The impact of service learning on the training of pre-service teachers: Analysis from a physical education subject

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Abstract

This paper discusses the effects of the use of service learning in pre-service teachers (PSTs). This methodology has been applied for two academic years at a Spanish university, providing a direct service for children with special educational needs (SEN) through motor and expressive games. We used Butin's model for the analysis of data collected through written reflections. The results show significant academic and personal learning, especially in areas useful for future teachers. The paper also proposes an extension (subcategories) of the original explanatory model.

Keywords

Service learning, physical education, pre-service teachers, initial teacher education

Introduction

The effectiveness of the methodology of service learning (SL) is constantly under review. In fact, several studies advocate further research on its effects, and in education this challenge is still pending (Butin, 2006; Eyler, 2000; Furco and Root, 2010; Warren, 2012). To this end, the work focused on the learning acquired by higher education students.

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There are different explanatory theories of SL effects (Bernadowski et al., 2013; Butin, 2003; Carrington and Iyer, 2011; Chambers and Lavery, 2012; Furco and Root, 2010; Galvan and Parker, 2011; Maynes et al., 2013; Saggers and Carrington, 2008; Seban, 2013). This study specifically opts for a rationale framework based on Butin's (2003) multiple perspectives model. It synthesizes the results derived from the application of SL and provides a comprehensive conceptualization of these dimensions. Butin proposes a model based on the classification of the results from four perspectives: technical, cultural, political and post-structural. The technical perspective includes outcomes of education relative to the effectiveness, quality, efficiency and sustainability of the teaching/learning (T&L) process taking place. In the case of physical education (PE) it refers to acquiring specific skills related to teaching this subject. The cultural perspective includes changes in the person stemming from understanding what decision making may mean for individuals. From this increased understanding, respect for disability and a consequently improved sense of who these people are in their community are acquired. In short, it is everything that concerns understanding the world and society in which we live through the changes in oneself directly linked to the emotional, ethical and life experience and training components of the SL. The political perspective consists of learning related to the understanding of society and the development of attitudes and behaviours encouraging participation in society as a means to transform it. Its essence involves giving voice to those persons, groups or communities who, for a variety of reasons, are silenced. Finally, the post-structural perspective encompasses changes that involve a reconstruction and transformation of identity, reinterpreting the rules by which we make sense of the world and ourselves (Butin, 2003, 2005a, 2006; Chambers and Lavery, 2012; Seban, 2013).

In relation to the construction of the pre-service teacher (PST) identity, Fletcher (2012) and Morgan and Bourke (2008) highlight the importance of relevant and useful educational experiences regarding elementary PSTs and non-specialist teachers respectively in order to form a professional and personal identity aligned with the educational needs of PE. This is especially important in the case of PSTs, whose formation in general is at a preliminary stage.

SL is shown to be an effective educational methodology as far as it concerns student learning and identity construction in relation to the experience. In their meta-analysis, Conway et al. (2009) relate improvements in academic, social and personal domains (interpersonal relationships, leadership, changes in beliefs and attitudes) and citizenship to SL. More recently, Yorio and Ye (2012) reviewed and described the effects of this methodology in terms of issues of social understanding, self-perception and identification with the group.

This present research was conducted on PSTs during their initial teacher education (ITE) training within PE. According to Kirk (2005), it is important that teachers (who are not PE specialists) have an adequate educational background in PE in order to acquire adequate competency. This is especially important in the case of early childhood education. Therefore, the use of experimental learning methodologies that involve applying knowledge in practice (Tsangaridou, 2012) is essential to their ITE training.

Within the area of teacher training, the effects of using an SL approach have been greatly examined. Research on the effects on conceptual learning and practical application in real situations (Bernadowski et al., 2013; Carrington and Iyer, 2011; Carrington and Saggers, 2008; Chambers and Lavery, 2012; Gil, 2012; Yang, 2012), self-efficacy (Bernadowski et al., 2013; Eyler et al, 2001), the development of critical thinking (Carrington and Iyer, 2011; Chambers and Lavery, 2012; Conner, 2010; Maynes et al., 2013), cultural understanding (Chang et al., 2011; Conner, 2010), and the practice and acquisition of values (Carrington and Iyer, 2011; Carrington and Saggers, 2008; Chambers and Lavery, 2012) have been studied extensively through PE.

