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HIGHLIGHTING EDUCATIONAL NEEDS IN A TEACHERS' PROFESSIONAL DEVELOPMENT PROGRAM

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Abstract:
This paper concerns the investigation of the educational needs of a group of teachers, who expressed interest in attending a training program that utilized Digital Educational Content and Open Educational Resources in the teaching of biological concepts in Primary School. The results of the research showed that the teachers wish to be trained in all the subjects of the Curriculum with an emphasis on environmental and disease issues and on new skills and practices that promote the student-centered model. Moreover, they wish for a program to utilize Digital Educational Content and cultivate scientific skills and scientific literacy in students. Regarding the form of the program, participants preferred asynchronous and suggested a duration of 4-5 weeks.

Keywords: educational needs, Biology, primary school teachers

1. Introduction

The design of teacher professional development programs concerns an adult education program, with the peculiarities of course, that a program includes when it concerns a homogeneous target population. It is therefore a decision-making process, which involves defining the objectives, the content, the teaching methodology, and the selection of the evaluation methods of the educational program. It follows specific standards, the observance of which plays a significant role, in the program to be effective for the learning of the participants in it and to activate them so that they function as autonomous learners and think critically (Cranton, 2000).

Specifically, these programs also follow the basic steps of designing an adult education program, which according to Sork and Buskey (1986) include the analysis of the design environment, the investigation of educational needs, the definition of educational purpose, and educational goals, the program construction, the adoption of a specific teaching methodology, the program implementation and the determination of program evaluation methodology.

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The investigation of educational needs is an integral part of the design of the educational program, because it highlights the specific needs of the target group, the satisfaction of which activates participation, reduces dropouts from it, and increases the effectiveness of the program (Karalis, 2005). This section should comprise a description of the general framework, definitions, and principles, primary issues and controversies, background information and contexts, etc.

2. The design of professional development programs and the necessity of investigating educational needs

Before analyzing the process of investigating educational needs, it is advisable to first define the concept of need and then the concept of educational need. The concept of need is often interpreted differently and differs in its meaning depending on the different contexts, while other times it is connected/confused with other concepts such as desire (Vergidis, 1999; Queeney, 1995).

Desire is not necessarily a need and concerns the motivation to participate in a program due to the interest in it (Karalis, 2005). On the other hand, need is expressed as a deficiency or deficit between a desired or more widely accepted situation or condition compared to the existing one (Queeney, 1995). Moreover, need is the interest or motivation to participate in a program due to the subjective finding by the individual of the lack in relation to the fulfillment of a role.

Knowles (1970, p. 85) was one of the first theorists of adult education to deal with the concept of educational need, which he defined as "*what a person should learn for the benefit of himself, an organization or society, the gap between the existing level of qualifications and a higher level of qualifications*". In addition, Jarvis (2004) advocates that the need for learning arises mainly when the individual realizes his/her deficiency or when a new experience does not fit into the existing individual reference system. Finally, Karalis (2005) indicates educational needs come as a result of the individual's effort for personal and/or professional development and are expressed in relation to knowledge, skills, attitudes, and deficit coverage that the individual experiences in relation to them.

Based on the degree of awareness of educational needs by the trainees, Vergidis (1999; 2021) proposes the following typology of educational needs:

- conscious and explicit,
- conscious and implicit,
- latent.

In the first two categories, there is a high degree of awareness of the target population but in the second the needs are expressed implicitly and in the third, the trainees are not aware of its needs. Furthermore, it should be mentioned that the success of a program for adult learners and consequently teachers are directly related to the target population and the frame of reference. Regarding the target population data for its characteristics (age, gender, marital status, place of residence, etc.), his level of education (degrees and certificates), as well as any other form of previous education (foreign languages, specializations, training programs), his professional experience (general

professional experience and relevant professional experience) and the special characteristics/qualifications related to the issue of educational intervention should be collected. Reference framework means all the conditions and activities that are directly related to the problem, which is called solving the educational intervention (Karalis, 2005). Thus, the investigation of educational needs is not a random process but is implemented in a systematic and structured way following a specific methodology, which aims to address specific deficits of the target group in relation to the reference framework (Karalis, 2005).

