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Extracurricular low salt recipe development as real world target oriented learning in dietetic education

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Research Article

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Abstract

Background

Developing practical menu-planning skills is a core component of dietetic education, as registered dietitians are required to provide concrete and feasible dietary recommendations tailored to individuals and populations. However, in many educational settings, menu planning is conducted in simulated contexts with hypothetical target populations, which may limit students' ability to integrate knowledge with real-world practice. In particular, opportunities for experiential and target-oriented learning remain limited. This study aimed to qualitatively explore what dietetic students learned through participation in extracurricular activities involving the development of low-salt recipes for community use.

Methods

This qualitative descriptive study involved 12 third-year dietetic students at a university in Japan who participated in a community-based extracurricular activity focused on creating low-salt recipes. After completing the activity, 7 students responded to a web-based questionnaire consisting of open-ended questions regarding their motivations, learning experiences, and future application of learning. The data were analyzed using the Steps for Coding and Theorization [SCAT] method, a systematic qualitative analysis approach suitable for small-scale textual data. Themes were generated inductively through iterative coding and interpretation.

Results

The analysis identified several key themes related to students' learning. First, participants developed target-oriented thinking, recognizing the importance of considering the needs, preferences, and abilities of the intended users when designing recipes. Second, they learned to balance salt reduction with taste, ease of preparation, and overall feasibility, highlighting the complexity of practical dietary planning. Third, students acquired practical and communication skills through hands-on experience, including cooking, photographing dishes, and presenting information in an accessible manner. These experiences enabled them to notice aspects that are often overlooked in classroom-based learning. Finally, participants recognized the applicability of their learning to future professional practice, such as menu planning and nutrition guidance, as well as to their own dietary behaviors.

Conclusions

Engagement in real-world, community-based extracurricular activities promotes experiential and target-oriented learning in dietetic education. By requiring students to address authentic challenges and consider actual users, such activities facilitate the integration of knowledge, practical skills, and

communication abilities. Incorporating these learning opportunities into dietetic training programs may enhance the development of competencies required for future registered dietitians.

1. Introduction

Excessive salt intake is a major risk factor for hypertension, and reducing salt consumption is a global public health priority [1–3]. In Japan, both salt intake and the prevalence of hypertension remain high [4], and salt intake tends to increase with age [5]. Notably, more than half of dietary salt intake is derived from home-prepared meals, particularly among older adults [6]. Therefore, improving dietary practices at the community and household levels is essential for effective salt reduction.

Registered dietitians play a key role in promoting dietary improvement through individualized nutrition guidance based on nutritional assessment [7]. In such guidance, presenting concrete and feasible meal plans is essential. Accordingly, training institutions for registered dietitians are expected to develop professionals who can design practical and effective meal plans that meet diverse societal needs. The model core curriculum for dietetic education in Japan emphasizes the ability to plan meals according to the characteristics of target populations, integrating knowledge of nutrition, food, and cooking [8].

Although dietetic students have multiple opportunities to learn menu planning through coursework such as cookery science and clinical nutrition, these activities are often conducted in simulated settings with hypothetical target populations. Previous studies have reported that students frequently experience difficulty in menu planning and have examined ways to improve this ability [10–14]. However, limited research has explored what students actually learn through the process of menu creation, particularly in real-world or community-based contexts.

In a village in Aomori Prefecture, initiatives to improve the food environment for salt reduction have been implemented, including the dissemination of low-salt recipe cards. As part of this initiative, dietetic students participated in extracurricular activities to develop low-salt recipes intended for community residents. This activity provided students with an opportunity to engage in practical, target-oriented menu creation in a real-world setting. Therefore, this study aimed to qualitatively explore what dietetic students learned through participating in extracurricular activities involving the development of low-salt recipes.

2. Methods

2.1 Study design

This study employed a qualitative descriptive design to explore what dietetic students learned through participation in extracurricular activities involving the development of low-salt recipes. This study was reported in accordance with the Consolidated Criteria for Reporting Qualitative Research [COREQ].

2.2 Participants

The participants were 12 third-year dietetic students enrolled at a university in Aomori Prefecture, Japan, who voluntarily participated in the extracurricular activity (participation rate: 33%). All participants were female. Recruitment was conducted prior to classes of required participants. Students were informed verbally and in writing about the purpose and content of the extracurricular activity, including its focus on improving the food environment in a local community. Participation was voluntary and unrelated to academic evaluation.