The contribution this paper makes consists of an applied intervention programme using motor and expressive games. Due to its procedural nature and the wide variety of content areas (health promotion, attention to disability, development of cooperative behaviour), and in accordance with the recent review by Carson and Raguse (2014), PE is a suitable subject for implementing SL projects. SL has been little used in PE and to a lesser extent in motor and expressive play with children with special educational needs (SEN) (Capella et al., 2014; Gil et al., 2013). To date, most research on SL in the field of PE has focused on areas such as cultural understanding (Domangue and Carson, 2008; Galvan and Parker, 2011; Konukman and Schneider, 2012; Meaney et al., 2008, 2012; Tremethick and Smit, 2009), issues of childhood obesity (Himelein et al., 2010; Massey-Stokes and Meaney, 2006; Meaney et al., 2009b), diversity (Baldwin et al., 2007), mobility in persons with impaired ability (Bishop and Driver, 2007; Williams and Kovacs, 2001), and issues of teaching and learning within PE specific subject knowledge (Galvan and Parker, 2011; Meaney et al., 2009a), to name a few.

Given the lack of research in the PE setting, the current study examined the influence of SL on identity construction and technical content learning related to teaching strategies and their application in the real context of teaching PSTs. The methodology was applied in the form of direct service through the experience of motor and expressive games sessions with children with SEN. The purpose of the study was to examine how SL influenced PSTs, according to the following research questions:

1. What technical knowledge of physical education does service learning contribute to pre-service teachers with respect to making their teaching of children with special educational needs adequate?
2. In what way does service learning contribute to pre-service teacher training in respect to the cultural understanding of diversity?
3. To what extent does providing a service to children with special educational needs develop the social participation of the pre-service teachers?
4. How does service learning change pre-service teacher identity?

Methods

Participants and setting

This study was conducted during the academic years 2011–2012 and 2012–2013 with PSTs. Upon ethical approval, a total of 346 PSTs agreed to take part in the study. They attended the annual course subject 'Fundamentals of body language; motor games in early childhood education', to participate in the research. The sample was chosen for the SL teaching quality framework in place at the university. The same two teachers taught during both academic years. They determined and informed the PSTs of the basic and specific skills as well as academic knowledge to be acquired in the course through the use of SL. The PSTs were organized into 59 intervention groups composed of five or six members. They participated in the start-up and implementation of a one year project in which they worked with social entities[1] that make up the social fabric of the area, summarized in Table 1. The time of service provided for each PST varied between 40 and 45 hours from November to May.

Participants were able to choose one of five social entities, with which the university had signed a cooperation agreement, within which to provide the service. Each entity is dedicated to the support and development of children with SEN or limited motor development arising through a lack of stimulation as a result of living in economically deprived areas. Consequently, the common

Table 1. Elements in the application of service learning.

Entity code	FBS	CEEPR	APADHACAS	CAESRA	FSD	Total
Number of PSTs	103	125	25	75	18	346
Number of intervention groups	10	32	6	8	3	59
Project objectives	Learning how to use the knowledge related to motor and expressive activities in the form of play adapted to user reality in specific situations Applying social skills aimed at improving personal interaction Modifying the PST perception of diversity through coexistence and reflection Improving the quality of living for people with diverse functionality					
Types of activities	Providing a direct service of motor and expression games sessions Interacting with children with SEN and their families to raise awareness of the conditions in which they live, problems affecting them and their needs and interests					
Child characteristics	Cerebral palsy	Special educational needs (autism spectrum disorder, Down's syndrome, etc.)	Attention deficit hyperactivity disorder	Consequences of an important lack of stimulation due to living in socio-economically deprived areas	Down's Syndrome	
Number of children with SEN	42	64	27	35	15	183

FBS: Fundación Borja Sánchez; CEEPR: Centro Educación Especial Penyeta Roja; APADHACAS: Asociación Padres Afectados por Déficit de Atención e Hiperactividad; CAESRA: Centro de Acción Educativa Singular Roca i Alcaide; FSD: Fundación Síndrome de Down; PST: pre-service teacher; SEN: special educational needs.

deficiency to be addressed was improving impaired motor skills and socialization, and to that end once weekly two-hour sessions giving motor and expressive games out of campus school hours were provided. This training proposal matched the objectives perfectly.