Moreover, educational needs are linked to adult learners' profiles and characteristics, since they indicate preferred ways of approaching learning and acquiring knowledge through methods and techniques that activate the participation of learners, cultivate the emotional relationship of all parts of the educational process and promote interaction, communication, "openness" and respect for all involved (Kedraka, 2009). Based on a humanistic perspective, the teacher, seen as a human being and a "person", is the center of every teaching and learning activity. Thus, the focus could be placed on the importance of his learning needs as a whole -not as just a mere method or technique (Rotidi, Kedraka, Frementiti & Kaltsidis, 2020). The educational needs of teachers in the frame of teaching staff's training in order to upgrade pedagogical skills in formal education focus not only on content but also on innovative approaches and methods of teaching and learning and are linked to the quality of the education provided (Kedraka & Dimasi, 2016).

In addition, the investigation of educational needs is a research process and therefore should collect data with quantitative and/or qualitative methods, which are always selected in relation to the characteristics of the target group and the reference framework. Specifically, quantitative methods are appropriate for explicit and conscious needs, while qualitative is appropriate for latent needs. However, because the investigation of educational needs concerns multiple levels, it is proposed both of the above methods ensure more valid results.

Taking into consideration the aforementioned, teachers' professional development programs should take into account the characteristics, particularities, and wishes of the specific target group, explore trainees' educational needs and actively involve them in the design and implementation of the program, a parameter that is a prerequisite for effective learning. However, it should be noted that educational needs as they arise from their investigation should be prioritized on the basis of (a) the criterion of the importance of needs and (b) the criterion of feasibility; in order to decide as much as possible their satisfaction during the implementation of the training program, which should be constantly adapted to the needs of the participants through systematic evaluation. The investigation of educational needs training should be completed with a "training contract" between trainer and trainees (Knowles, Holton & Swanson, 1998), which makes the trainees co-designers of the program and increases their commitment and active involvement.

3. Research objectives

The purpose of this research was to identify the educational needs of a specific group of teachers, who expressed interest in participating in a training program related to the teaching of biological concepts in Primary School. To design this program, an open-ended and closed-ended questionnaire was constructed, which explored their educational needs regarding the teaching of biological concepts.

4. Method

4.1 Research context and sample

At the beginning of the research, we administrated the bio-STEBI-A instrument to 509 teachers to investigate their self-efficacy beliefs regarding the teaching of biological concepts in Primary School (Tzovla & Kedraka, 2020a). It included 13 items of the Personal Biological Teaching Efficacy Belief (PBTE) subscale of bio-STEBI-A and measured teachers' personal self-efficacy beliefs for teaching biological concepts and 11 items of the Biological Teaching Outcome Expectancy (BTOE) subscale of bio-STEBI-A, which measured the outcome expectancy from the teaching of biological concepts. Utilizing the research results and the conclusions of the initial research, a short questionnaire was designed and sent to the teachers that investigated their educational needs regarding the teaching of biological concepts in Primary School.

Of 509 teachers, who participated in the initial survey, 430 expressed interest in participating in the training program. The educational needs instrument was sent to them, to investigate their needs in the design of the program. 289 teachers answered the questionnaire, who was the sample of the present research. Of these, 214 were female and 75 were male, 48 were aged up to 30 years, 78 were 31-40 years old, 70 are 41-50 years, and 93 were over 50 years. Of the participants, 53 had 0-5 years of teaching experience, 18 had 6-10 years of teaching experience, 124 had 11-20 years of teaching experience, and 94 had more than 20 years. 55 were graduates of Pedagogical Academies and 259 were graduates of university and 158 had postgraduate studies. 111 had taught in the first and second grade of Primary school, 125 in third and fourth, and 175 in the fifth and sixth grade of Primary school. The majority of them (158) had attended the "Humanities" Orientation Group of the Last Grade in Lyceum. Moreover, 203 liked the subject of Biology in High School, 236 had good and very good performance in it and 132 had attended it as an elective course. In addition, 162 had attended 1-2 Biology classes in their basic studies. Of them, 61 answered that they did not help them at all to improve their self-efficacy beliefs and 89 answered that they helped them a lot. Finally, 206 answered that they have not attended any training program related to the teaching of biological concepts and the vast majority (241) answered that they are very interested in attending such programs.

