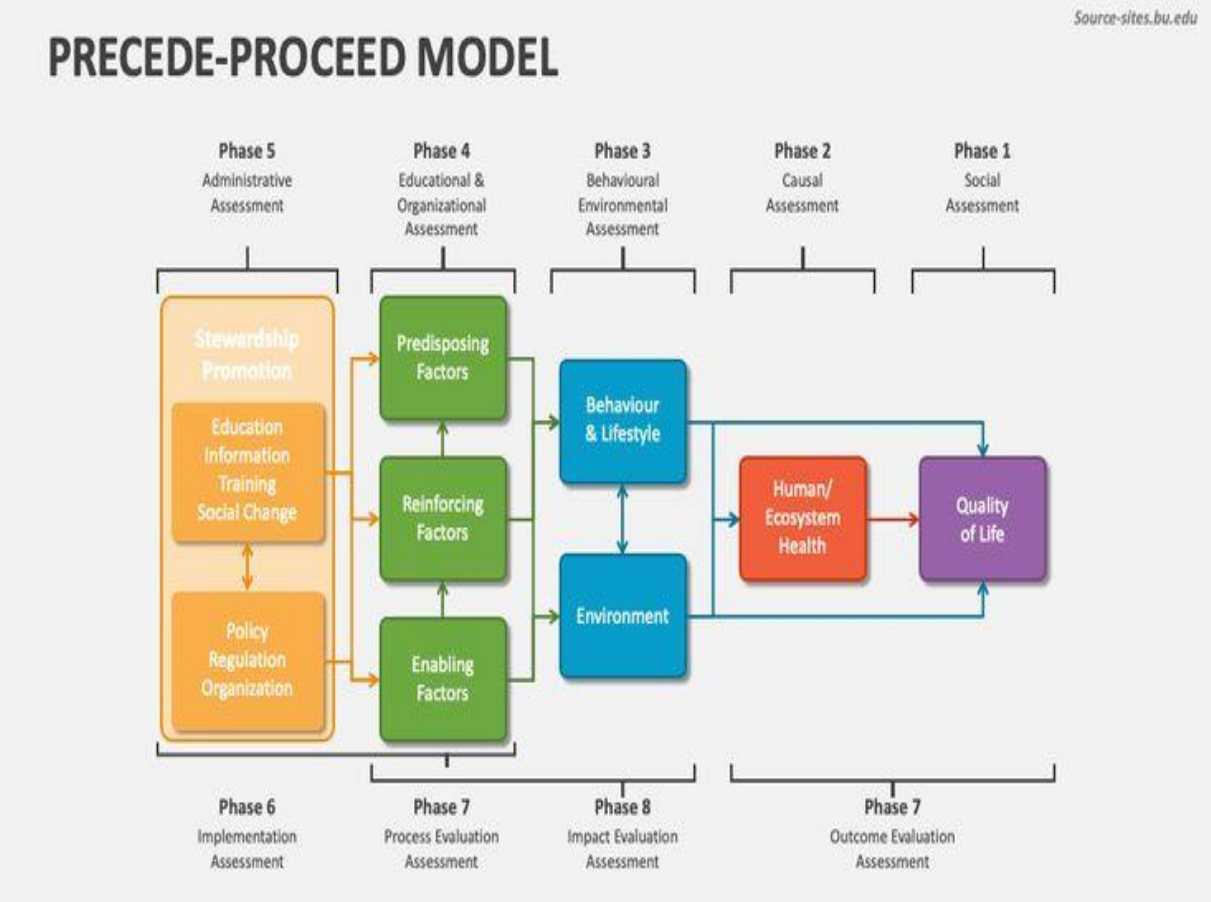
A contemporary definition resulted from the realization of the complexities associated with nutrition and determinants of dietary patterns

*'...any combination of **educational activities**, accompanied by environmental supports, designed to **motivate** and facilitate **voluntary adoption of food choices** and other **food-related behaviours** conducive to the health and well-being of individuals, communities and the planet'*