Table 1 presents the description of the SL project timetabled in the institutions.

Data collection and analysis

In SL, knowledge consolidation via reflection is considered methodologically important (Bleicher and Correia, 2011; Correia and Bleicher, 2008; Molee et al., 2010). A characteristic of this project was the establishment of a rigorous reflection system. The questions that PSTs answered in this research were focused on the structure of Butin's explanatory model. From the technical lens they were: What difficulties have you encountered during the completion of the session? What curricular knowledge have you put into practice? What changes to your planning will be incorporated in the next session? Have you met planned goals; or, upon completing the session were activities

inadequate for the characteristics and situation of the child learner? These questions were related to the technical lens according to Saggers and Carrington (2008), whose research is also based on Butin's model. The technical lens focuses on a pedagogical effectiveness that mostly concentrates on innovative elements such as quality and efficiency (Seban, 2013).

With regard to the cultural lens, it focuses primarily on the development of respect and understanding diversity as well as gaining a greater sense of self-knowledge about community identity and social responsibility for the community in which PSTs live. The exact questions were: What feelings have you experienced during the session? Have you understood the difficulties presented by children with SEN?

The political lens focuses on a worldview that recognizes how social groups dominate values and macro power relations in society. Thus, the question was: Do you understand there is a need for participants and their families to participate in the program?

Finally, the post-structural lens centres on the means by which we give meaning to the world and ourselves. SL generates major changes in the socio-cultural perceptions of its participants (Butin, 2005b). The question was: Has your vision of diversity changed after interaction with these people?

After all the group interventions, global discussion sessions were held (one per entity and per course), with the most relevant aspects arising from the reflections of each intervention group introduced as terms for discussion. The PSTs, lecturers, professionals and heads from the other social entities facilitated and monitored this analysis, and records of the main conclusions reached were taken for each meeting.

The data obtained from written reflections by the PSTs were drafted after the panel discussion following each session. They were written as a cooperative group activity, and the written reflections had no impact on the overall academic score. Only the attendance and participation during the project were taken into account as a part of the final grade.

Rigorously monitored cooperative learning procedures using individually handwritten minutes were used over this period (Johnson and Johnson, 1994; Slavin, 1995). Successive note taking and detailed learning contracts demonstrated everybody took part. The global discussion sessions were recorded in audio and were transcribed and analysed by a researcher.

On completing the data collection phase, the written reflections and data provided from the group discussion sessions were analysed using qualitative data analysis techniques. Using the programme Atlas.ti, v7, data were encoded, identifying patterns that resulted in categories and subcategories in their own right. The Atlas.ti software focused on the conceptual saturation and frequency of concepts, which were reflected as percentages.

In order to contribute to a body of theory and an explanatory reference framework to determine the effects on students of using SL, the proposed Butin (2003) model was utilized. This author provides a broad and inclusive look at the effects on students of SL. According to Seban (2009, 2013), the use of analytic tools helps researchers deepen ways of understanding the complex process of learning phenomena from multiple perspectives.

Once the data were encoded, a discussion group consisting of expert researchers from different areas of knowledge (theory of education, teaching and school organization and teaching body language) was created according to the criteria of Skjong and Wentworth (2000). The analysis was based on the interpretative theoretical construct proposed by Butin. Patterns were determined within each category. Furthermore, different subcategories that expanded the initial proposal and interpretative framework proposed by Butin were created.

The data processing analysis began with an initial filtering performed by the group of experts. The group removed the irrelevant quotes and classified those selected in the categories in the Butin

Table 2. Global research data.

Perspectives	Number of groups	Number of quotes	Percentage of quotes
Technical	58/59	385	53.1%
Cultural	32/59	107	14.8%
Political	17/59	35	4.8%
Post-structural	53/59	198	27.3%
Total	59	725	100%

model. The group of experts carried out a process of detecting patterns within each category. To create subcategories certain conditions were established. The first was that the concept was cited by 50% or more of the intervention groups. If this condition was not met, another possibility was that the group of experts, by consensus, created a subcategory based on the quality of data. In the results section the subcategories are shown.

Results

Results from the data analysis revealed discernible categories and subcategories across the four perspectives under investigation: technical, cultural, political, and post-structural.