4.2 Research instrument

The questionnaire, which explored the educational needs of teachers consisted of six (6) questions. Four (4) of them were closed-ended and two (2) open-ended. Specifically, the questionnaire consisted of 2 multiple-choice questions, graded on the Likert scale. The statements concerned: a) the thematic units of the biological concepts, which are included in the Curriculum of the Primary School and in which the teachers would like to deepen their knowledge and b) teaching methods and practices that the participants would like to cultivate to support the teaching of biological concepts. In addition, it contained two (2) closed-ended multiple-choice questions concerning a) the preferred form and b) the preferred duration of the distance learning program and two (2) open-ended questions concerning a) the specific needs that the participants would like to satisfy in the training program and b) the formulation of conditions, which limit the dropout of it.

5. Results

5.1 Analysis of closed questionnaire questions

Table 1 presents the results of the descriptive statistics of the needs of the participants in the research on the thematic units in which they wish to keep their knowledge. The majority of participants (77.8%) answered that they want to deep into environmental issues/problems and it is worth noting that in this topic no one answered that they are not interested at all. Additionally, an equally significant percentage (76.8%) expressed the desire to train in issues of human health, 70.6% noted the topic of Ecology and 69.9% stated the topic of systems of the human body.

Table 1: Thematic units of biological concepts, in which they want to delve deeper (N = 289)

	Not at all	**Few**	**Enough**	**Very**	**Very much**
q1.1 Human health	0,3%	3,5%	19,4%	30,4%	46,4%
q1.2 Systems of the human body	0,7%	7,6%	21,8%	33,9%	36,0%
q1.3 Ecology issues	1,4%	7,6%	20,4%	32,9%	37,7%
q1.4 Animals	1,4%	15,9%	29,1%	32,5%	21,1%
q1.5 Plants	1,7%	14,5%	30,1%	32,2%	21,5%
q1.6 Inorganic organisms	7,3%	18,7%	37,0%	23,5%	13,5%
q1.7 Evolution of species	2,4%	10,7%	30,1%	27,7%	29,1%
q1.8 Environmental issues/problems	0,0%	5,9%	16,3%	24,9%	52,9%

Table 2 presents the results of the methods and practices those participants wish to cultivate in order to support the teaching of biological concepts. It seems that all the proposals gathered very high percentages of interest with higher methods and practices of inquiry learning (81.3%) and the use of multiple sources (81%) in the teaching of biological concepts. However, the range of teachers who wish to cultivate skills in planning, organizing, implementing, and evaluating a lesson plan related to the teaching of biological concepts in Primary School is also very high (76.5%), while an equal percentage (76.1%) wants to cultivate skills related to collaborative learning and learning in authentic contexts.

Table 2: Skills they wish to cultivate to support the teaching of biological concepts (N = 289)

	Not at all	Few	Enough	much	Very much
q2.1 Design, organization, implementation, and evaluation of a lesson plan related to the teaching of biological concepts in Primary School	0,3%	3,1%	20,1%	33,2%	43,3%
q2.2 Organization of interdisciplinary activities	0,3%	4,2%	20,1%	31,1%	44,3%
q2.3 Inquire learning	0,3%	3,8%	14,5%	32,9%	48,4%
q2.4 Cooperative learning	0,3%	3,1%	20,4%	32,5%	43,6%
q2.5 Utilization of multiple sources (printed material, utilization of digital technologies, Digital Educational Content, Open Educational Resources, etc.)	0,0%	3,1%	15,9%	33,2%	47,8%
q2.6 Learning in authentic contexts	0,3%	4,8%	18,7%	34,9%	41,2%
q2.7 Flipping Classrooms	0,7%	6,6%	18,3%	30,4%	43,9%

Finally, in the question concerning the preferred form of the program, the majority chose the asynchronous form (59.9%) and in the question, concerning the duration of this program, the largest percentage (39.9%) chose 4-5 weeks.

