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Textbooks and Teaching Materials in Rural Schools: A Systematic Review

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≈ This paper presents the results of a research project whose main purpose is to analyse the concept of multigrade teaching resources and the teaching materials used by teachers in rural schools, in particular the role of textbooks. The use and dimensions of teaching materials are studied in order to promote inclusion and learning in multigrade classrooms with children of different ages mixed together. The present systematic review aims to identify and analyse all of the research papers published internationally on teaching resources in rural schools for the Web of Science and Scopus databases (from 1992 to 2021) and Google Scholar (between 2010 and February 2021). Due to the dearth of publications focused on the topic of study, the reviewed articles have broad inclusion and exclusion criteria. This gives relevance and an innovative character to the research, allowing us to objectify the state of the question on multigrade didactic materials and their relation to teaching-learning processes. From a total of 332 research papers in the field of rural multigrade teaching identified for further analysis, only papers that met the inclusion and exclusion criteria and passed all phases of the PRISMA flow diagram were used ($N = 33$). Some research publications contributed to identifying opportunities and needs, and to suggesting criteria to be taken into account for the selection and creation of materials to promote inclusion and active learning methodologies. The first results show the need to create one's own materials that analyse the reality of these schools, as well as the need to personalise and adapt printed or digital textbooks and other teaching materials in order to involve the students actively in the learning process and to respond to the needs of rural students in multigrade classrooms.

Keywords: multigrade classrooms, rural school, teaching material, textbooks, systematic review

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Učbeniki in učna gradiva podeželskih šol: sistematični pregled

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≈ V prispevku predstavljamo rezultate raziskovalnega projekta, katerega glavni namen je bil analiza koncepta kombiniranih učnih sredstev in učnih gradiv, ki jih uporabljajo učitelji podeželskih šol, zlasti vloge učbenikov. Uporaba in razsežnosti učbenikov so preučene z vidika spodbujanja inkluzije in učenja v kombiniranih oddelkih z otroki različnih starosti. Sistematični pregled skuša prepoznati in preiskati vse mednarodno objavljene prispevke o učnih gradivih v podeželskih šolah z uporabo podatkovnih baz *Web of Science* in *Scopus* (1992–2021) ter *Google Učenjaka* (2010–2021). Zaradi pomanjkanja publikacij, ki bi se osredinjale na izbrano tematiko, imajo pregledani članki blaga merila glede vključenosti oz. izključenosti. To daje raziskavi relevantnost in inovativnost, kar nam dopušča, da objektiviziramo stanje glede kombiniranega didaktičnega gradiva in njihovo razmerje do procesov poučevanja/učenja. Od skupno 332 člankov s področja poučevanja v kombiniranih oddelkih podeželskih šol, ki smo jih vključili v obdelavo, so bili nazadnje uporabljeni samo prispevki, ki so zadostili merilom in prestali vse faze diagrama PRISMA ($N = 33$). Nekatere raziskovalne publikacije so prispevale k prepoznavanju priložnosti in potreb ter k predlaganju meril, ki bi jih bilo treba upoštevati pri izboru in ustvarjanju gradiv za spodbujanje inkluzije in metod aktivnega učenja. Prvi izsledki kažejo potrebo po oblikovanju lastnih gradiv, pri čemer bi se preučilo samo realnost teh šol, pri tem pa tudi potrebo po personalizaciji in prilagoditvi tiskanih ali digitalnih učbenikov ter drugega učnega gradiva, da bi lahko učence aktivno vključevali v učni proces in se odzivali na potrebe podeželskih učencev v kombiniranih oddelkih.

Ključne besede: kombinirani oddelki, podeželska šola, učno gradivo, učbenik, sistematični pregled

Introduction

One of the main characteristics of rural schools is the grouping of students into multigrade classrooms, either for structural reasons or by choice. This configuration requires a response adjusted to the diversity of the classrooms and the rural context in order to take advantage of this context and the differences between students, thus enriching joint learning (Boix & Bustos, 2014; Domingo-Peñafiel & Boix, 2015; Santos, 2011) by considering different aspects of multigrade didactics, such as teaching resources to support the methodology used. The objective of the present research is to deepen the conceptualisation and the state of the art of teaching materials in the multigrade classroom of the rural school. The research is necessary due to the lack of publications focused on this topic despite its importance, as manifested in various publications (Coladarci, 2007; Fargas-Malet & Bagley, 2021). In order to help fill the research gap on this topic, the study presents a systematic review of the main findings of the existing literature on the subject, defines the term “multigrade teaching resources”, and provides relevant information on the typology of resources used in the multigrade classroom, as well as on the needs and opportunities in this regard and the criteria for its development, thus making the study relevant.

Given the heterogeneity of multigrade classrooms in rural schools, working together with students of different ages and characteristics and taking advantage of their pedagogical and inclusive value involves changes in methodology and requires teaching-learning processes that are different from those used in single-grade classrooms. Teachers have a very important role to play in ‘multigrade didactics’ (Bustos, 2007), implementing innovative and globalised teaching strategies that take into account the contextual particularities of the rural school. These methodological changes must be accompanied by didactic materials that allow the development of multigrade teaching, with adaptation of the teaching response to the diversity of the classrooms being essential (Boix & Bustos, 2014). It is crucial to avoid the hegemony of actions carried out in graded classrooms (Terigi, 2009) that do not fit this school model. In many cases, this is what happens with textbooks, which are one of the most used resources. Textbooks are created from a graded and homogeneous school model based on the curriculum and education legislation. Furthermore, they condition the teaching methodology according to the commercial activity of the publishing sector (Fernández Palop & Caballero García, 2017). This does, however, depend on the national education policy in some countries, as there is evidence of the creation of some textbooks for teachers and students in rural schools, as shown in certain studies in South America and Finland (Da Silva & Cardoso

Filho, 2017; Juárez, 2012; Santamaría Pérez, 2021) indicating that governmental guidelines have had an impact on school. Although such textbooks provide guidance, they do not fully reinforce the pedagogical value of the multigrade classroom, nor are they perceived by teachers as a useful resource adapted to the context and the multigrade classroom (Boix & Bustos, 2014; Bustos, 2007). For teaching material to be useful, it requires reflection by teachers in order to adapt it to the methodology used and the characteristics of the students in the classroom (Boix & Bustos, 2014; Santos, 2011). It also requires teacher training that is not based on urbanised patterns, so as not to import a standardised and graded teaching model. Rural classrooms require a specific pedagogical model due to their organisational peculiarities, whereby teaching and learning processes, as well as the educational response, have to be adapted to the maturity and learning level of each student in confluence with other students of different ages (Terigi, 2009).