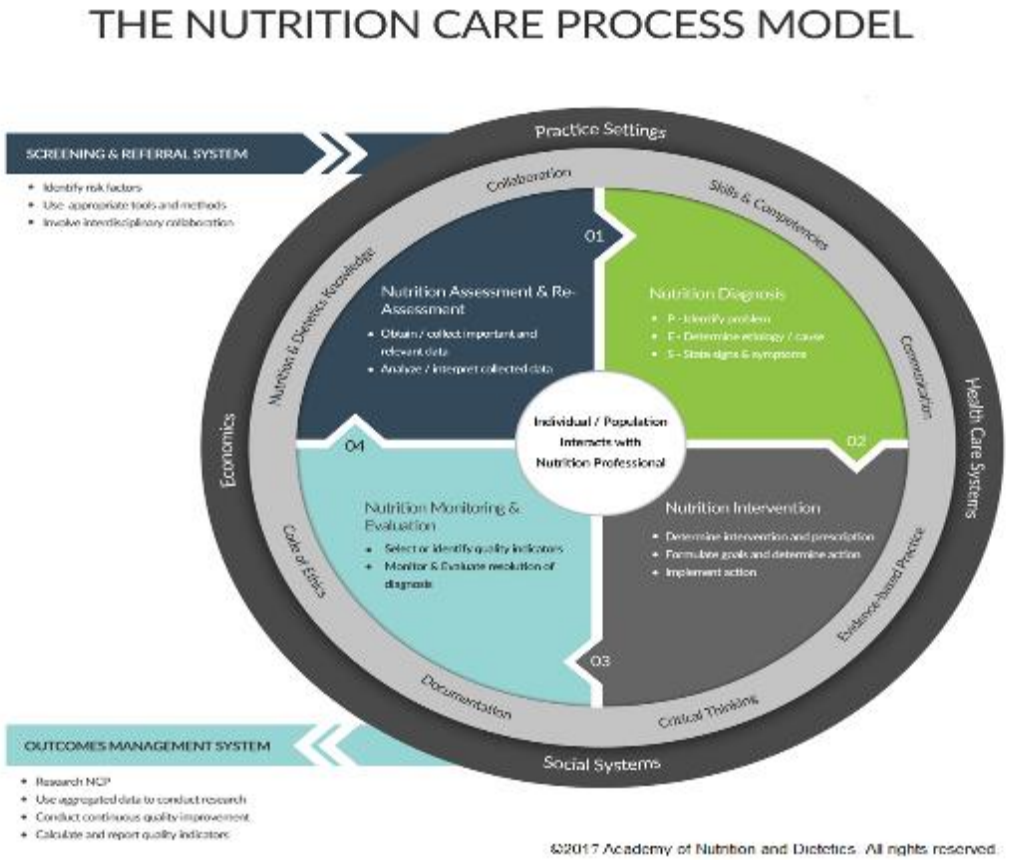
Education is not synonymous with information

- Education also fosters **motivation, growth, and change**
- NE uses activities that seek to help people to
  - learn to eat well
  - by enhancing their motivation,
  - through effective communication…
- NE is systematically planned
  - it should not just be random