Within the technical perspective the categories of uncertainty, the connection between learning and the real world, learning methodology, analysis in terms of time, space and material, and analysis of the teacher's or PST's performance were identified. For the cultural perspective, the categories of understanding the difficulties arising from diversity and diversity as a source of learning were identified. With respect to the political perspective, the categories of facilitating participation, models of participation and expectations of participation were identified. As for the post-structural perspective, the categories of positive feelings, negative feelings, values and vision of diversity were identified.

Table 2 presents the overall results of the research, detailed by each perspective as defined by Butin. In the second column is the number of intervention groups that reported reflections on the different perspectives, in the third is the total number of quotes quantified for each one, expressed in the fourth column as the percentages they represent of the total quotes in function from each perspective. This model suggests academic learning for PSTs exists. However, we observe that the benefits provided in the political dimension, understood globally as participation in society, were limited.

The data reveal a marked change in the participants with regard to the cultural and post-structural perspectives. In accordance with the explanation in the methods section, it is worth noting the importance of analysing the results from a qualitative perspective. The Atlas.ti software allowed a qualitative analysis that focused on the conceptual saturation and frequency of concepts considering the number of quotes, the origin of the groups from within which the quotes arose and the criteria of the group of experts.[2]

Technical perspective

In our case the technical perspective is understood as the teaching knowledge PSTs have drawn from its methodological application. We obtained 385 quotes from a total of 725 analysed in the expert focus groups (53.1%). The content analysis generated five categories (uncertainty; connecting theory and practice; methodological learning; analysis in terms of time, space and equipment; teacher and PST performance analysis) and 10 subcategories, defined below.

Uncertainty. Uncertainty is defined as the adaptation of the PSTs to the feelings experienced in dealing with educational unknowns and variables generated by fear of error in the required SL teaching practice.

> The fear and concern struck me whether I would know how to do this, if I might do harm to a child, or the millions of other things that went through my head for the simple fact that it was my first contact with children and also children with characteristics that I'm not used to dealing with, that always seems scarier still. (19:2)[3]

Connecting theory and practice. Connecting theory and practice is learning generated through the application in real applied situations of theoretical knowledge learned in class.

> What we are doing voluntarily, should be a must and preset by the administration, as we put into practice the true reality of our profession and learn most significantly every Saturday, when we meet these children. (7:10)

Methodological learning. Methodological learning refers to the learning of procedural techniques in T&L situations. This category focuses on reward procedures that modify child behaviour by positively rewarding adequate performance.

> To highlight that with the help of monitors there, I've noticed that through dialogue, understanding and behavioural techniques the more 'rebellious' children or those that most want to do what they want to do, can be directed to make the job easier. They have taught me some tactics for this not to happen again in future teaching practice. (15:13)

The subcategories are:

Skills and attitudes analysis. Skills and attitudes analysis provides evidence of the capacity developed by the PSTs of 'how to think' and critically and strategically applying thinking skills and attitudes during the activity.

Capacity to adapt activities. Capacity to adapt activities is conceived as the ability to make changes in activities to suit the characteristics of children with SEN so as to succeed in their intentions.

Skills developed. Skills developed is defined as the ability to apply acquired academic knowledge adequately to teach with a high degree of quality and efficiency.

Reward. Reward is understood as a way of proceeding to modify the behaviour of children by granting a reward for adequate performance.

Analysis in terms of time, space and equipment. Analysis in terms of time, space and equipment is the PST-developed capacity of 'how to think' critically, and strategically applying thinking about time, space and equipment related to their useful optimization.

> What I have most enjoyed for various reasons has been that firstly we had the session better prepared than at other times, we did not use as much equipment and things were simpler, which gave the kids a better understanding of the game and what we thought was most important was we have approached the session with a different attitude. (3:3)

Analysing PST and children with SEN performance. Analysing PST and children with SEN performance is understood as the skills developed by the PSTs of 'how to think' and critically and strategically applying this thinking to their own teaching performance or to the children's performance during the activities.

> The experience has been very positive. We left the pavilion commenting what each child was like, in whom our attentions had most been set, who had proved tiring for us, and the situation in which we had seen ourselves. (5:14)

This category is subdivided into:

Self-assessment. Self-assessment is understood as acquired learning derived from a process of reflective learning on the PSTs own teaching activities.