5.2 Analysis of open questionnaire questions

In decoding the posts, we used the content analysis method (Bryman, 2016; Creswell, 2008) and proceeded to codify the comments, identify categories and present the findings. During the analysis of the answers, 10 thematic axes were identified in each of the two (2) open-ended questions. Tables 3 and 4 list the thematic axes, which emerged from the analysis of each of the 2 open-ended questions and indicative excerpts of answers per thematic axis (T = Teacher).

Table 3: Thematic axes of the needs that the participants wish to satisfy in the distance professional development program (N = 114)

Thematic axes	Quotes
Implementation in the classroom	T65 *"I would like the program to contain ideas for implementation in the classroom."* T163 *"To provide me with the necessary knowledge, which is useful and practical and can be applied and utilized properly to classroom reality."*
Utilization of digital educational content	T118 *"For example ... refer to videos, experiments, constructions, online activities."* T230 *"Informing on digital educational content related to Biology topics that can be used in the classroom."*
Creating flexible teaching proposals	T11 *"… Flexibility in planning, organization, implementation, and evaluation of a lesson plan that concerns the teaching of biological concepts in the Primary School."* T198 *"Specific teaching proposals with the possibility of their extension."*
Presentation of good practices	T8 *"There should be good teaching practices* T219 *"… examples of some good and original practices that have been used in the teaching of specific biological concepts."*
Interdisciplinary approach	T14 *"Teaching in combination with other courses."* T53 *"Interdisciplinary approach to biological concepts."*

Connection with current issues	T85 *"I lack confidence when I teach concepts of biology and their connection to current issues."* T206 *"Understanding and managing biological concepts in everyday life."*
Compatible material with the interests and age of the students	T86 *"Can be applied to students of all ages and levels"* T181 *"To be compatible with the interests and needs of the students (attractive, current educational material)."*
Familiarity with methods and practices	T17 *"To increase my knowledge about the content of the concepts but also about their teaching methods."* T111 "*I want to meet innovative ideas, proposals, and methods."*
Interaction and exchange of ideas with other participants	T68 *"Interaction with participants."* T119 *"Activities can be planned and posted together in collaboration with teachers per class or subject (all teachers can participate and help each other)."*
Flexibility	T99 *"If we take into account that the trainees are employees and have other social and family responsibilities, it is understandable that there is a lot of pressure ..."* T162 *"I wish there was flexibility in the hours and days of the program."*

Table 4: Thematic axes of the conditions that must be met in order not to leave the program (N = 223)

Thematic axes	**Quotes**
Asynchronous	T146 *"…to have an asynchronous form and not to have a strict schedule of each unit."* T152 *"Or entirely by asynchronous form"*
An interesting, flexible, well-structured program	T16 *"To be well-structured, interesting, and to meet the needs/requirements of the participants."* T102 *"To be user-friendly, not destructive, to be flexible for the monitoring time and with short tasks, to be interesting ..."*
Focused not only on theory	T8 *"In my opinion, a distance professional development program should offer participants, in addition to theoretical knowledge, useful and essential information that can be used in the classroom, so as to pique their interest."* T222 *"The theory is good, but when it takes up a lot of the program it gets tired."*
Non-stressful in terms of time and delivery of work	T2 *"His material should be adjusted in time so that an employee can support it, without much pressure."* T64 *"Do not put pressure on its implementation activities in terms of time!"*
Managed study	T24 *"The material should not be too chaotic, and should not require many hours of reading."* T51 *"Not a lot of study."*
Linking to the classroom	T76 *"The activities that will be done should be simple and understandable and can be applied in the classroom reality."* T267 *"Properly targeted and well-presented knowledge that is directly related to the educational practice."*
Feedback from the educators	T3 *"Possibility for immediate feedback and frequent communication with the educators, so you do not lose interest."* T287 *"Finally, there should be communication among teachers and educators for any questions and discussions."*
Active participation of teachers	T4 *"Active involvement of the participants."* T7 *"There should be the possibility of active participation of the participants"*
Certificate	T63*"It could be a good idea to an attendance certificate."* T188 *"Some relevant certificate."*
Planning activities and implementation in the classroom	T231 *"Design and implementation in the classroom of teaching proposals."* T312 *"To design and implement activities in the classroom with digital educational material."*