The lack of specific and adequate didactic resources to address teaching and learning in multigrade classrooms, together with the lack of knowledge of their nature, is a recurrent problem that is highlighted in research and publications in the field of rural education and multigrade didactics (Brown, 2010; Juvane, 2005; Msimanga, 2019). The creation and adaptation of materials is therefore a challenge for teachers in rural schools. The invisibility of the rural school is evidenced by the scarcity of published studies on the subject, despite its obvious importance (Bagley & Fargas-Malet, 2021). There are no research activities focusing exclusively on the field of multigrade resources (Coladarci, 2007; Fargas-Malet & Bagley, 2021; OECD, 2019). The main focus of the present article is to review internationally published research in order to define the concept of multigrade materials and examine their reality in practice, as well as to identify opportunities and needs, and to contribute to the generation of knowledge on the subject. The theoretical review enables us to make proposals for the future improvement of teaching-learning processes and the task of teaching based on a critical documentary analysis of the reviewed publications.

The present paper complements previous publications in this journal about printed and digital textbooks (Ivic, 2019), as well as another systematic review (Devetak & Ferik Savec, 2020), by presenting unpublished research from a systematic international review on teaching materials and textbooks in the context of multigrade classrooms in rural schools. According to a recent scientific literature review about research on rural schools (Fargas-Malet & Bagley, 2021), this is a relevant issue that needs to be addressed.

The relevance and role of textbooks and teaching materials in multigrade rural classrooms

The organisation of children of different ages in the same classroom involves a change in the methodological approach to teaching and learning. Didactic proposals must be multigrade and contextualised, must consider the rural school environment and the territorial dimension of the curricular proposals, and must be interdisciplinary and meaningful (Boix & Domingo-Peñañiel, 2019). This methodological change means that teachers also have to create and adapt resources to this way of teaching, based on the proposals developed and the specific didactics of multigrade classrooms (Bustos, 2007). This requires a firm conviction on the part of teachers regarding the pedagogical value of multigrade classrooms and the positive interactions that take place in such classrooms. In the teaching and learning process in the multigrade classroom there are two components that can be considered basic: learning activities and teaching resources (Boix & Bustos, 2014). Special emphasis is placed on teaching materials and their variety in order to be able to address and provide an adequate educational response to the full diversity of students in the multigrade classroom. However, the mere presence of teaching materials does not guarantee the quality of teaching and learning. The materials must support didactic strategies in an effective way in order to guide learning. In any case, it is necessary to emphasise the role of teachers in adapting them to the educational situation and to the didactic objectives. This aspect is even more relevant in the case of rural schools when, through teacher reflection, it comes to adapting, creating or designing materials that promote the pedagogical value of the multigrade classroom and its rural context, allowing them to respond to the diversity of students in terms of equity (Cornish, 2006; Domingo-Peñañiel & Boix, 2015). Materials must be adapted to the specific contextual requirements of each classroom. Textbooks and other multigrade materials need to be varied and diversified to help ensure educational success in multigrade classes (Santos, 2011). Moreover, they should be properly organised and arranged in the classroom so as to facilitate learning and ensure interaction between students (Joubert, 2010).

Other studies highlight the inadequacy of existing multigrade resources as a challenge for teachers in multigrade classrooms. Such resources represent one of the needs of rural schools in their commitment to multigrade learning (Boix & Bustos, 2014; Fargas-Malet & Bagley, 2021; Juvane, 2005; McEwan, 2008) and indicate a line of research still to be investigated. This has been taken into account in the approach of the present research, which also highlights

training needs and the shortcomings of initial training and throughout professional development. Teacher training should contribute to a belief in the pedagogical value of multigrade classrooms and their pedagogical possibilities, taking multigrade resources as an indispensable aspect of multigrade didactics. Little (2005) argued that materials and resources should be created specifically for multigrade classrooms. It is important to teach using materials adapted and contextualised to the existing reality in these schools, to the multigrade classroom and the rural context, and not to simply use single-grade materials and textbooks that are not adapted to these conditions. In general terms, resources are focused on the achievement of curricular learning and do not usually take into account the particularities of the contexts. It is necessary to review these resources with all schools and their educational needs in mind in order to provide support to teachers for their adaptation or development.

Interest in the rural school as an object of study has re-emerged in the twenty-first century, recognising the value of its school model and didactics. Nonetheless, there is still a lack of existing repositories of textbooks, multigrade materials and publications on the subject. There is a need to disseminate and analyse materials that have been created in this context and to guide teachers in overcoming the difficulties associated with the creation of teaching materials for multigrade classrooms (Brown, 2010). Teachers should be encouraged to reflect on the existing materials, to assess their suitability and to create their own materials adapted to the characteristics of their multigrade classroom and rural context. It is difficult to find materials that are adapted (Genc, 2016) and having guidelines to assist their creation or adaptation would also facilitate their development (Petrie & Darragh, 2018). A more detailed analysis of textbooks and teaching materials is needed in order to shed more light on the current state of this issue. The present review therefore provides a detailed examination of how the meaning of multigrade teaching resources is currently conceived in the literature and considers the types of materials used in rural schools, especially textbooks, and their role in teaching and learning processes. It analyses the needs and opportunities related to the subject and proposes criteria for the creation, adaptation or selection of textbooks and other materials to suit multigrade education and the context. The study also aims to highlight the importance of multigrade resources as a significant aspect to be considered by teachers when making innovative classroom proposals. The aim is not only to describe the state of the art, but also to implement future improvements in teaching practice.