2.3 Extracurricular activities

Since November 2021, a village in Aomori Prefecture has implemented initiatives to improve the food environment with the aim of reducing salt intake [15]. As part of this initiative, low-salt recipe cards were distributed at health centers, restaurants, and supermarkets frequently visited by local residents. Dietetic students participated in extracurricular activities to develop these low-salt recipes. The recipe cards were updated approximately once a month in collaboration with a local supermarket. The primary requirement for recipe development was that the salt content per dish should be 1 g or less. Students created recipes mainly at home or, when necessary, in the university kitchen. They submitted photographs, preparation methods, one-point advice, and nutritional values. All submitted recipes were reviewed and corrected by an experienced registered dietitian, and feedback was provided to the students.

2.4 Data collection

Data were collected using a web-based open-ended questionnaire administered after the completion of the activity. The participants who had engaged in the activity in 2021 completed the survey after finishing their final recipe submissions.

The questionnaire included the following questions:

1. Reasons for participating in the activity
2. What they learned or noticed through the activity
3. How they intended to apply their learning in the future

Responses were collected in written form and used as qualitative data for analysis.

2.5 Data analysis

Qualitative data were analyzed using the Steps for Coding and Theorization (SCAT) method [16], which is suitable for small-scale qualitative data such as open-ended questionnaire responses. The analysis followed a four-step coding process:

1. Identification of key words and phrases from the text
2. Paraphrasing using words outside the text
3. Explanation of the concepts underlying the words
4. Development of themes and constructs, followed by the construction of a storyline

The analysis was conducted iteratively by the researcher, moving back and forth between the data and emerging concepts to refine interpretations. The SCAT analysis sheet was developed to organize the coding process, including extraction of key words, paraphrasing, conceptual explanation, and theme development.

2.6 Researcher characteristics and reflexivity

The researcher was involved in supervising the extracurricular activity and providing feedback on the recipes. This positionality may have influenced data interpretation; therefore, the analysis process was conducted systematically following the SCAT procedure to enhance transparency.

2.7 Trustworthiness

To enhance the credibility of the analysis, the coding process was conducted systematically following the SCAT procedure. The researcher repeatedly reviewed the data and coding process to ensure consistency and transparency. In addition, the analytical process was documented to ensure transparency.

2.8 Ethical Considerations

This study was approved by the Ethics Review Committee of Aomori University of Health and Welfare [Approval No. 21087, February 2, 2022]. This study was performed in line with the principles of the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study. Participants were informed that participation in both the extracurricular activity and the survey was voluntary and that their responses would be anonymized. Completion of the questionnaire was considered to indicate consent.

3. Results

3.1 Participant Characteristics

Of the 12 students who participated in the extracurricular activity, 7 completed the questionnaire [response rate: 58%].

3.2 Reasons for Participation

Participants reported multiple motivations for joining the activity, including interest in recipe development, perceived usefulness for future careers, and opportunities for community involvement. Some participants also indicated that the activity would be beneficial for job hunting.

3.3 Learning through the Extracurricular Activity

Analysis of the responses generated several themes regarding students' learning. Qualitative analysis using SCAT generated several themes related to students' learning and its application [Table 2]. An example of the coding process is shown in Table 1.

Table 1
Example of SCAT analysis process

Original text	Key words	Paraphrase	Explanation	Theme
It is important to think from the perspective of the target person	target person	target-oriented thinking	Recipes should be designed based on users' needs	Target-oriented thinking
It is not just about reducing salt, but also taste and ease	salt, taste, ease	balance of factors	Practical constraints must be considered	Balancing salt reduction and feasibility
By cooking and taking photos, I noticed improvements	cooking, photos	experiential learning	Hands-on experience enhances awareness	Practical skill acquisition
The appearance of photos is important	photos, appearance	visual communication	Presentation influences engagement	Communication awareness

Table 2
Themes derived from SCAT analysis

Category	Theme	Description
Learning	Target-oriented thinking	Recognizing the importance of considering the target population
Learning	Balancing salt reduction and feasibility	Integrating taste, ease, and health considerations
Learning	Practical skill acquisition	Learning through hands-on experience beyond classroom settings
Learning	Communication awareness	Understanding the importance of presentation and information delivery
Application	Professional application	Applying learning to future dietetic practice
Application	Personal application	Applying learning to personal dietary behavior

Theme 1: Target-oriented thinking in recipe development

All participants emphasized the importance of considering the target population when developing recipes. They recognized the need to design recipes that are not only low in salt but also easy to prepare and appealing.

It is important to think from the perspective of the target person, including ease of cooking and taste.

Theme 2: Balancing salt reduction with palatability and feasibility

Participants learned that reducing salt does not simply involve lowering sodium content, but requires maintaining taste and practicality. Some noted that salt reduction was easier than expected when using low-sodium ingredients.