6. Discussion

The analysis of the closed and open-ended questions of the educational needs questionnaire showed that the participants want to deepen their knowledge in the curriculum about the biological concepts related to environmental issues/problems, Ecology and the systems of the human body, and human health. It is remarkable that all the proposed topics were of interest to them. Regarding the methods and practices that the participants wish to cultivate for the teaching of biological concepts, all the proposed methods and practices gathered high percentages of interest with small differences between them, promoting the cultivation of inquired learning, the utilization of multiple learning the design, organization, implementation, and evaluation of a lesson plan related to the teaching of biological concepts in Primary School and collaborative learning. Regarding the form of the program, participants preferred asynchronous and suggested a duration of 4-5 weeks.

The above indicates that participants are interested in biological concepts and are particularly aware of issues that plague the planet such as environmental issues and disease issues (Tzovla & Kedraka, 2020b). Respectively, their interest in training in new knowledge, pedagogical perceptions, and practices refer to a group of teachers who are interested in incorporating new methods in their teaching methodology and in their daily educational practice, to structure learning activities and change their beliefs and attitudes about the learning process, that is in line with Guskey (2002)'s teacher professional development model.

Specifically, the high range of teachers who noted that they wish to be trained in inquired learning activities shows that they have realized the need to adopt the student-centered model, and the cultivation of scientific and literacy skills in students, as noted by Avery and Mayer (2012) and the Organization for Economic Co-operation and Development (2007). In addition, the need to utilize multiple learning resources indicates the anxiety of teachers to meet the needs of the times and to follow the new trends in Pedagogy, according to which multiple learning resources are an effective tool for teaching biological concepts, as they contribute to their better understanding (Muppudathi & Pazhanivelu, 2012; Tzovla & Kedraka, 2020b). Furthermore, the expression of the need to train participants in skills in designing, organizing, implementing, and evaluating a lesson plan highlights their interest in a complete and structured approach to biological concepts, covering all aspects of teaching.

The needs expressed by the research participants are explicit and conscious needs. However, there may be conscious and non-expressive needs as well as latent ones (Karalis, 2005; Vergidis, 2021) that were not stated in this research. Therefore, the question that arises is how these could be explored, and this could be the subject of the following research.

7. Conclusion

In conclusion, it is worth noting that there is an increased interest both in the teaching of biological concepts in Primary Education, in topics that are relevant to the active citizen and in skills related to the new data of Pedagogical Science, and in the use of digital educational content and OER in their teaching. Based on the results of the initial research and after investigating the educational needs of teachers, who expressed interest, a program was designed and implemented exclusively for in-service elementary school teachers, with the aim of improving their self-efficacy beliefs in teaching biological concepts (Tzovla & Kedraka, 2021; Tzovla et al., 2021a; Tzovla et al., 2021b). This project is innovative, as the design and implementation of a distance learning program for in-service elementary school teachers, which investigates before its implementation the educational needs of teachers who expressed interest in attending it, has not been applied at the Greek and international level.

The fact that the distance learning program completed a high rate of participants advocates that the investigation of educational needs plays a significant role in monitoring and completing a program, as it is structured according to their personalized educational needs so that it is targeted and satisfies them as much as possible (Karalis, 2005; Vergidis, 2021).

Conflict of interest statement
The authors declare no conflicts of interest.

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