Context assessment. Context assessment includes reflections referring to the analysis of the environment in which the activity took place as a level of personal and social interaction.

Initial PST performance and initial children with SEN performance. Initial PST performance and initial children with SEN performance includes initial determinations concerning various aspects of the PST's own performance and the performance of the children with SEN.

The PST's reaction to performance and children with SEN's reaction to the performance. The PST's reaction to performance and children with SEN's reaction to the performance involves group learning that is based on initial performance and the reformulation of the performance from a critical analysis thereon.

Table 3 presents the results obtained in this perspective, together with details of the quotes that configure each one and their represented percentages.

The ability of the PST to modify the didactic interventions by adapting them according to their analyses of lived reality is observed. This emphasizes the development of the ability to react to changing and complex situations at the educational level by interpreting the T&L context and adapting the training to the capacity of the children.

Cultural perspective

We understand this perspective as learning that leads to understanding diversity. We obtained 107 quotes from a total of 725 analysed in discussion groups (14.8%). The content analysis generated two categories (understanding diversity issues and diversity as a source of learning) and three subcategories (capabilities, interests and needs), defined below.

Understanding diversity issues. Understanding diversity issues reflects the personal learning emanating from understanding the child's characteristics from knowledge of: their capabilities, which are those typical of the problems of the children in the sessions; the children's interests that are directly disorder related; and also include the children's needs, diversity related personal and legitimate aspirations and other care related issues that their special situation requires.

> Despite being exhausted from making so much effort to move and play, when the child approached the wheelchair the look on his face totally changed, lowering in distress because they must have thought that the fun had ended. (18:7)

Table 3. Technical perspective results.

Categories and subcategories	Number of groups	Number of quotes	Percentage of quotes
Uncertainty	29/59	38	9.9%
Connecting theory and practice	24/59	35	9%
Methodological learning			
Skills and attitudes analysis	16/59	26	6.8%
Capacity to adapt activities	25/59	43	11.2%
Skills developed	17/59	24	6.2%
Reward	5/59	8	2.1%
Analysis in terms of time, space and equipment	15/59	26	6.8%
Analysing PST and children with SEN performance			
Self-assessment	23/59	29	7.5%
Context assessment	21/59	40	10.4%
Initial PST performance	15/59	17	4.4%
Initial children with SEN performance	12/59	14	3.6%
PST reaction to performance	41/59	75	19.5%
Children with SEN reaction to the performance	8/59	10	2.6%
Total	59	385	100%

PST: pre-service teacher; SEN: special educational needs.

Diversity as a source of learning. Diversity as a source of learning covers different personal learning that future teachers have experienced related to the diversity present in the sessions.

> The feelings you experience after contact with these children is great, for me they are a great example of struggle and overcoming because sometimes they told me they wanted to play the most difficult game or to throw from further away, and what they wanted was to better themselves. (27:10)

Table 4 presents the results on learning of future teachers in the cultural perspective. Represented quotes and percentages are detailed.

The world of functional diversity remains largely unknown to society. Despite efforts in the educational and social sectors to promote inclusion, the vision of cultural knowledge acquired by future teachers shown in Table 4 shows the limitation of this understanding. Nonetheless, both the number of quotes by the category as well as intervention groups suggest that the use of SL is an appropriate way forward in overcoming this situation. It fosters understanding diversity as a source of learning about and understanding the daily lives of these people.

Political perspective

This perspective is seen as the individual skills developed to understand society and the participation in political, social and cultural institutions critically, to promote the overcoming of barriers and inequalities in search of a fairer society. We obtained 35 quotes from a total of 725 analysed in discussion groups (4.8%). The content analysis generated three categories (facilitating

Table 4. Cultural perspective results.

Categories and subcategories	Number of groups	Number of quotes	Percentage of quotes
Understanding diversity related issues			
Capacities	18/59	32	30%
Interests	8/59	14	13%
Needs	11/59	19	17.8%
Diversity as a source of learning	24/59	42	39.2%
Total	59	107	100%

participation, participation model, and expectations of participation) and two subcategories (positive/negative model) defined as:

Facilitating participation. Facilitating participation makes reference to attitudes that demonstrate willingness to continue taking part in the planned intervention or elsewhere in the social environment.

