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Evaluation of programs of nutrition education in pre-school and school age based on a criteria catalogue

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Abstract

The aim of this study was to evaluate the quality of the available German-language nutrition education programs for preschool and school children; a criteria catalogue was developed and used for this purpose. This catalogue was divided into three quality fields, each containing 15 criteria: "Subject Content", "Methodology and Didactics of Transference" and "Formal Design". 40 programs were identified for evaluation, 20 of which were included in the study. All the evaluated programs proved to be suitable for use in preschool and school nutrition education, taking account of features relevant to the target groups. The best results were recorded by three programs: *fit4future, Klasse2000* and *GartenKinder*. The evaluation also generated several suggestions for improvement, which could be incorporated in the development of new and in the revision of existing nutrition education programs. The criteria catalogue could be used by teachers and professionals to evaluate different measures and to select a program suited to the target group.

Keywords: criteria catalogue, nutrition education, nutrition education programs, children, adolescents

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Introduction

Early childhood nutrition education has an influence on the development and health of children and adolescents. Greater use should be made of its potential for prevention, particularly given the high prevalence of nutrition-induced diseases such as obesity and high blood pressure [1, 2]. In total, approx. 1.9 million children and adolescents in Germany are overweight. In comparison to reference populations from the 1980s and 1990s, the proportion of overweight children has increased by around 50% [3]. If we regard overweight as an indicator of a certain lifestyle and diet which cause long-term health risks, then nutrition education becomes an essential pedagogical assignment. The key objective must be to enable children and adolescents to devise their own diet and nutrition competently, independently and healthfully [4].

We can therefore assume that nutrition-related cultural tools are being passed on within the family environment to a lesser extent than in previous generations [5] and that the corresponding skills for selecting and evaluating foods as well as for processing and preparing them are being lost [1, 6, 7]. Care and educational facilities increasingly provide all-day supervision, all-day education and afternoon support; as a result, they also provide lunchtime catering for many children and adolescents on workdays. Hence the need for daycare centers[1] and schools to provide not only catering, but also nutrition education and socialization for children and adolescents, at least in part [8, 9].

Considering these developments, it is

[1] In this study, 'daycare center" refers to facilities which care for children aged between 3 and 6.

Publisher and System	Link
Bundeszentrale für gesundheitliche Aufklärung (BZgA) (Federal Center for Health Education) ***Qualitätskriterien für Maßnahmen der Gesundheitsförderung und Primärprävention von Übergewicht bei Kindern und Jugendlichen*** (Quality Criteria for Measures of Health Promotion and Primary Prevention of Overweight among Children and Adolescents)	www.bzga.de/botmed_60649130.html
Dr. K. Dadaczynski and Dr. H. Witteriede ***Q^{GPS}-Verfahren (Qualitätsentwicklung von gesundheitsbezogenen Programmen in Schulen)*** (Q^{GPS} Process: Quality Development of Health-Related Programs in Schools)	www.qgps.de/Konzept.html
Universitätsklinikum Hamburg Eppendorf und BZgA ***QIP (Qualität in der Prävention)*** (QIP: Quality in Prevention)	www.uke.de/extern/qip/
Verbraucherzentrale Bundesverband e. V. ***Materialkompass Verbraucherbildung*** (Consumer Education Material Compass)	www.verbraucherbildung.de/

Table 1: **Overview of the evaluation tools which provided guidance for the development of the criteria catalogue**

clear that effective measures for the prevention of nutrition-related diseases and the promotion of health are necessary [10]. Programs which offer extra-curricular nutrition education can significantly expand on teaching content or prepare the way for the lasting integration of nutrition education and the promotion of health into the facility's daily schedule [11].

