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Sumario

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Summary

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Presentación

Presentation

Por acuerdo de la Junta Directiva -de 9 de febrero de 2012- de la *ACIPE-Asociación Científica de Psicología y Educación,* tenemos que responsabilizarnos de la Dirección/Edición de los volúmenes 7 (2012), 8 (2013) y 9 (2014) de la REVISTA DE PSICOLOGÍA Y EDUCACION / *JOURNAL OF PSYCHOLOGY AND EDUCATION*.

Asumimos el encargo -y la delicada responsabilidad- proponiéndonos seguir haciendo mejoras, al estilo vigotskiano, en el formato y en el contenido. Como la generación anterior nos entrega un instrumento material o artefacto (la revista) útil para resolver determinado número de problemas, nosotros tenemos que hacer solo aquellos cambios que permitan, a la REVISTA DE PSICOLOGÍA Y EDUCACION / *JOURNAL OF PSYCHOLOGY AND EDUCATION*, adaptarse mejor al medio al que pertenece: el mundo -claramente globalizado y obsesionado con los índices de impacto (*impact factors*) e índices de uso (*downloads factors*)- de las revistas científicas en general y de las revistas de psicología en particular.

Las ***mejoras en el formato***, son las más evidentes. Basta con coger el volumen 6 (2011) y comparar con este que tiene en sus manos (volumen 7, número 1 (2012) en aspectos tales como: diseño gráfico y verbal de la portada, de la contraportada, de los índices de contenidos (en español y en inglés), de la maquetación, etc.

Las mejoras en el formato no hubieran sido posibles sin el incremento del número de personas que forman el Consejo de Redacción. A partir de este volumen se incorporan dos especialistas en sistemas de edición y relaciones sociales. Acompañan al profesor *Angel de Juanas Oliva* que hasta ahora ha llevado el peso de la Redacción de la Revista. Son *Carlos de Frutos Diéguez* (Becario FPU del Ministerio de Educación) y *Lorena Valdivieso León* (Becaria

de FPI de la Universidad de Valladolid). Ambos trabajan en el Departamento de Psicología de la Universidad de Valladolid.

"*Apareceremos dos veces al año*", escribían Jesús Beltrán Llera y Víctor Santiuste Bermejo, el 25 de mayo de 2005, cuando apareció el vol-1, núm-1. Pero por diversas razones, que no vienen al caso, la REVISTA DE PSICOLOGÍA Y EDUCACION / *JOURNAL OF PSYCHOLOGY AND EDUCATION* muy pronto editó un solo número al año. Pues bien, volvemos a retomar el objetivo fundacional y publicaremos los dos números al año. Esto quiere decir que tras este número (v-7, n-1) aparecerá -en breve- el volumen-7, número-2 (2012).

Así mismo -y de manera progresiva- todos los artículos se publicarán en inglés y -en su caso- en otra lengua; la que autor o autores decidan. Pediremos a los autores de los artículos, a los que los revisores (*peer review*) den el visto/bueno, que traduzcan sus artículos al inglés para publicar, o bien las dos versiones (por ejemplo: español e inglés, portugués e inglés, francés e inglés, etc.) o bien -si así lo prefieren- solamente en inglés.

La REVISTA DE PSICOLOGÍA Y EDUCACION / *JOURNAL OF PSYCHOLOGY AND EDUCATION* se seguirá publicando en dos soportes: papel y electrónico. Como habrá podido ver en la contra-portada hemos incrementado –con respecto al volumen-6 (2011) el número de bases de datos y de catálogos en que se encuentra indexada. Concretamente -en estos momentos- se encuentra indexada en estas bases de datos: EBSCO, IN-Recs, Resh, Latindex, Dialnet, A360º, Compludoc, MIAR y Biblioteca Nacional de España; y en estos catálogos: WorldCat, DICE, Scirus, Google Scholar, ISOC del CSIC, Ulrichsweb, Cisne (UCM), COPAC, Sidoc y ZDB.

Las ***mejoras en el contenido***, en cambio, se harán evidentes a medida que vaya leyendo -de manera significativa y situada- cada una de las páginas de este volumen y/o entre en la página web de la Revista (www.revistadepsicologiayeducacion.es). Sin olvidar, por supuesto, la contra-portada donde se informa de las bases de datos en que está indexada la revista. Bases de datos que seguiremos incrementando a medida que vayamos cumpliendo con los requisitos que cada una de ellas nos exigen. Lo iremos haciendo por aproximaciones sucesivas, por moldeado. Es decir se notarán más los cambios en el v-9 de 2013 que en este.