> Experiences like these are a fundamental enrichment to everybody, you see other points of view, other possibilities, and you value the effort and example of betterment the children give. (21:6)

Participation model. The participation model represents social action resulting from the experience lived of the applied methodology, either positive or negative.

> This experience has left great memories, after this we are considering forming volunteer groups, the learning you draw from sessions like this is of great benefit. (58:16)

Expectations of participation. The category 'expectations of participation' groups the ideas arising from the experience of participating in social, cultural and political environments. This changed their perceptions about the societal context, involving those that took part in making improvements.

> I would like to specialize in this type of special education to help people who really need us. (59:20)

Table 5 presents the results of the political perspective. Represented quotes and percentages are detailed.

One of SL's fundamental objectives is to promote social participation within education. The extent to which results in this field have been obtained is limited, although categories noting the participation model projected by children with SEN and their contexts have been established. Globally, PSTs obtained learning of interest from interacting with these people and their real life circumstances.

Post-structural perspective

This perspective refers to the construction of identity from PSTs experience and reflection on their own practice. We obtained 198 quotes from a total of 725 analysed in discussion groups (27.3%).

Table 5. Political perspective results.

Categories and subcategories	Number of groups	Number of quotes	Percentage of quotes
Facilitating participation	8/59	10	28.6%
Participation model			
Positive	12/59	15	42.8%
Negative	2/59	2	5.7%
Expectations of participation	7/59	8	22.9%
Totals	59	35	100%

The content analysis generated four categories (positive feelings, negative feelings, values, and view of disability) and one subcategory (empathy), which we then conceptualized.

Positive and negative feelings. Positive and negative feelings are favourable or unfavourable impressions created by the practice which contributed to changes appearing in the opinions of the PSTs.

> Thanks to this practice, we believe we have learned a lot, both at a training and personal level, that serves to provide reflection and realize what really matters in life. (30:17)

Values. The values that PSTs discovered in children became built into their own personal make up. We have highlighted a changed subcategory: empathy (cognitively and emotionally identifying with another's feelings) for its special relevance.

> Beside him I feel that the things that overwhelm me and seem so important become insignificant or non-existent, disconnecting me from everything and making me enjoy every moment, because that's what is most important. (18:9)

View of disability. View of disability is a category composed of the view PSTs obtained from witnessing how children normally live with their disability.

> I found that I had often had prejudices towards people with cerebral palsy and it was very nice for me to discover that my idea about this condition was wrong. (20:6)

Table 6 presents the results on the structure in categories and subcategories generated and quantified in this perspective.

The positive feelings experienced were higher than the negative ones. These have contributed to the development of PSTs towards inclusion. The data obtained show insights towards SEN that were more adjusted to reality.

Discussion

Butin's proposed model offers a starting point for the results analysis while adequately encompassing other converging proposals made by other authors. For this reason, we take it as an

Table 6. Post-structural perspective results.

Categories and subcategories	Number of groups	Number of quotes	Percentage of quotes
Positive feelings	50/59	100	50.5%
Negative feelings	11/59	14	7%
Values	16/59	39	19.6%
Empathy	6/59	9	4.5%
View of disability	27/59	36	18.4%
Totals	59	198	100%

analytical framework. Below, we highlight (a) the general results of research based on the model discussed, and thereafter (b) we focus on each of the research questions.

Overall results

This model posits the existence of four general categories. Among them, this author and others such as Carrington and Iyer (2011) emphasize the quantitative predominance of the technical perspective over the rest. Thus, studies indicate that in applying SL, PSTs learn from this applied practice issues related to technical content (Gil et al., 2014). This study is congruent with this view, since 53.1% of the research findings have described the development of technical competencies for PE teaching (see Table 2).

In another sense, the limited number of political category quotes (4.9%) directly related to social participation is noteworthy. It is likely that this result derives from the SL model programme, as its own specificity requires that PSTs focus more on the implementation of practical sessions and direct their attention towards people more than to the overall understanding of what it means to participate in society at the political level in order to help improve the quality of life of children with SEN.

The results extend the model, based on the findings from a systematically applied two school year long programme. To complete a thorough analytical framework for the effects of SL on the PST, categories and subcategories have been identified and conceptualized.