Lesson materials, concepts and projects on nutrition education have up to date only been partially evaluated. And these results can only be compared to a limited extent, because unavailable and inconsistent bases for evaluation [6, 12, 13]. A further need for research in this field in Germany must be recognized [12]. The few evaluation tools currently available are the *"Qualitätskriterien für Maßnahmen der Gesundheitsförderung und Primärprävention von Übergewicht bei Kindern und Jugendlichen"* (quality criteria for measures of health promotion and primary prevention of overweight among children and adolescents), the *"QGPS-Verfahren"* (QGPS process), the *"Informationssystem zur Qualitätsentwicklung von Prävention und Gesundheitsförderung"* (information system on the quality development of prevention and health promotion) and the *"Materialkompass Verbraucherbildung"* (consumer education material compass) (◆ Table 1). However, these are, except for the *"Materialkompass Verbraucherbildung"* and the *"QGPS-Verfahren"*, not geared to preschool and school nutrition education programs. These programs also entail a cost or do not allow teachers and professionals to carry out the evaluation themselves. None of the existing tools can therefore be used in full or unaltered to assess nutrition education programs. These evaluation tools provided a basis for the selection of individual criteria and guidance for the classification of quality fields and points systems in the development of the criteria catalogue for this study. In this context, a criteria catalogue was developed, by means of which projects and materials for preschool and school nutrition education could be assessed. Decision makers in the field of nutrition education for children and adolescents (e.g. school management or teachers) could therefore receive support in their selection of a program which corresponds as precisely as possible to the individual demands of the target group and the framework conditions within the facility. The criteria catalogue was applied to selected projects and materials as part of this study.

Materials and methods

Data collection and selection of programs

A total of 40 programs for preschool and school nutrition education in the German-speaking region were identified by the deadline of September 30, 2015. The program providers were asked to supply materials for quality assessment. The availability of teaching and learning materials and a written concept or accompanying text was identified as a selection criterion. Of the 40 programs initially identified, 20 were included in the quality evaluation.

Criteria catalogue and evaluation

The criteria catalogue identified three quality fields, adopting the structure used by the *"Materialkompass Verbraucherbildung"*: "subject content", "methodology and didactics of transference" and "formal design". Each area was represented by 15 quality criteria and assessed by means of a points system.

A points-score between 1 (criterion is not fulfilled) and 5 (criterion is completely fulfilled) was awarded per criterion; a maximum of 75 points could be attained per quality field. The three quality fields were

Category	Points		Evaluation
	from	to	
A+	225	215	unreservedly recommended
A	214	204	
A-	203	188	
B+	187	172	recommended
B	171	156	
B-	155	135	
C	134	113	recommended with reservations
D	112	45	not recommended

Table 2: **Classification of total points-score into eight categories and four evaluation fields**

1. Subject content	
Concept component nutrition (total of 6 criteria)	
No classification of food as "healthy or unhealthy"	To avoid in communication with children and adolescents, possibly opposite effect
Content conforms to DGE/ corresponds to other institutions	Recommendations from the *Deutsche Gesellschaft für Ernährung e. V.* (DGE) (German Nutrition Society) or other institutions are considered.
Concept component movement (total of 3 criteria)	
Promotion of physical activity	Movement promotes the development and health of children and adolescents; recommendations: 4–6 years ≥ 180 minutes/day; 6–18 years ≥ 90 minutes/day[a]
Movement/activity games	Playful integration of movement into daily schedule; joy in movement; reduction of long sitting periods
Concept component stress management (total of 2 criteria)	
Relaxation exercises	Support for avoiding stress; objectives are recognition of the problem and coping strategies
Alternative: subject-specific concept component (total of 5 criteria)	
Relevance	Subject relevant to nutrition education and health promotion for children and adolescents
Meets the needs of the target group	Content is relevant to the target group and suitable for the age group/level of knowledge
2. Methodology and didactics of transference	
Formulation of clear learning objectives	Necessary to allow for evaluation of the success of the measures at a later date; ensures a structured process
Teachers can co-design processes	Freedom to incorporate own ideas/adapt content to target group's knowledge level
3. Formal design	
Media	Are there practical elements such as games/ posters and do they support transference of learning content?
Overall design	Are differences in age, gender and nationality respected?

Table 3: **Examples of criteria in the three quality fields in the criteria catalogue (15 criteria per quality area)**

[a] see: Rütten A, Pfeifer K (Hg). Nationale Empfehlungen für Bewegung und Bewegungsförderung (2016)

equally weighted in the overall assessment. The total points-score from all three quality fields (maximum 225 points) was subsequently classified into one of eight categories (A+ to D) and assigned an overall evaluation, ranging from "unreservedly recommended" to "not recommended" (◆ Table 2).