The present study was conducted in order to examine all of the papers published on the subject by recognised scientific journals in Web of Science

(WOS) and Scopus up to the time of the search (1 February 2021). After searching the databases, the results obtained on teaching materials in rural schools dated from 1992 to 2021. Due to the scarcity of studies on the topic, and in order to expand the references and information from popular sources, search results from Google Scholar were added in order to examine the most recent publications, appearing from 2010 to February 2021. The time range for Google Scholar had to be narrowed due to the large number of results, so that only those from the last ten years are selected. The aim was to examine the evidence on multi-grade teaching materials in rural schools in order to establish a definition of materials for rural multigrade classrooms and to examine the state of the art.

Based on this research focus, the following research questions can be formed:

- What are the characteristics of the research published on textbooks and teaching materials used in rural schools? What are the main findings that could help to determine how multigrade teaching resources are conceptualised? What is the state of the art?

Our research objectives are the following: (1) to describe and analyse the concept of multigrade resources; (2) to review and analyse the types of didactic materials, especially textbooks, used by teachers in rural schools, as reflected in the selected publications; (3) to identify opportunities and needs regarding didactic materials; and (4) to identify the dimensions and criteria that a resource must have in order to be multi-grade and pedagogically significant.

Method

A systematic review was undertaken to describe, through a conceptual theoretical investigation, the nature of multigrade resources and the typologies that can be found in multigrade classrooms according to studies published internationally in the selected databases. Aspects to be considered in future research related to innovative proposals on teaching resources and their dimensions are also highlighted. The systematic review configures a qualitative research methodology that is appropriately adapted to the achievement of the proposed objectives. It systematically and objectively summarises the results of various qualitative and quantitative studies in order to answer the research questions and objectives posed (Sánchez-Meca & Botella, 2010; Smith et al., 2011).

Search strategy and parameters

In the first step of the study, the article selection criteria and search parameters were determined. The inclusion criteria for papers were as follows: (1) the studies were related to multigrade teaching materials or resources in rural schools; (2) all of the studies were selected for WOS and Scopus and, from the period from 2010 to February 2021, for Google Scholar; (3) **the studies were reported** in languages that are intelligible to the researchers, i.e., English, Spanish, Portuguese, Catalan or French; 4) due of the international nature of the study, which investigates all research focused on the types of teaching materials used by rural teachers, their use, problems and needs, as well as the conceptualisation of such materials, all of the relevant studies were included regardless of their geographical origin; the papers included were open access articles listed in the databases used and accessible to the researchers; and (5) all relevant primary studies on the subject were included, but systematic reviews were excluded. All publications in the scientific field of social sciences, the area of multigrade teaching or education, and the subarea of materials or resources in the rural education context were included in the research.

The WOS, Scopus and Google Scholar databases were reviewed with the same search parameters. Google Scholar was included in order to broaden the range of publications of a more informative nature and thus provide more information. Due to the scarcity of more recent results, the last ten years were used in Google Scholar, with particular attention devoted to the most current results.

A systematic search was carried out by combining Boolean indicators using the main concepts that allow definition of the object under study and are linked to the object of analysis. With the aim of finding the most suitable articles for the object of study, the strategy of searching with more specific terms was used, also taking into account possible orthographic or synonymous variations. Thus, AND/OR operators and the wildcard (*) were used to find possible endings of the same word. Finally, the following search string was set up: multigrade AND (teach* OR class* OR education*) AND (material* OR resource*). This combination of terms related to the object of study was chosen as it provided the best and most accurate results. The search was done for abstract, title and keywords. This search allowed us to find articles in the field of social sciences, and specifically rural education, that relate to teaching materials in the multigrade classroom.

A total of 332 papers were identified. After deleting duplicates, 294 sources remained. The final selection was conducted using the PRISMA (Preferred

Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram (Moher et al., 2009), which ensures the quality treatment and selection of research articles and data, as well as enhancing the rigour and reliability of the obtained results (Figure 1). Content analysis was performed on the final 33 selected studies related to teaching materials in the multigrade rural school context.

Filtering in the paper selection process and data extraction

For the paper selection process, the phases of the PRISMA flow chart were followed (Moher et al., 2009). The research procedure was characterised by an initial heuristic phase based on the identification of all publications from the selected databases. In the screening phase, the results were filtered out excluding duplicates. Results that did not meet the search objectives were also removed by the authors after reading the title, abstract or keywords. In the subsequent adaptation phase, the full text of the resulting articles was reviewed based on predetermined selection criteria for their possible relevance. Finally, in the last phase of the process, only the publications to be analysed in the systematic review were included.

The resulting articles were recorded in descriptive tables or guides for qualitative synthesis. From there, the information was managed and classified with Mendeley's programming and Excel tables. An initial phase of data reduction was carried out with Atlas Ti through a system of codes and categories, performing various descriptive analysis actions (reporting of codes, frequency of events, citations, memos and word clouds) in order to organise and describe the information obtained. In the second phase, actions were carried out to critically interpret the results (analysis of code networks, analysis of interpretation of citations or tables of co-occurrences) in order to enable theorisation. A critical and rigorous analysis of the 33 publications was carried out, taking into account ethics and respecting the positions of the different authors.