Response to the research questions (1, 2, 3, 4)

1. What technical knowledge of PE does SL contribute to PSTs with respect to making their teaching of children with SEN adequate? Data showed that PSTs have acquired adequate teaching skills. In some quotes the PSTs contributed viable solutions to concrete problems arising from the adaptation of motor games for children with SEN. These results are in line with the effects on learning determined by Warren (2012) in her meta- analysis of learning and the results of Conway et al. (2009) with respect to improvements in the academic field and partly with the benefits described by Yorio and Ye (2012) with regard to self-esteem, self-efficacy, problem solving skills and academic performance.

In more detail, we see that when PSTs follow a programme of SL and apply their knowledge in a real context, they acquire technical learning (methodological learning, analysis in terms of time, space and equipment and analysing PST and children with SEN performance) to carry out T&L processes effectively in spite of the uncertain situations faced, corroborating the results obtained by Meaney et al. (2012). The issue of connecting theory and practice is essential for proper learning.

In this sense, the results obtained in the subcategory 'connecting theory and practice', according to Carrington and Iyer (2011), allows the statement that SL is a good methodology for connecting and giving meaning and value to theoretical learning. Methodological learning is essential for future teachers. Our model reports that this type of learning accounts for 26.3% of the total data, consistent with that obtained by Chambers and Lavery (2012), Galvan and Parker (2011) and Yang (2012). Learning the management of time, space and equipment is very important in general teaching and teaching PE in particular as it is so procedural.

In this dimension, results of interest exist that are similar to those obtained by Meaney et al. (2009a): a full 48% of the categorized quotes featured in the subcategory of 'analysing PST and children with SEN performance'.

In line with results from research conducted by Bernadowski et al. (2013) and Carrington and Saggers (2008), the PSTs learned about self-assessment in teaching situations, reacting to the actions of peers and teaching children to resolve pedagogical situations.

2. In what way does SL contribute to PST training in respect to the cultural understanding of diversity? The emphasis of the results of the cultural perspective (14.8% of total quotes stem from a broad base of 32 groups with notable consistency) allowed the researchers to address the second research question. Participation improved cultural understanding of the collectives with diverse disabilities. The data showed how interaction had been the basis for understanding the groups' issues, as expressed by understanding ability, interest and needs (60.8% of the quotes from 37 groups), reinforcing the findings of Borrero et al. (2012).

SL is a practical methodology based on solving real problems, and which creates experiences which otherwise cannot be easily produced. In this case, this research and SL provision was an interaction with children with SEN. This produced a powerful source of learning for PSTs (39.2% of quotes from this perspective from 24 intervention groups). The results are consistent with those obtained by Chang et al. (2011). Within this perspective the special suitability of the SL applications in the field of PE is noteworthy. Studies reveal that the relationships established in the field of motor skills (e.g. through motor games, in this case) are especially suitable to achieving deeper cultural understanding of collectives that alter the perspectives of the PSTs. In this sense, the results are in line with Domangue and Carson (2008), Galvan and Parker (2011), Gil (2012), Konukman and Schneider (2012) and Meaney et al. (2012). The importance of diversity as a modulating element of learning for SL participants is high (Warren, 2012). Given that this study focused on children with SEN, this goes a long way in explaining the importance of the results obtained.

3. To what extent does providing a service to children with SEN develop the social participation of the PSTs? One of the objectives of SL methodology is building an understanding of society through participation and involvement in its improvement. This is called the political perspective. We questioned the extent that providing a service to children with SEN could be a factor in promoting social participation in future teachers. Of note was the number of intervention groups that related learning derived from the participation model as a positive aspect (Table 5). The limited effect of political learning has already been detected by other authors (Butin, 2003, 2006; Gil, 2012; Seban, 2013) and is a pending issue with regard to the effects of SL (Butin, 2006; Furco and Root, 2010).

We are aware that to bring about change towards a more inclusive society through educational methodology is an ambitious goal. The authors report research evidence, however limited, in this regard. We would like to highlight the importance of long-term longitudinal studies to further clarify this interest and rethink the applied programme model further.

In this particular case, modifying the parameters that inform awareness about child and family needs unattended by social and educational services would probably help to improve learning in terms of participation in social, civic and political structures.