It is not just about reducing salt, but also considering whether the dish is tasty and easy to make.

Theme 3: Acquisition of practical skills beyond classroom learning

Students reported that the activity provided opportunities to engage in the full process of recipe development, including cooking, photographing, and revising recipes. This allowed them to notice details that are often overlooked in classroom-based learning.

By doing everything from cooking to taking photos, I was able to notice areas for improvement that I had not realized before.

Theme 4: Awareness of communication and presentation

Some participants became aware of the importance of effectively communicating recipes to the target audience, including the use of appealing photographs and clear wording.

The appearance of the dish photos is important to attract interest.

Application of Learning to the Future

Participants described how they intended to apply their learning in both professional and personal contexts.

Theme 5: Application to professional practice

Many participants stated that they would apply their learning to menu planning and nutrition guidance as future dietitians. They also noted the importance of tailoring information to the target population.

I would like to use this experience when creating menus for patients who need salt restriction.

Theme 6: Application to personal dietary behavior

Some participants indicated that they would apply what they learned to their own dietary habits, such as making small adjustments to reduce salt intake in everyday meals.

I would like to continue making small adjustments to reduce salt in my daily cooking.

To integrate these findings, a conceptual model illustrating the learning process was developed [Figure 1]. The model shows that participation in a real-world extracurricular activity prompted students to become aware of the importance of considering the target population. Through engaging in practical challenges, such as balancing salt reduction with taste and feasibility, students acquired practical and

communication skills. These learning experiences were then linked to their intended application in future professional practice and personal dietary behavior.

4. Discussion

This study explored what dietetic students learned through participation in extracurricular activities involving low-salt recipe development. The findings revealed that students developed target-oriented thinking, acquired practical and communication skills, and recognized the applicability of their learning to both professional practice and personal dietary behavior.

The learning process identified in this study [Figure 1] suggests that engagement in real-world activities promotes deeper learning. In particular, developing recipes intended for actual community use encouraged students to consider the needs and perspectives of the target population. Furthermore, addressing practical challenges—such as balancing salt reduction with taste and feasibility—facilitated the integration of knowledge and skills.

This process can be understood as a form of experiential learning, in which knowledge is constructed through concrete experience and reflection [17]. The present findings suggest that such experiential processes can be effectively fostered through extracurricular, community-based activities in dietetic education.

Previous studies have shown that dietetic students often experience difficulties in menu planning and have focused on improving technical skills through classroom-based education [10–12]. While these studies highlight the importance of menu planning ability, they primarily address structured educational settings. In contrast, the present study demonstrates that learning in real-world contexts enables students to connect theoretical knowledge with practical application. This finding is consistent with previous research indicating that practical training and hands-on experiences are perceived as useful in professional practice among registered dietitians [9].

A notable finding of this study is the importance of having a real target population. In many educational settings, students develop menus for hypothetical individuals; however, this study involved recipe development for actual community members. This difference appears to enhance students' awareness of user perspectives and practical constraints. Such findings are in line with the concept of service-learning, which emphasizes the integration of academic learning with community engagement [18]. Engaging with real-world problems may promote not only skill acquisition but also a deeper understanding of the social role of dietitians.

The findings suggest that incorporating opportunities for real-world, target-oriented learning may enhance competency development in dietetic education. In particular, activities that involve engagement with community settings—whether through extracurricular or curricular programs—may be effective in fostering practical skills, communication abilities, and professional awareness.

This study has several limitations. First, the sample size was small and limited to students who voluntarily participated in extracurricular activities, which may indicate higher motivation compared to the general student population. Second, the data were based on self-reported responses, which may be subject to bias. Third, this study did not directly assess competency achievement using objective measures. Future studies should examine whether similar learning effects can be observed in larger and more diverse student populations. In addition, combining qualitative and quantitative approaches to assess competency development would provide a more comprehensive understanding of the educational impact of such activities. This study suggests that learning is enhanced when students engage in authentic tasks that require them to consider real users, supporting the importance of authenticity in health professional education.

5. Conclusion

This study qualitatively explored what dietetic students learned through participation in extracurricular activities involving low-salt recipe development. The findings revealed that engaging in real-world, community-based activities promoted target-oriented thinking, facilitated the integration of knowledge and practical skills, and enhanced awareness of communication and application in future professional practice. These results suggest that incorporating real-world, target-oriented learning opportunities into dietetic education—whether through extracurricular or curricular activities—may be effective in fostering competencies required for registered dietitians.

Declarations

Author Contributions: Conceptualization, methodology, data curation, formal analysis, writing – original draft: TK.