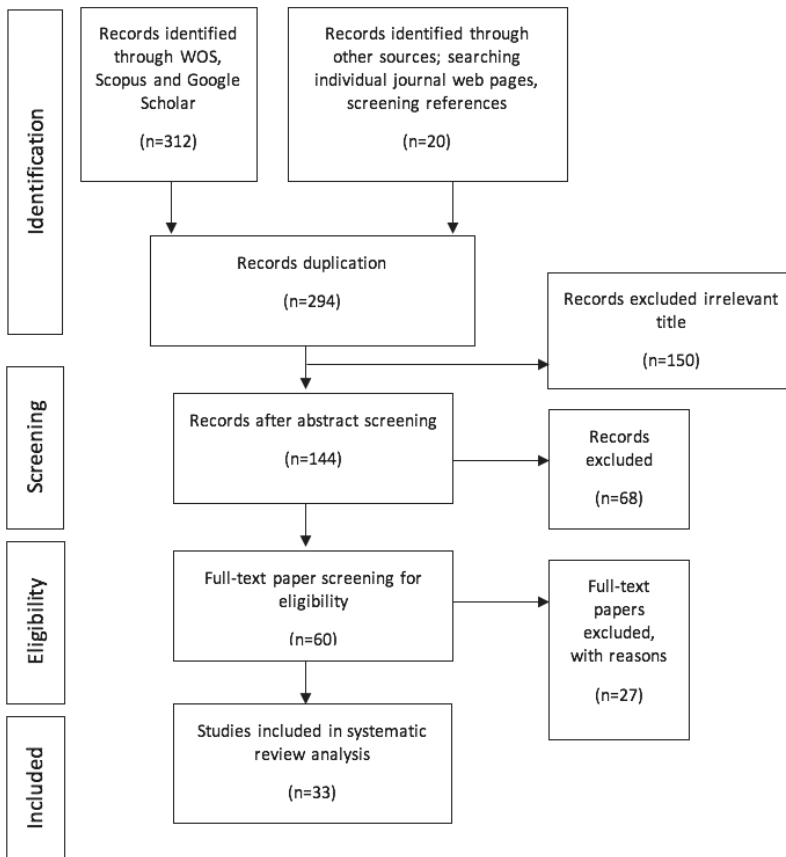
Results and discussion

As reflected in the flow diagram (Figure 1), only 294 of the 332 articles initially identified in the databases passed the screening phase, eliminating duplicates (38 records). A further 150 articles were excluded due to irrelevant titles. After reading the abstract, and based on the inclusion/exclusion criteria, 68 studies were withdrawn from complete analysis, leaving a total of 144 publications. The main reason for rejecting the aforementioned 68 papers was that their content was repetitive or unspecific, or they contained information

linked to the terminology of the subject but unrelated to the objectives of the present study. In addition, some of them were not in open access in the databases and the full text could not be obtained by the researchers. Consequently, only 60 articles passed the eligibility phase. Of these, a further 27 papers were excluded after reading the full text, mainly because their content deviated from the central question and were not aligned with the objectives and focus of the research. Finally, in the last phase of the process, a total of 33 published papers were included in the systematic review analysis.

Figure 1

PRISMA flow diagram for the present study



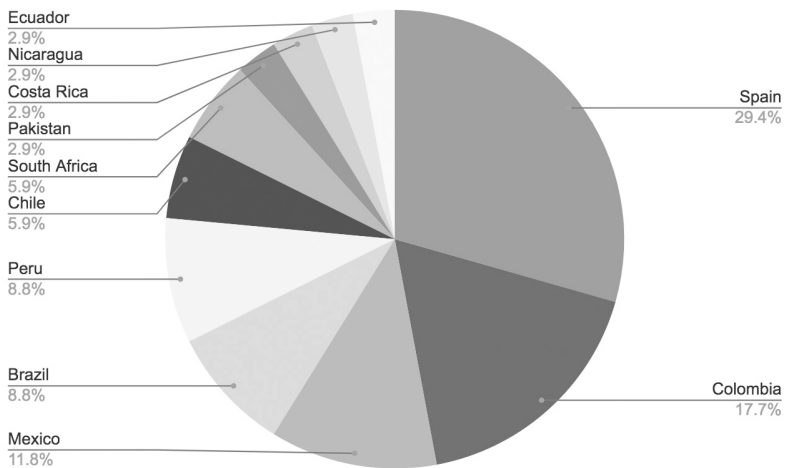
Note. Adapted from Moher et al., 2009.

Characteristics of the analysed studies

Due to the international focus of the systematic review, articles were included regardless of their geographical origin, as noted above. The final studies selected present contextual characteristics that must be taken into account. The international articles included were mostly based on research conducted in Spain, Colombia, Brazil, Peru and South Africa, in that order (Figure 2). This indicates which countries have devoted more attention to the topic of multi-grade resources in their research on rural education and multigrade didactics.

Figure 2

Country of origin of the reviewed articles.



The languages of the articles coincide with the majority language of the countries of origin shown above. Most are written in Spanish ($N = 22$), followed by English ($N = 9$) and Portuguese ($N = 2$). There are no selected records in other languages in the check result, which shows the appropriate choice of selection criteria in terms of the language and country of origin of the articles.

Most of the papers reviewed belong to education journals ($N = 21$), followed by doctoral theses or university projects, and finally lectures and books (Table 1). This theoretically supports the research, as most of the studies belong to peer-reviewed education journals.

Table 1

Type of papers included in the sample

Total sample of papers = 33	
Source	<i>N</i>
Education journals	21
Theses	5
Bachelor's degree final theses	3
Postgraduate final theses	2
Conferences	1
Books	1

The majority of the papers reviewed deal with the subject of multigrade teaching resources in a superficial manner, so an exhaustive review of each of them was required (Figure 3). Most of them are related to multigrade didactics and teachers (48.6%), followed by those referring to resources in general (20%) and those of a specific nature (25.7%). The publications highlight the use of Information and Communication Technologies, followed by textbooks (Figure 4), either printed or digital. These are the resources most frequently used in multigrade classrooms. In the present review, special emphasis is therefore placed on textbooks, both printed and digital. The analysis of these data highlights the lack of specificity in the treatment of resources in rural schools, with even less attention being devoted to multigrade schools.