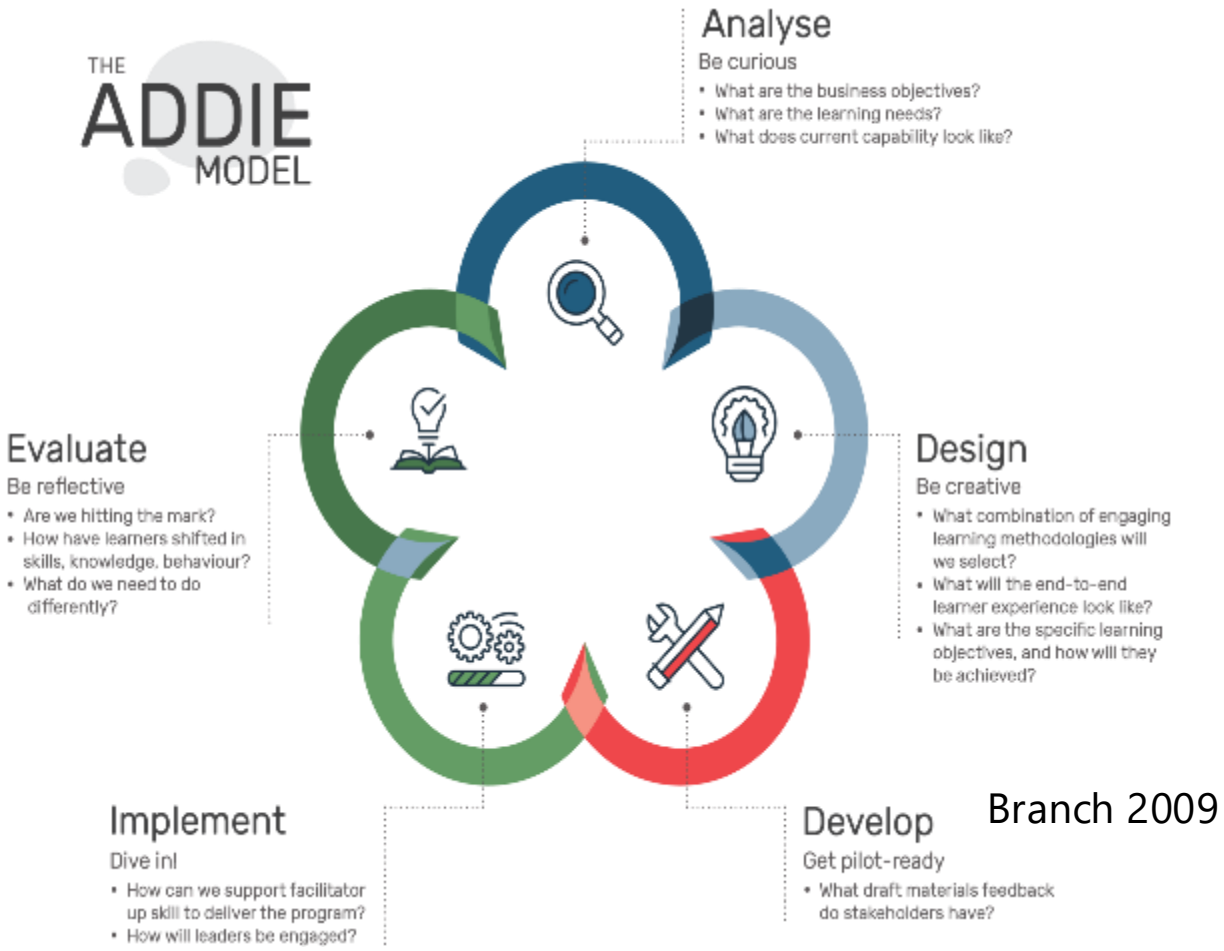
Existing models



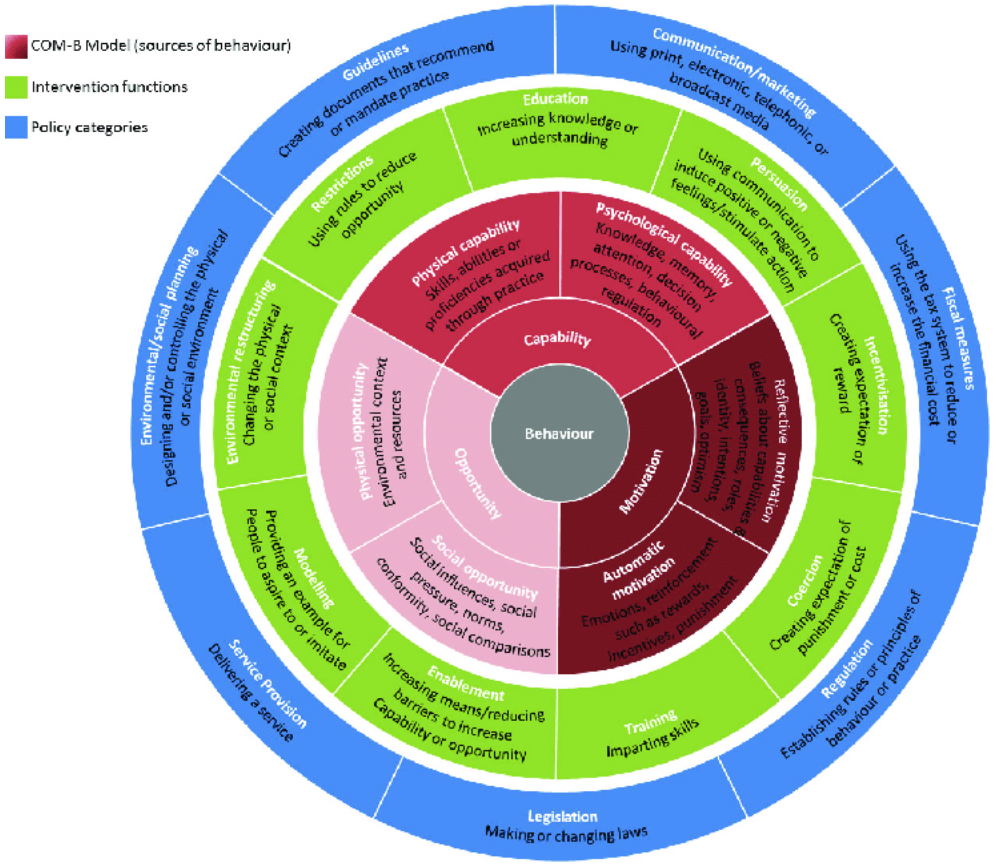
Crosby et al 2009



Existing models

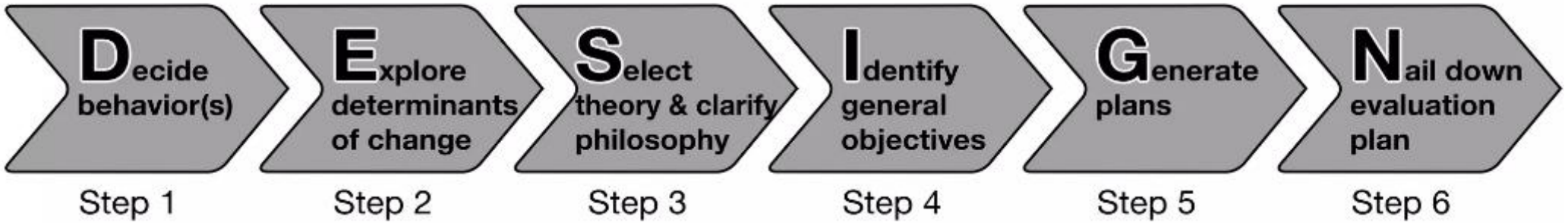


Branch 2009



Michie et al, 2014

The DESIGN procedure



Contento & Koch 2025

Nutrition education has to draw on the work of many other disciplines

A blend of several disciplines with a social-ecological framework

- Psychology
- Education