El *incremento en la calidad* de los contenidos depende -por una parte- de la calidad de las aportaciones que académicos y profesionales nos ofrezcan, y -por otra- de la calidad del proceso de revisión, del rigor en la evaluación de cada uno de los trabajos. El primer factor no está en nuestras manos controlarlo,

pero –felizmente- lo hace por nosotros el *zeitgeist* de los tiempos que nos está tocando vivir. El segundo factor, en cambio, lo podemos controlar elevando calidad y rigor de los criterios que pedimos a los revisores (*peer review*). En la página web (www.revistadepsicologiayeducacion.es) pueden verse los criterios en el *Cuestionario de evaluación para los revisores*.

Las aportaciones de este número han sido altamente valoradas por los revisores (*peer review*). Todas se centran en torno a tópicos relevantes de la *psicología de la multiculturalidad*.

Adrian Furham de la University College London aporta evidencias a tener muy en cuenta por los profesionales que trabajen en el ámbito de la educación comunitaria: *Culture shock*.

Barry H. Schneider y Yusuf Malik, ambos de la University of Ottawa, y Stephen J. Udvari de la University of Toronto en su artículo: *Cultural encapsulation of children's friendships: A manifestation of prejudice or pride?*, aportan datos enormemente útiles a padres, madres (educación familiar) y profesorado (educación escolarizada) que se ubiquen o trabajen en barrios y/o centros con abundantes niños y niñas de muy diverso origen cultural.

Psicólogos educativos académicos y Psicólogos educativos profesionales pueden aprovecharse de las aportaciones teórico-conceptuales y tecnológico-instrumentales de los artículos de Malka Margalit de la Tel-Aviv University and Peres Academic Centre, *Children's resilience, loneliness and hope: The Positive Psychology perspectives*; y de Pierre Mounoud del Departamento de Psicología de la University of Geneva: *No new skills without existing skills, but these skills are both practical and conceptual*.

Los dos últimos artículos que publicamos son del ámbito de la educación escolarizada. Están más alejados de la multiculturalidad, pero nos obligan a poner los pies en la tierra. Mª José Miralles Romero, Juan Luís Castejón Costa, Antonio Miguel Pérez Sánchez y Raquel Gilar Corbí, del Departamento de Psicología de la Universidad de Alicante, hacen *Un análisis de los efectos de la escuela sobre el rendimiento académico en matemáticas: Un análisis multinivel con datos de PISA 2003*; y Calixto Gutiérrez Braojos, Purificación Salmerón Vílchez y Ana Martín Romera, del Departamento de Métodos de Investigación y Diagnóstico en Educación de la Universidad de Granada, se preguntan *¿Difieren los universitarios en metas de logro, estrategias de regulación y rendimiento académico en función de las disciplinas que estudian?*

Finalmente, la REVISTA DE PSICOLOGÍA Y EDUCACION / *JOURNAL OF PSYCHOLOGY AND EDUCATION* ha estado y sigue estando abierta a los trabajos

de académicos y profesionales de la psicología y de la educación -como en sus inicios- que deseen dar a conocer las ***aportaciones***, teórico-conceptuales, tecnológico-instrumentales y/o técnico-prácticas, de sus trabajos de investigación, a la psicología de la educación.

Garantizamos (índices de uso/*downloads factors*) que sus aportaciones, sean de un tipo o de otro, van a llegar a las manos de miles de psicólogos, pedagogos, psicólogos educativos, profesores y educadores en general (sin olvidar a padres y madres), interesados en aplicar los ***últimos avances*** de la psicología a la educación en cualquiera de sus tres grandes ámbitos: familia (psicología de la educación familiar), escuela (psicología de la instrucción) y comunidad (psicología de la educación comunitaria).

Valladolid, 25 de Mayo de 2012

José-María ROMÁN SÁNCHEZ
Víctor SANTIUSTE BERMEJO

Culture shock
Choque cultural

Adrian Furham

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Abstract

This paper considers the popular concept of culture shock. From the academic perspective co-researchers from different disciplines (anthropology, education, psychiatry, psychology, sociology) have attempted to operationalise the concept and understand the process behind it. It represents fifty years of research using different methodologies and trying to answer different questions about the experience of travel for many reasons. This paper also considers issues concerned with the "overseas" student, of which there are ever more, travelling abroad to study. They can have serious culture shock difficulties. Implications of this research are considered.