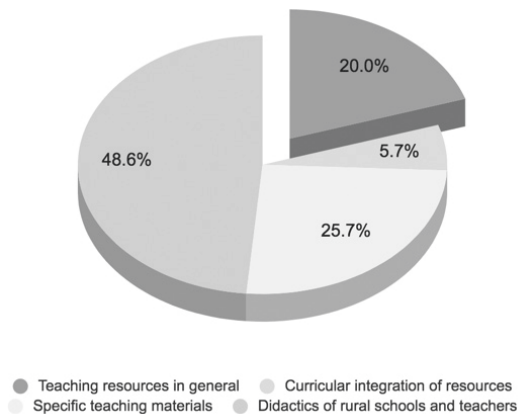
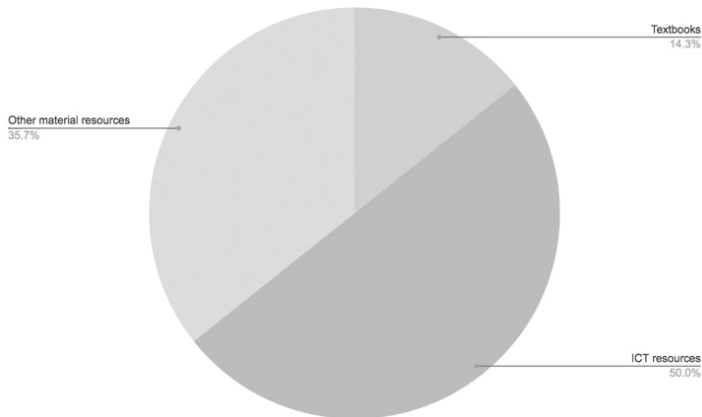
Figure 3*Focus of the papers reviewed*

Figure 4*Main teaching resources in the papers*

Regarding the design of the studies, most of them are qualitative (75.5%), others use mixed methods (15.5%) and a minority are quantitative (9.1%). This reflects not only the great variety of studies and methodologies on the topic, but also the need for more studies of a mixed type, including both quantitative and qualitative data, in order to obtain data of a diverse nature that complement each other and enable an increase of knowledge on the subject.

Characteristics of the studies analysed in terms of content

The analysed studies were divided into four sub-sections of the main research fields: (1) the concept of multigrade teaching resources, theoretical bases and the state of the art; (2) the types of didactic materials, especially textbooks; (3) the opportunities and needs based on multigrade resources; and (4) the dimensions or criteria that multigrade material and textbooks must have.

The concept and the state of the art of textbooks and multigrade teaching resources

Despite the importance given to multigrade teaching materials for educational improvement and the success of multigrade teaching (Bustos, 2007) in the reviewed publications, the review highlights the fact that there is no explicit and consensual definition of the concept of multigrade teaching resources in the context of rural schools. According to some studies (Brown, 2010; Msimanga, 2019), there is a lack of knowledge about the nature of these resources. Although this terminology is not used, most papers nonetheless present various

proposals to define all of the didactic resources in the framework of multigrade didactics (Coaquira, 2018; López, 2011; Msimanga, 2019; Rahim, 2018). Various terms are used, such as learning resources, support materials like textbooks, learning media, teaching aids, equipment and teaching tools (Juárez, 2012; Msimanga, 2019). From the outset, it is necessary to analyse the terms used to designate learning materials, as they are often referred to as instructional materials or self-learning materials, definitions that are more related to one-way, self-directed learning by the learner. It is necessary to use terminologies that relate the materials to discovery-related and active-participatory learning (Newby et al., 1998 in Drinkwater, 2002). The materials must be coherent with the work of the multigrade classroom, avoiding connotations far removed from the work with active methodologies in the multigrade classroom. More contextualised learning in line with the multigrade classroom also implies changes in the type of materials and their connotation.

The review also highlights the fact that textbooks and teaching materials must be as diverse as possible (López, 2011), taking into account multiple intelligences, the diversification of learning styles (Msimanga, 2019), different levels of complexity and forms of presentation (Block, et al., 2017). They can be specifically created for multigrade learning or used in the classroom context for this purpose (Silva et al., 2020). From the information in the various articles, it can be seen how an initial distinction can be made between specifically multigrade materials, such as textbooks or other curricular materials created with the multigrade classroom in mind, and materials that help to promote, improve or facilitate multigrade work through their use and teaching action, even though they are not specifically created for the multigrade classroom; for example, manipulative materials created with elements from the environment. The latter are conditioned by the methodological strategies applied and by teaching planning (Silva et al., 2020). In addition, research indicates that the boundary between didactic materials or resource, activity and strategy is not clear. In some cases, although reference is made to teaching materials, it is evident from the examples that the studies actually refer to classroom methodology (Dávila, 2018). This demonstrates the need to conceptualise and delimit the term teaching materials, so that it is clear what it refers to. Moreover, most of the studies conclude that textbooks and teaching materials should facilitate the interpretation of content and encourage cooperation and interaction between learners of different ages; they must be specific and appropriate to the configuration of multigrade classrooms and their context (Marhot, 2001). The importance of the existence of materials or textbooks in line with the multigrade classroom and the contextual reality of each rural school is highlighted (Boix & Bustos, 2014).

In fact, several authors (García Prieto & Pozuelos Estrada, 2017; Guerra, et al., 2019) refer to textbooks as the main material used in rural school classrooms, classifying children by levels, which is very different from the perspective of multigrade work. More creative use of these materials, based on teacher reflection, is important in order to support classroom projects (Domingo-Peñañiel & Boix, 2015; García Prieto et al., 2017); for example, the adaption of existing materials so that they can respond to all of the students regardless of their characteristics and be useful for supporting active methodologies.