- Communication scientists

Contento & Koch 2025

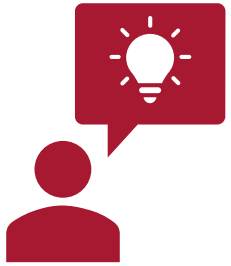
Delivering Nutrition Education

What channels will be used?

Should one consider using group sessions, printed material, websites, mass media?

Many strategies and educational activities available

Metacommunication



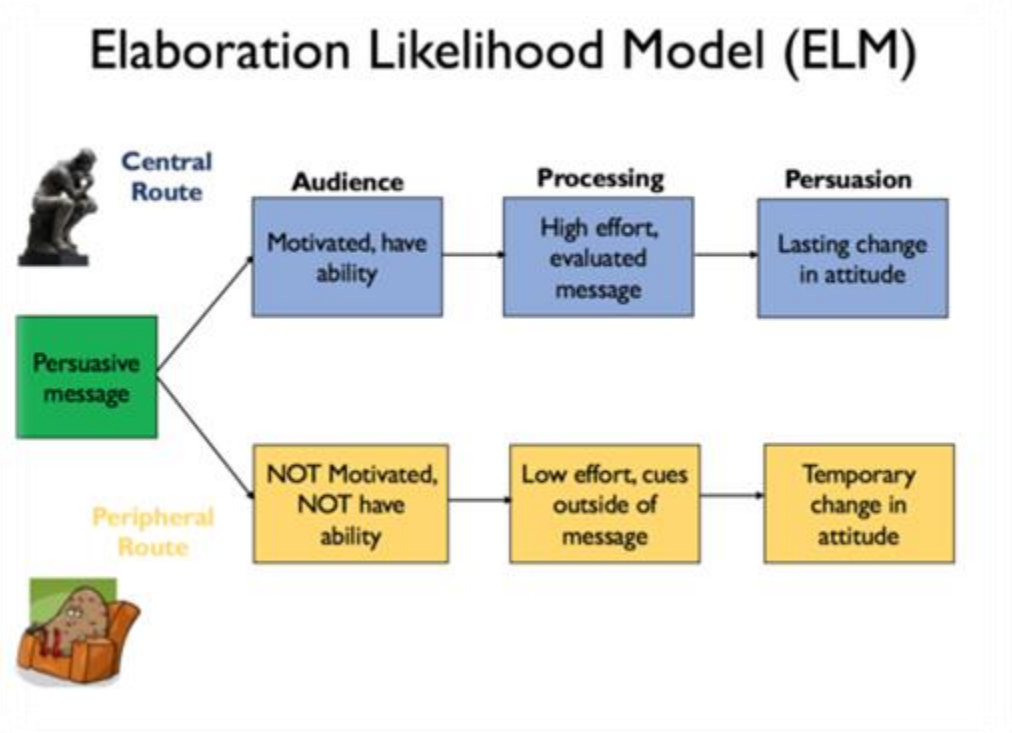
The Elaboration Likelihood Model (ELM) of communication proposes