The criteria catalogue considered the link between the different components of "nutrition", "movement" and "stress management", in accordance with the "EBS" approach in the *GUT DRAUF* program developed by the *Bundeszentrale für gesundheitliche Aufklärung* (BZgA) [14]. These three closely-connected lifestyle factors have a significant influence on health and on the occurrence of lifestyle diseases [15, 16]. There are programs which do not include the components of "movement" and "stress management", but which combine nutrition with another specific subject such as e.g. sustainability or food waste. These programs can also be assessed using the criteria catalogue, with the omission of the concept components of movement and stress management (◆ Table 3). Other examples of quality criteria included in the criteria catalogue are shown in ◆ Table 3.

A total of 20 programs for preschool and school nutrition education were assessed using the developed criteria catalogue.

Results and discussion

◆ Table 4 summarizes the results of the evaluation of the 20 nutrition education programs. This table shows the points-score obtained in each of the three quality fields, the total points-score and the category classification for each program.

In general, the evaluated programs proved to be suitable for use in preschool and school nutrition education. The average total points-score was 170. Most programs tested (approx. 85%) were assigned to

	Program	Quality fields			Total points-score	Category
		Subject content	Methodology and didactics	Formal design		
1	*fit4future*	71	68	71	210	A
2	*GartenKinder*	64	65	72	201	A-
3	*Klasse2000*	61	62	67	190	A-
4	*Ernährungsführerschein*	51	65	71	187	B+
5	*SchmExperten – Wissen, das schmeckt*	54	59	73	186	B+
6	*Über Milchpiraten und Limokönige*	65	51	70	186	B+
7	*Ernährungspyramide*	60	54	69	183	B+
8	*SchmExperten – in der Lernküche*	54	52	71	177	B+
9	*Kita-Ideen-Box Krümel und Klecksi*	65	51	61	177	B+
10	*Der Weg der Nahrung*	64	44	66	174	B+
11	*Woher kommt mein Essen?*	63	48	61	172	B+
12	*Clevere Durstlöscher*	61	44	58	163	B
13	*5 Sterne fürs Frühstücken*	53	49	59	161	B
14	*Gib8 – Wertschätzung und Verschwendung von Lebensmitteln*	62	40	50	152	B-
15	*So macht Essen Spaß (Kita)*	48	41	62	151	B-
16	*Ess-Kult-Tour*	54	44	52	150	B-
17	*Esspedition Schule*	46	46	56	148	B-
18	*Schokologie*	53	40	50	143	B-
19	*So macht Essen Spaß (Grundschule)*	47	37	57	141	B-
20	*Wie viel esse ich? Portionen und Portionsgrößen*	49	41	50	140	B-

Table 4: **Overview of the overall evaluation of the 20 programs in descending order of total points-score**

category B; none were assigned to categories C or D. According to the criteria of this evaluation, three programs proved to be "unreservedly recommended": *fit4future*, *GartenKinder* and *Klasse2000* (◆ Figure 1).
The results demonstrate that the evaluated programs showed the greatest potential for improvement in the quality field of "methodology and didactics of transference", according to the criteria in the criteria catalogue. On average, only 67% of the maximum points-score was achieved in this field. However, in the "subject content" field, approx. 76% of the maximum points-score was attained. The best result was found in the quality field of "formal design", in which on average around 83% of the maximum points-score was achieved (◆ Table 5).
The link between the subject areas of nutrition, movement and stress management, as recommended by the BzgA, was implemented in the concepts of four programs: *Fit-4future*, *Klasse2000*, *Kita-Ideen-Box Krümel und Klecksi* and *Über Milchpiraten und Limokönige*. Nine programs combined the components of nutrition and movement. Seven programs dealt with the subject of nutrition in connection with another subject-specific topic, e.g. provenance and cultivation of plant foods – gardening with children *(GartenKinder)*.
The results of other requirements tested are presented in ◆ Table 6.