Finally, based on the results and the discussion of the data, an approximation of the definition of multigrade teaching resources in the context of rural schools can be made. Multigrade teaching resources are all those diversified and accessible teaching aids designed to support learners and teachers, and which facilitate and improve teaching and learning processes in multigrade classrooms. They contribute to providing an educational response to diversity by creatively adapting to children, regardless of their age, level of knowledge or competence. They are created or adapted for educational benefit. They must be able to successfully support specific multigrade teaching. They can be curricular in nature, like textbooks, and can either address multigrade teaching itself or have a specific application that contributes to meaningful work according to the methodology used. These are materials that allow us to give a useful, joint and inclusive educational response to all of the students in the multigrade classroom, and that do not respond to homogeneous graded classrooms working separately by grades. They are a concretisation of the general didactic resources adapted to the idiosyncrasies of rural schools, as they must be useful and in line with the nature of the didactic strategies used, which are multigrade, contextualised, interdisciplinary and significant. In this regard, specific dimensions have to be taken into account in the elaboration or use of these resources, so that they are adapted and in accordance with the context, the needs of the classroom and the methodological strategies used to positively promote multigrade. Furthermore, as García Prieto (2015) mentions, it is necessary to move towards deliberate curricular materials. Teaching materials and textbooks should be a resource that is open to decisive teacher intervention and that does not allow for automatic transfer to the classroom. Such materials need adaptations that depend on the context and the group of learners. They must be flexible with regard to the different ages and characteristics of the students in the multigrade classroom, so that they can be revised with the understanding that not all rural schools or multigrade classrooms are the same, thus preventing homogenisation (Domingo-Peñañiel & Boix, 2015; Tomlinson, 2001). In fact, all didactic materials must be flexible so that the teacher can adapt them to each classroom,

to the students and to the circumstances. This aspect is especially relevant in the case of didactic materials referring to rural versus urban schools, where it is also necessary to face and adapt to the diversity of ages that interact in the same classroom, the strategies used in multigrade teaching and the management of time and space to enhance the pedagogical value of the multigrade classroom and the joint circulation of knowledge.

The research also indicates other important considerations for defining the state of the art. Two papers (Msimanga, 2019; Torres et al., 2019) highlight Montessori educational theory as a point of reference for the construction of multigrade materials. This theory attaches particular importance to teaching materials to promote meaningful learning, that is, the materials should encourage learner autonomy and active learning through discovery, and should be flexible and include manipulatives. Most of the studies reviewed find that although teachers strive to develop their own teaching materials, many of them do not know how to design materials that are appropriate in this context (Brown, 2010; Bustos, 2014). The works consulted highlight the need for teaching materials and textbooks to be specific to multigrade teaching, taking into account the inclusive and contextual dimension, and improving knowledge of the territory and the children's sense of identity. They also emphasise the need for student and community participation in the development of classroom materials (Bustos, 2009; Säg, 2009), while the need for a multigrade and cyclical curriculum that allows for interdisciplinary work is also highlighted (Juárez, 2012). Finally, from the studies reviewed it can be concluded that there is a lack of specific teacher training to introduce changes in teaching and to be able to design curricular materials in accordance with the idiosyncrasies of rural schools.

Types of teaching materials

The analysis of publications focusing on the types of teaching materials used by teachers in rural multigrade classrooms shows various classifications. These refer, for instance, to tangible, intangible, rural, digital, printed, tactile, auditory, visual or audiovisual, didactic-technological or programmable resources (García Prieto, 2015; Guevara et al., 2012; Msimanga, 2019; Rahim, 2018; Fraser et al., 1993). Moreover, materials can be adapted, edited or self-created (Msimanga, 2019). It is observed that the use of technological resources for didactic purposes must be suitable for multigrade work (Miranda et al., 2018).

The human resources of the educational community, families or students themselves are also considered (García Prieto, 2015; Mathot, 2001). Physical resources related to school infrastructure, spaces and the rural context itself are also mentioned (Rahim, 2018). It can be concluded from the publications

analysed that teaching materials can be of a curricular nature, such as textbooks that take the multigrade into account in their development, or unspecific materials for multigrade work, where their appropriateness is determined by the methodology used. Both can be intended for individual or group work (Afzalnia, 2005; Msimanga, 2019). Most of the reviewed publications refer to textbooks, whether printed or digital, and the need to adapt them to multigrade work. In addition, the systematic review shows that textbooks and digital resources are most frequently mentioned in the articles as the main teaching resources in multigrade rural school classrooms (Boix & Bustos, 2014; Boix & Domingo-Peñañiel, 2014; Bustos, 2014; Brown, 2010; Forero et al., 2016; García Prieto, 2015; Guerra, et al., 2019; Juárez, 2012; López, 2011; Msimanga, 2019; Rodríguez & Saavedra, 2018; San Pedro & López, 2017; Severiano, 2013; Valderama, et al., 2011). Other resources described in the works and used in multigrade classrooms are Tika workbooks (López, 2011), multimodal resources and textbooks (Cardona, 2020), games, video games (Giraldo, et al. 2018), the curriculum itself as a support document for teachers, and the school garden or eco-garden (Dávila, 2018). In general, it can be surmised from the publications that graded work with didactic materials prevails in most cases, despite efforts to teach in a multigrade manner. Existing research highlights the lack of suitable classroom materials created for this purpose (Torres et al., 2019). In addition, there is no material in the publications that is *a priori* called multigrade. This aspect allows us to determine the need, as mentioned in the papers, to explore the existing resources in rural schools in order to provide help and guidance to teachers for their own creation and adaptation of resources, as well as improving their knowledge by giving them more support (Chaves et al., 2013). Finally, in the context of the present article, an in-depth analysis is carried out of the studies on textbooks as one of the most prevalent didactic resources in rural schools.