4. How does SL change PST identity? Investigating how SL changes PST identity involves analysing the results obtained within the post-structural perspective defined by Butin. Almost one in three cases of learning identified in the content analysis helped bring about PST-personality change. These results are in line with those of Tindall et al. (2014), who affirm that the practice of activities related to PE helps PSTs develop a deeper understanding of how to engage children with disabilities. This finding is reinforced by the number of intervention groups preparing and selecting quotes about this fact (53 of 59). These results clearly show that applied SL is a source of positive feeling (50.5% of quotes from the perspective of 50 intervention groups). These, properly managed through the process of reflection, form a supportive pillar for the change experienced by PSTs in its most affective aspect.

Likewise, Bernadowski et al. (2013) emphasize the development of the affective domain of SL related to increased self-efficacy. In this study PST values underwent substantial changes as the underlying foundation to beliefs, attitudes and behaviours experienced were affected. The data showed that the value structure of PSTs changed, renewed or incorporated understanding, cooperation, trust, inclusion, tolerance and dialogue (24.1% of quotes from 22 intervention groups). Other authors also mention learning about values from applying SL: Chambers and Lavery (2012) found improvements in confidence and Carrington and Saggers (2008) in collaboration and inclusion. Of special mention was empathy, a value put into play and spoken about by intervening PSTs so often that it was included in the values structure.

Learning empathy could be relevant and useful for PSTs in their work. Results in this regard are consistent with those of Chambers and Lavery (2012) and Carrington and Iyer (2011), who appreciate significant developmental improvements. Nonetheless, the assumption is that learning values is complex. If learning, reflection, or service approaches are poorly focused, negative values contrary to the SL related to social improvement may arise. Butin (2003) warns of this effect when the model of the four lenses is proposed. For instance, in the category 'Negative feelings', reflections appear where the value of charity comes up. Sharing Butin's (2006) view, when reference is made to the dangers of this methodology, this value is not assumed to be positive. Under no circumstances must the service provision be transformed into benevolent volunteering. This is not only to be in solidarity with the suffering of others, but to adopt a more humanistic approach, promoting vital attitudes based on an integrated approach to human values leading to the understanding of diversity equated to normalizing and inclusive actions in society. The results support this approach, and the vision of children with SEN gained by the PSTs is based on this same idea. Specifically, 27 groups (quoted 36 times, corresponding to 18.4% of the total quotation of this perspective) emphasized the enriching element of change in their own initial conception. Additionally, Maynes et al. (2013), Carrington and Iyer (2011), Conner (2010) and Chambers and Lavery (2012) reported improvements compatible with the results of this study.

Conclusion

Discussing the results allows the establishment of the following conclusions related to the research questions and the usefulness of Butin's model in analysing the effects of SL on PSTs.

The four perspectives (technical, cultural, political and post-structural) explain the effects of the use of SL on university students as proposed by Butin, proving the worthiness of his method in analysing the data collected in this investigation. Likewise, this article extends the original model through the analysis of data from the systematic application of SL for two academic years, which allows a detailed comprehensive study in regard to the learning that occurs in PSTs participating in an SL programme provided for children with SEN.

At the technical level, SL allowed PSTs to acquire skills that improved teaching competency, especially for children with SEN.

SL was shown to be a tool for PSTs to increase cultural understanding of disability, where the education system may contribute towards inclusive societies. Its effectiveness in the field of PST is limited with regard to the political dimension since no significant findings are noted in promoting social participation.

SL has been shown to be effective in terms of its impact on the identity of the PSTs. It produced changes in their conception of socio-cultural reality, especially in understanding disability.

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Notes

1. Social non-profit organizations whose mission is to assist children with SEN in order to improve their quality of life. In this case five social entities were involved: Fundación Borja Sánchez (FBS); Centro Educación Especial Penyeta Roja (CEEPR); Asociación Padres Afectados por Déficit de Atención e Hiperactividad (APADHACAS); Centro de Acción Educativa Singular Roca i Alcaide (CAESRA) and Fundación Síndrome de Down (FSD).
2. The quotes that are presented are those which demonstrate the most relevant findings.
3. Atlas.ti assigned reference index showing the document number and the contained quote.

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