Behavioral and situational prevention

The criterion of "behavioral and situational prevention" was often unfulfilled. This quality criterion assesses whether the program accounts for behavior-based preventive aspects, which have an impact on the knowledge and attitude of the target group, and examines whether the program recommends modification of structures and pro-

	fit4future	GartenKinder	Klasse2000
Provider	*Cleven Stiftung*, Schweiz	*Stiftung Besser essen. Besser leben.*	*Verein Programm Klasse 2000 e. V.*
Target group	children at primary school age	children at daycare center age	children at primary school age
Area of application	primary schools and special schools	daycare centers and preschools	primary schools and special schools
Objectives	• sustainably active and healthy lifestyle • reduction in the lack of movement and overweight • fun in movement, healthy nutrition and "brain fitness" • prevention of stress and aggression	• promotion of understanding of natural cycle • cognitive, social and intercultural learning opportunities with self-grown vegetables • appreciation and responsibility for food	• getting to know the body • what can be done for one's own health • skills to deal with criticism and stress • addiction prevention (alcohol, tobacco, drugs)
Subjects	nutrition, movement and "brain fitness"	cultivation, care and harvesting of agricultural plants	nutrition, movement, stress, addiction
Duration	at least 3 years	1 planting year	12–14 school lessons
Source	www.fit-4-future.ch/de/programm-umsetzung.html	project folder *GartenKinder* and www.landfrauen.info/themen/kompetent-im-alltag/artikel/projekt-gartenkinderlernen-was-gesund-ist/	www.klasse2000.de/das-programm/ gesundheitsfoerderung-und-praevention.html

Fig. 1: **Short introduction to the three programs with the highest total points-scores**

cesses within the facility to promote health. This could be achieved in a school setting, for example, through the sale of healthy snacks at the school kiosk or the provision of lunchtime catering. The provision of play equipment to encourage active break periods and sufficient opportunities for movement could have a situation-based preventive effect in both schools and daycare centers [17, 18]. The results of the evaluation show that all the tested programs contained behavior-based preventive elements, yet situation-based preventive measures were only incorporated in 10 programs. Half of the evaluated programs placed the focus on individual behavior. Situation-based preventive measures were left up to the facility to design.

Involvement of parents

Another point which was somewhat neglected in the field of "methodology and didactics of transference" was the involvement of parents in the program processes. Ten of the evaluated programs had no provision for participation from parents. This could be disadvantageous, as children and adolescents could lack support for the implementation of learning content within the family environment. The *DGE-Fachgruppe Ernährungsbildung* (DGE Expert Group on Nutrition Education) points out that the chances of success for nutrition education is greater through close collaboration between the daycare center/school and the parents [19].

Quality field	Ø points (absolute/ percentage)	Spread of points	
		from	to
Subject content	57 (76 %)	46	71
Methodology and didactics of transference	50 (67 %)	37	68
Formal design	62 (83 %)	50	73

Table. 5: **Points attained in the three quality fields,** presented as absolute and percentage average values and as points spreads (maximum per area: 75 points)

Costs of learning materials

A study carried out in 2005 by Ullrich et al. revealed that the surveyed teachers required templates for lesson materials and information materials, as well as supplementary materials such as e.g. posters. According to the survey, most schools were prepared to spend around €50 for a collection of materials in 2005 [20]. This study illustrated that 18 of the 20 programs offered prefabricated master templates. The prices ranged from "free" to €55, thus corresponding to the price suggestions expressed in the study cited above.

No moral pointing finger

The programs gave a very positive impression in the requirement to avoid any association between food and judgmental adjectives, as well as "moral pointing finger". Nutri-

	Number of programs per points category				
	1	2	3	4	5
1. Subject content					
No reward/punishment through food				18	2
No finger-wagging messages			1	15	4
No classification of food as "healthy and unhealthy"				15	5
Content conforms to DGE/corresponds to other institutions	1	3	4	7	5
No advertising for products, companies or political movements			1		19
2. Methodology and didactics of transference					
Duration of implementation	3	2	6	6	3
Formulation of clear learning objectives			11	5	3
Evaluation/assessment available	5	1		1	13
Integration of target groups	1	3	6	4	6
Teachers can co-design processes			1		19
3. Formal design					
Language (technical terminology, word choice and sentence structure)				6	14
Media (practical elements such as games/posters)	5	4	3	2	6
Target group material (bound booklet desired, no additional burden due to weight in school bag)	1		13	2	4
Master templates available	2		3	2	13
Overall design takes account of age, gender and nationality of target group		1	2	2	15