Textbooks in multigrade rural classrooms

Most of the papers surveyed conclude that textbooks do not contribute to multigrade didactics and therefore would not be a useful resource for this purpose (García Prieto et al., 2017; Bustos, 2007). Nonetheless, they are still the most widely used resources (Boix & Bustos, 2014). Despite considering textbooks inadequate for the contextual reality, teachers use them to gain security when faced with the difficulty of planning or applying existing materials to the multigrade reality of rural schools (Brown, 2010). This is associated with the lack of teacher training related to rural schooling, multigrade teaching and the acquisition of competencies to serve students regardless of their characteristics

in the same classroom in a rural school (García & Machado, 2017). The research revealed that most textbooks are created to work in a graded way; they are decontextualised and contain standard content (García Prieto et al., 2017) that is not adapted to the organisation of multigrade teaching. All of this can also be related to what is happening in the publishing industry, where there is no contact with educational experience or teachers at the time when textbooks and printed teaching materials are developed, and the needs of the different types of schools are not considered (Fernández Palop & Caballero García, 2017).

Several studies show that rural schools cannot adopt materials from graded urban education (García Prieto et al., 2017; Boix & Bustos, 2014). Textbooks, whether printed or digital, are not designed for the multigrade classroom, nor do they take into account the rural context of the students, instead taking graded schools as a point of reference (Bustos, 2007). Some textbooks are elaborated as guides for teachers, but this does not contribute to obtaining adequate guidelines for managing a multigrade classroom or implementing methodological changes (Little, 2005). The articles reviewed highlight the need for textbooks or edited materials that are focused on the reality of schools and the joint work of students of different ages in the same classroom (Msimanga, 2019). Some of the papers value the need for the creation of printed materials that help teachers to carry out work that enhances the inclusive nature of the multigrade classroom, thus facilitating the adaption of strategies and projects. The need for a textbook-based support curriculum that is cyclical and works on different subjects at different levels of complexity is highlighted. Moreover, the need for textbooks to have content that responds to a globalised, interdisciplinary and contextualised approach to learning, including activities with different levels of complexity, is valued in various publications. Such textbooks should promote autonomous individual or group work and cooperation, and should have creative content and a resourceful format that facilitates student discovery, learning and creative thinking. According to the data collected, many textbooks encourage repetition and work separated by school year, which is something that needs to be reconsidered and changed because is it not in line with multigrade didactics (Chaves et al., 2013; Msimanga, 2019). The incorporation of these textbooks would not imply methodological changes and would not be adjusted to the context and idiosyncrasies of rural schools. Furthermore, the importance of self-learning guides or orientation bases to guide students' work with different levels of complexity is also mentioned (Juela & Matailo, 2015). As far as digital books are concerned, the playful aspect of the complementary activities they present, their attractive format and their flexibility are valued in many cases versus printed books, contributing to the completion of network tasks and student motivation. However,

digital support does not contribute to methodological change either; most digital resources follow the same line of content and work by levels as the printed textbooks (Forero et al., 2016; Severiano, 2013). The different studies reviewed shed light on how the role of textbooks and their prevalent use in rural schools influences the methodology used by teachers in rural schools. This calls for both a review of their format and content and an assessment of their suitability or necessity in this type of context.

Opportunities and needs based on multigrade resources in rural schools

Some of the studies analyse the opportunities and needs of multigrade teaching materials in rural schools. Two of the papers highlight the barrier of invisibility of some of the multigrade materials developed by teachers in rural schools in different countries, pointing to the need for platforms to share these resources and support teachers in their processing and development. They also highlight the difficulties for teachers in creating such materials, as well as the need for more training to adapt existing materials or create new ones to support the active teaching methodologies implemented in the multigrade classroom (García Prieto, 2015; Pozuelos & Travé, 2004).

Another important aspect that some authors highlight is Montessori Theory as a starting point for the development of manipulative materials that allow students of different ages to work together in the same classroom (Msimanga, 2019). This theory comprises specialised and flexible educational materials that allow it to cater for learners of mixed ages. These materials can support meaningful and discovery learning (Msimanga, 2019; Torres et al.; 2019). This highlights the need to review existing resources along these lines and seek opportunities for the creation of multigrade materials. Different studies also emphasise the fact that in many cases the problem not a lack of materials, but the use of existing ones, as in the case of digital resources. There is also a need to review these materials in order to move towards cooperative work in networks, opening the school to the environment and to the global territory, including working with online resources and making use of new learning modalities (Bustos, 2014; Forero et al., 2016; Mathot; 2001), thus helping to reduce the isolation of rural territories (Carrete-Marín & Domingo-Peñafiel, 2021). In this regard, Severiano (2013) concluded that just having certain resources does not help to generate methodological changes; everything has to be coordinated along the same lines.

In line with earlier remarks on the importance of context, the appearance of the Place Based Education concept in one of the studies analysed (San

Pedro & López, 2017) not only allows us to take into account the didactic possibilities of the environment, but also the need to move towards a new curricular approach that seeks to link classrooms with communities or regions (Smith, 2002, 2007). This idea could be related to the concept of Biogeographic Regions (Rivas-Martínez et al., 2011), making it possible to extrapolate textbooks and teaching materials from one area to another at an international level based on their similarities in terms of contextual characteristics. This would allow the creation of new networks of teachers around the world to share materials and meaningful proposals.

Criteria for multigrade teaching materials: Proposals for improvement

Another important aspect of the research is the detection and proposal of criteria to be considered for the creation or adaptation of teaching resources suitable for the multigrade classroom. The analysis of the information in most of the papers has allowed us to establish a proposal for the dimensions that must be taken into account in teaching materials in order to ensure their suitability (Table 2).