Funding: This research received no external funding.

Data availability: The surveys that support the findings of this study are available from the corresponding author, but restrictions apply to the availability of these data, which were used under license for the current study and so are not publicly available. The data are, however, available upon request and with the permission of the corresponding author.

Institutional Review Board Statement: The study was approved by the ethics committee of the Aomori University of Health and Welfare (Reference number: 21087). This study was performed in line with the principles of the Declaration of Helsinki.

Informed Consent Statement: All participants provided written informed consent and participated voluntarily.

Consent to Publish Declaration: Not applicable

Competing interests

The authors declare no competing interests.

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Figures

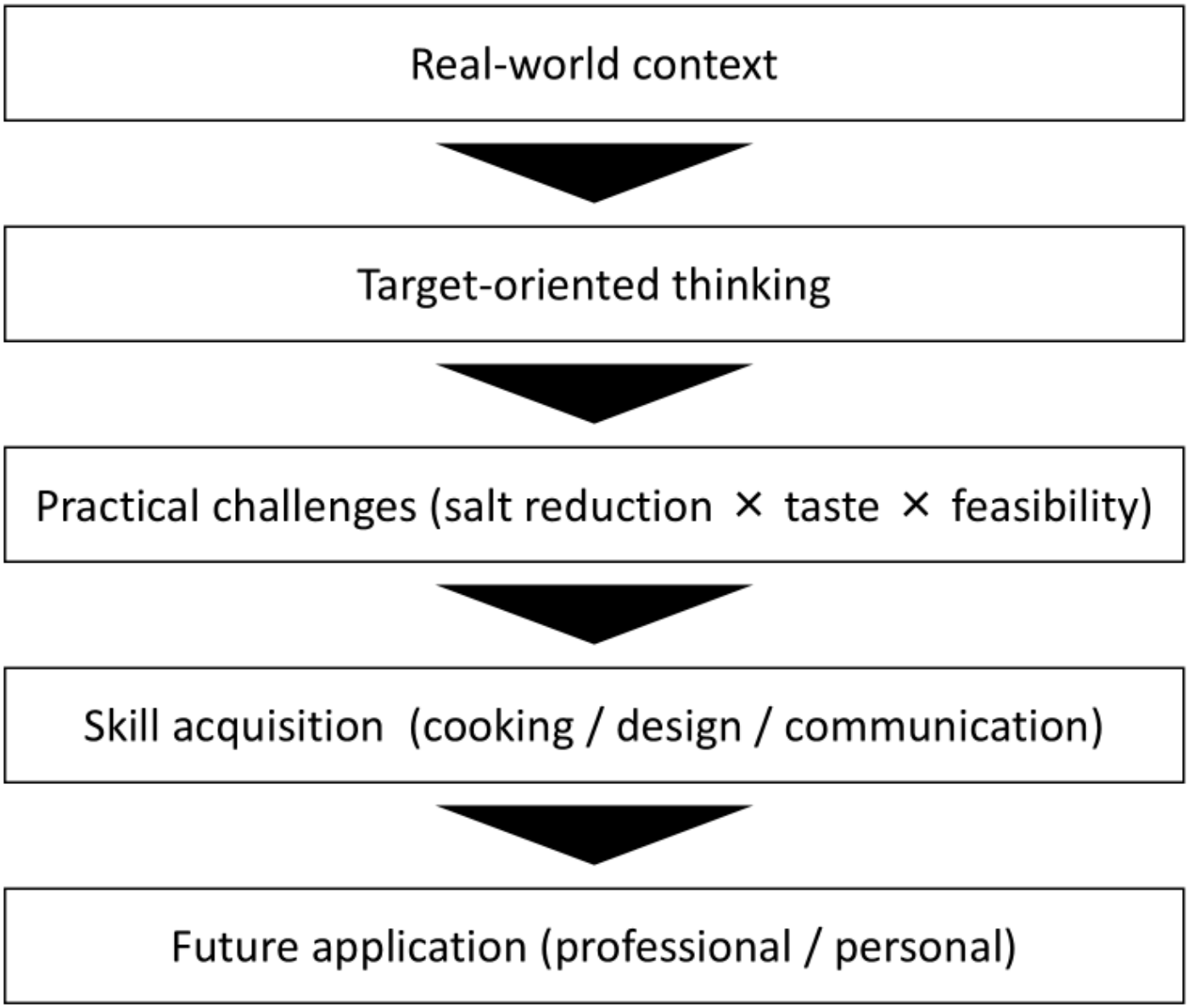


Figure 1

Learning process of dietetic students through extracurricular low-salt recipe development

Supplementary Files

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