Table 6: **Selected criteria from the criteria catalogue and number of programs per points category** (5 points = assessment of "completely fulfilled")

tional messages containing terms such as "healthy" and "unhealthy" or "good and bad food" can have an effect contrary to the desired modification of behavior, as foods with negative connotations can become especially interesting to children and adolescents [21, 22]. And aversions to meals and dishes can develop as a result of pressure or prohibition. Reward or punishment through food should therefore also be avoided. The negative effects of "unhealthy" food are not rapidly understood by children, nor are the advantages of healthy behavior. In contrast, perceptions such as e.g. taste are immediate experiences. Desired eating behaviors should therefore be promoted via emotionally positive situations and interactions [4]. Particularly worth mentioning at this point is the "nutrition driving license" by aid; its teaching brochures address the problem of "moral pointing finger" as follows: "Teachers are not know-it-alls or instructors but guides" [23].

Alignment with DGE recommendations

Nine programs were aligned to the DGE recommendations (e.g. the "10 Rules") or named the DGE as a source of additional information. The DGE "nutrition circle" and "three-dimensional food pyramid" were also referenced. The "aid" nutrition pyramid was also frequently cited in the materials (◆ Table 6).

Duration of the program

It has been proven that long-term measures over a period of several school years are more effective than short-term measures over the course of a few days or weeks [13, 17]. This evaluation showed that almost half (9) of the programs evaluated fell within the upper points fields in this criterion (4 points for > 10 school lessons[2]; 5 points for > 10 school lessons and integration into daily schedule). Five points were achieved by *GartenKinder*, *fit4future* and *Klasse2000*, as their concepts provided for implementation of the program over a period of one year (or longer) and thus consolidation within the facility's daily schedule. Six programs had mid-length timescales of 7–10 school lessons (3 points). Two programs had short timescales (2 points: 4–7 school lessons) and three programs required

[2] In this evaluation, a school lesson equals 90 minutes, not the otherwise standard duration of 45 minutes.

less than four school lessons (1 point) (◆ Table 6).

This picture was also reflected in the teacher survey carried out by Ullrich et al., in which approx. 50% of survey respondents allocated between 4 and 10 school lessons per school year to the subject of nutrition [20]. The subject of nutrition and health is given little space in curricula and teaching plans in comparison to other school subjects [1, 19]. Nutritional issues are largely, and only briefly, addressed in subjects such as biology or sports [4, 20]. Reasons for this include a lack of expert and support personnel as well as somewhat inconsistent training for teachers and professionals. There is also insufficient provision of workrooms and school kitchens [1, 19].

Summary

This study tested a newly developed criteria catalogue for the assessment of nutrition education programs on 20 programs for preschool and school nutrition education. The results of this program evaluation showed that all tested programs were suitable for use in the nutrition education of children and adolescents.

The following positive factors were found in the evaluated programs:

- Contents were factually correct in accordance with current scientific knowledge; references were largely provided.
- Materials contained no advertising for products, companies or political movements.
- Teachers were given the opportunity to co-design lessons and program processes and to adapt them to the target group.
- Contents made no reference to reward/punishment through food and did not classify food as "healthy" or "unhealthy".

Further need for improvement was found in three main areas:

- Linking the fields of nutrition, movement and stress management within the program design.
- Inclusion of situation-based preventive measures.
- Involvement of parents in the form of information events or participation.

Short-term actions are less sustainable; it is important to link nutrition to everyday life. Measures and projects should therefore be conceived on a long-term basis. In future, it is essential that school curricula and daycare center plans are more closely associated with preschool and school nutrition education and health promotion to enable teachers and professionals to implement suitable measures.

This study found that there are plenty of measures and materials for preschool and school nutrition education. However, there is a need for research into the quality and effectiveness of programs. Only a small proportion of the available materials and concepts were evaluated. The results of projects' internal evaluations cannot be compared with each other, due to their different bases for evaluation.

The criteria catalogue developed as part of this study may prove useful as a tool for teachers to evaluate nutrition education programs, through self-assessment or by independent experts. The criteria may also be used as guidance in the development of new or in the revision of existing programs. The assessment of programs is always subjective, from the user's perspective. This is tolerable, as the user's subjective view would be the same for all the programs examined by the same user and any mistakes would therefore be subjectively systematic. This criteria catalogue should be subjected to a further evaluation process.

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Conflict of Interest
The authors declare no conflict of interest.

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