individuals differ in their motivation and ability to process messages

Thoughtful process of messages likely to lead to behaviour change

Elaboration Likelihood Model

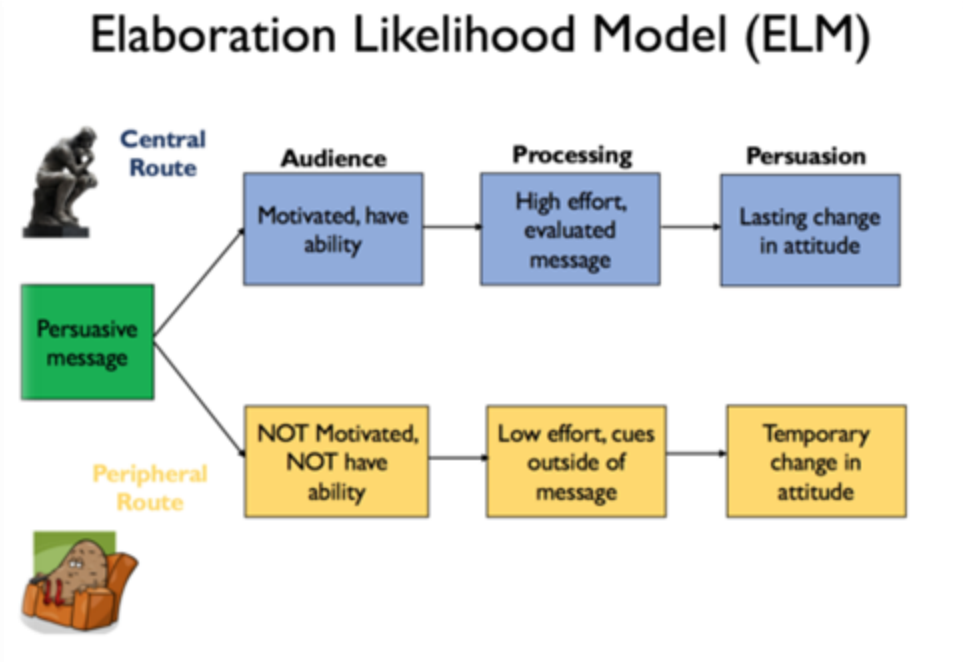
- To increase motivation of the audience, the messages should have the following characteristics:
  - Unexpected or novel
  - Memorable
  - Meaningful
  - Culturally appropriate
  - Stated in terms of what participants will gain from taking action
  - Involve humour, warmth



Contento & Koch 2025

Elaboration Likelihood Model

- To increase ability, messages should be:
  - Straightforward and clear
  - Repeated or reinforced
  - Presented with minimal distractions



Technological advancements

- 21st century brought a major turning point
- Technology entered the nutrition education landscape
- Growth of:
  - Online learning platforms
  - Mobile and web-based nutrition tools
  - Digital health programs

- The rise of the internet and smartphones reshaped how nutrition information was delivered and consumed

Nor et al., 2024

- Other key innovations include:
  - Mobile and smartphone applications
  - Wearables and digital self-monitoring tools
  - Big data analytics and machine learning

- These tools enabled:
  - **Personalized nutrition guidance** at scale
  - Real-time dietary tracking
  - Large-scale behavior monitoring
  - Higher-reach, lower-barrier program delivery