Table 2

Criteria to develop multigrade teaching materials

Interdisciplinary and globalised work	Materials must be complete and well organised with a clear design
Use of educational specialities such as music or art as a transversal axis of learning	Materials must take into account multiple intelligences and different ways of presenting information
Use of an alternative curriculum system with a common curricular basis and topics as a reference	Inclusion of manipulative elements (in accordance with the Montessori Theory)
Curricular flexibility. Materials not divided by courses, but by abilities and skills. Inclusion of different levels of complexity.	Focused on problem-based and discovery-based learning
Inclusion of guides or bases of multilevel orientation	Creative and motivating
Flexible and open materials, adapted to multigrade classrooms and rural contexts	Contextualised materials. Inclusion of the territorial dimension and referents of the rural environment.
Fostering individual or group autonomy and cooperative work	Effective and specific in relation to the multigrade methodology

Teaching materials must allow interdisciplinary and globalised work, in line with the active methodology used in multigrade didactics, integrating the

specialities in a transversal way. Their content must be adapted to the different age groups, taking into account different levels of complexity, making the curriculum more flexible and adapting flexibly to the context and to each multi-grade classroom, including elements of the territorial dimension. The materials should allow for individual and cooperative work among students, and should therefore be well organised in order to understand how to work at any given moment. They must consider not only the diversity of ages, but also the diversity of learning styles, presenting information in different ways and therefore providing manipulative elements, as well. Finally, they should be motivating for students and encourage creative thinking and discovery learning, such as problem-based learning. We will briefly consider those materials that are related to the methodologies used in multigrade teaching and that are effective in their context of use.

In addition to these criteria, it is necessary to highlight the important role of teachers in the adaptation of materials according to their specific context and the multigrade classroom (Bustos, 2007; Santos, 2011). Some criteria are included that are applicable not only to rural schools, but could also be taken as a point of reference for the creation of resources and materials from an inclusive perspective; for example, the fact that materials should be flexible and open. It should, however, be emphasised that these aspects are especially relevant in the case of this type of school, including the complexity of the treatment of multi-grade classrooms and the inclusion of the rural environment.

Most of the materials would be applicable to creating or adapting curricular resources, where the textbook, whether digital or printed, would come in, as well as other multigrade teaching materials, such as including different levels of complexity of the activities. The research highlights the fact that there is a lack of materials that are suitable for multigrade classrooms (Torres et al., 2019) and that fulfil the majority of these criteria as well as being deliberative, that is, materials need to be revised and adjusted by the teachers of rural schools, thus guaranteeing their effectiveness in every classroom and context (García Prieto, 2015).

Conclusions

The main focus of the present study was to review the concept of multigrade resources, that is, the types of teaching materials, specifically textbooks, used by teachers in rural multigrade schools, to identify opportunities and needs with respect to all teaching materials, and to identify criteria for multigrade teachers to be pedagogically meaningful. Papers were reviewed identifying the main findings that could help determine the current situation

of multigrade textbooks and materials in rural education. It is important to highlight the fact that all of the research objectives have been achieved to a high degree, which has enabled the central research question to be answered. Through the systematic review it has been possible to determine the main characteristics of the works related to teaching resources in multigrade classrooms. English, Spanish and Portuguese stand out as the main languages in relation to the predominant countries in the scientific production on the subject. In addition, most of the articles reviewed come from peer-reviewed research journals in the field of social sciences. Most of the studies selected for the systematic review are qualitative in nature, demonstrating the need for more studies that provide quantitative, mixed method data in addition to qualitative data in order to expand knowledge on the topic. Furthermore, there is still a lack of research focused on multigrade teaching materials, and the present review contributes to summarising and expanding knowledge, as well as putting forward proposals for educational improvement. The analysis of the results of the studies that form part of the systematic review shows that there is a lack of a consensual definition of the concept of didactic material in the context of rural multigrade classrooms. This research has made it possible to analyse the concept and the state of play of multigrade teaching materials, proposing a definition and thus establishing a basis for responding to the difficulties that teachers have in understanding the nature of these resources and being able to create them. It is necessary to review education policies as well as the initial and ongoing training of teachers to enable them to face the challenges of diversified attention in multigrade classrooms and the selection, adaptation or creation of didactic resources. Many publications refer to multigrade resources as textbooks, which shows that, despite the efforts of teachers, working with printed or digital textbooks is not adequate for multigrade classrooms with different levels and ages of students. There is a need to revise existing materials and textbooks so that they are adapted to the context and to multigrade teaching. The importance of considering digital teaching materials should also be emphasised, as they allow for greater adaptability, flexibility and interactivity compared to print materials. Digital materials are particularly important in rural territories in order to open the local context to the global territory. In addition, the present study highlights the need for future research on the topic and for networking among teachers and sharing existing multigrade materials through digital platforms. Moreover, the results show that improvements in teacher training should also be implemented, taking into account the specific configuration of rural schools and multigrade work, due to the difficulties teachers encounter in developing their own teaching materials and applying them to multigrade

teaching. It is necessary to foster the creation or adaptation of textbooks or other teaching materials to facilitate and promote multigrade work in the classroom. This should be done in cooperation with the publishing industry and education policy in general, taking into account the existing multigrade school model and the educational reality of classrooms through teachers. Finally, the present research enables us to establish some criteria that should be considered in the creation of textbooks and other curricular materials, allowing their adaptation to multigrade classrooms and promoting the inclusion of all students. Knowledge of these criteria and the considerations involved can help teachers to improve their teaching and the adaptation of teaching materials. The present research project therefore contributes to reflecting on the state of play of textbooks and teaching materials, and to envisioning possible challenges and solutions to improve their creation, thus facilitating multigrade classroom teaching and situated learning. In addition, it contributes to the necessary discussion on whether materials should be adapted to contexts and be more flexible in order to take into account other realities.

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