Artificial Intelligence

- Machine learning and AI are unlocking new opportunities for:
  - Customized dietary guidance
  - Predictive analytics on health outcomes
  - Tailored feedback based on genetics, preferences, and health goals
- These technologies are revolutionising individualized diet planning

Key Design Principles

- To increase engagement, interventions must:
  - Allow personalization
  - Use age-appropriate language
  - Offer clear tutorials
  - Provide a clear purpose and goal
  - Include reward systems
  - Use gamified activities
  - Enable peer connectivity and support

Impacts and limitations

- The following were reported
  - Apps showed **acceptable usability**
  - Adolescents valued **personalization**, **social interaction**, and **gamification**
  - Disengagement risks remain: complexity, unclear instructions, repetitive tasks
- Importance of iterative co-design with youth is strongly reinforced

In older adults

- Interventions demonstrated:
  - Improved diet quality, e.g. DASH diet adherence
  - Reduced sodium and processed food intake
  - Improvements in HbA1c, blood pressure, functional mobility
  - High feasibility and acceptability with >80% completion in several trials

Limitations

- Declining engagement with mobile apps over time
- Digital literacy limitations
- Access challenges: devices, broadband, technical support

Need for hybrid models with human support (dietitians, phone follow-ups

Equity and Inclusivity in Nutrition Education

There is growing acknowledgment of the need for equitable access to nutrition resources.

- Key priorities include:
  - Reducing disparities in access to nutrition education
  - Addressing systemic bias in dietary guidelines
  - Creating content that is culturally relevant and accessible to diverse populations

Equity-centered approaches aim to ensure nutrition education serves as a tool for health promotion and social justice.

Conclusion

- Nutrition education is a dynamic, evolving, and multidimensional field
- The field's ongoing evolution = need for continued innovation to ensure nutrition education remains
  - relevant, evidence-based, inclusive, and impactful

References

Branch RM. 2009. *Instructional Design: The ADDIE Approach*. Springer.

Contento IR & Koch PA. 2025. Nutrition Education: Linking Research, Theory, and Practice, Fifth Edition 5th Edition

Crosby R, Kegler M, & DiClemente R. 2009. *Emerging Theories in Health Promotion Practice and Research*. Jossey-Bass.

FAO. 2024. Food and Nutrition Education for Healthy Diets. Available from https://www.fao.org/nutrition/education

GBD 2017

Green, L. W., & Kreuter, M. W. (2005). *Health Program Planning: An Educational and Ecological Approach* (4th ed.). McGraw-Hill.

Martin A, Caon M, Adorni F, Andreoni G, Ascolese A, Atkinson S, Bul K, Carrion C, Castell C, Ciociola V, Condon L, Espallargues M, Hanley J, Jesuthasan N, Lafortuna CL, Lang A, Prinelli F, Puidomenech Puig E, Tabozzi SA, McKinstry B. 2020. A Mobile Phone Intervention to Improve Obesity-Related Health Behaviors of Adolescents Across Europe: Iterative Co-Design and Feasibility Study. *JMIR Mhealth Uhealth*. 8(3):e14118. doi: 10.2196/14118

Michie S, van Stralen M, & West R. 2011. The Behaviour Change Wheel: A New Method for Characterising and Designing Behaviour Change Interventions. *Implementation Science*, 6(1), 42.

Michie S, Atkins L, & West R. 2014. *The Behaviour Change Wheel: A Guide to Designing Interventions*. Silverback Publishing.

Nor NM, Noor MIM, Halim Z, Manaf MHA, Bukry SA, Asmawi UMM. 2024. Mapping the Evolution of Nutrition Education: A Scientometric Review from 1970 to 2023, Unveiling Insights Over Half a Century. *Nutr Food Sci*.12(1).

Swan WI, Vivanti A, Hakel-Smith NA, Howarter KB, Papoutsakis, et al., 2014. Nutrition Care Process and Model Update: Toward Realizing People-Centered Care and Outcomes Management. *Journal of the Academy of Nutrition and Dietetics*. 117 (12)

Tabassum N, Biediger-Friedman L, Johnson C, Lane M, Marceaux S. 2026. Digital and Technology-Based Nutrition Interventions, Including Medically Tailored Meals (MTMs) for Older Adults in the U.S.—A Scoping Review. *Nutrients*. 2026; 18(3):385. https://doi.org/10.3390/nu18030385

Thank you