Keywords: Adjustment (to Environment); Cultural Background; Culture Conflict; Interpersonal Competence; Study Abroad; Travel

Resumen

El presente artículo pretende abordar el popular concepto de choque cultural. Desde una perspectiva académica, co-investigadores de diferentes disciplinas (antropología, educación, psiquiatría, psicología, sociología) han intentado operacionalizar el concepto y comprender el proceso subyacente. Este artículo compila cincuenta años de investigación sirviéndose de diferentes metodologías y tratando de responder las distintas preguntas acerca de la experiencia de viajar. Este artículo también aborda las cuestiones relacionadas con el estudiante "foráneo", de los cuales hay cada vez más, viajando al extranjero para estudiar. Estudiantes que han de enfrentarse a serias dificultades concernientes al choque cultural. Se han considerado las implicaciones de esta investigación.

Palabras clave: Adaptación al entorno, trasfondo cultural, conflicto cultural, competencia interpersonal, estudiar en el extranjero, viajar

Introduction

People have, and will always, travel to "far off lands", different countries and regions for very different purposes. To convert and then conquer, the trade and to teach, to learn and to settle. There are many ways to categorise these travellers i.e. how long they go for (i.e. migrants vs. sojourners vs. tourists); how far they travel (near vs. far); their motives for movement (education, trade, expansion); the nature of stranger-host relations (friendly vs. antagonistic). There are many types of sojourners: business people, diplomats, the armed forces, students, voluntary and aid workers, missionaries, etc., who often spend six months to over five years in `other countries' in order to do business; represent their country; protect others or instruct other armed forces; study; teach or advise locals; convert and proselytize, respectively. It is obviously important that these sojourners adapt to the new culture rapidly in order that they may operate effectively in whatever they are doing. The costs of repatriation and breakdown are high.

Bochner (1982) have attempted to classify individuals in terms of their psychological responses to the host country. He posited that there are 4 main ways in which people behave when in a new culture:

'Passing' - rejecting the culture of origin and embracing the new culture. The original culture's norms lose their salience and the new culture's norms gain salience. This type of mind set may be prevalent for migrants looking for employment that have come from war-torn countries and seek a new life.

'Chauvinism' - rejection of the current culture and exaggerating the original. The original culture's norms increase in salience and the new culture's norms decrease in salience. This can cause an increased feeling of nationalism for the individual and can lead to racism, and as a society cause inter-group friction. This type of mind set is increasingly rare, with people becoming more accepting of other cultures and religions.

'Marginal' - hovering between the two cultures, the individual is not certain of who he/she is. Norms of both cultures are salient but are perceived as mutually incompatible. This leads to mental confusion for the individual, over compensation and conflict and for the society causes reform and social change. Again this type of mind set is increasingly rare, with integration into a foreign society being greatly eased.

'Mediating' - synthesizing both cultures. This mind set is most ideal as it can mediate between both cultures. Norms of both cultures are salient and are perceived as capable of being integrated. This leads to the individual

growing personally and society exhibiting higher levels of inter-group harmony and cultural preservation. This is probably the most prevalent mind-set that can be.

There is dispute and debate as to who conceived the concept of culture shock and precisely when this occurred. There is less debate about its definition and psychological consequences. Over the years various researchers have tried to refine the definition of the term looking at very specific psychological factors or facets that make up the experience (Winkelman, 2010; Xia, 2009). It has been seen as a loss of one's culture, a marker of moving from one culture to another and as a re-socialisation in another culture. It comes as a "hurtful surprise" to many who travel for various reasons.

Definitions

There remains no clear definition of culture shock, usually attributed to the anthropologist, Oberg (1960) over 40 years ago. Various attempts have been made to "unpack" the definition (Ward et al. 2001):

1. Strain due to the effort required to make necessary psychological adaptations.
2. A sense of loss and feelings of deprivation in regard to friends, status, profession and possessions.
3. Being rejected by/and or rejecting members of the new culture.
4. Confusion in role, role expectations, values.
5. Surprise, anxiety, even disgust and indignation after becoming aware of cultural differences.
6. Feelings of impotence due to not being able to cope with the new environment.

Whilst the term culture shock may have originated in the academic literature it very quickly took root in the popular imagination. The popular media has been full of references to culture shock for 50 years. Guides in how to mitigate the effects of culture shock are offered to all sorts of travels. People recognise it immediately though they are surprised by it. There are many related definitions but they nearly all convey a similar meaning. The concepts quoted are: "disorientation", "anxious confusion", "disease", "mental shock" or "transition shock": it is agreed that culture shock is a disorientating experience of suddenly finding that the perspectives, behaviours and experience of an individual or group or whole society are not shared by others. However it is also agreed that it is a ubiquitous and normal stage in any acculturative adaptive process that

all "travellers" experience. Going to 'strange places' and losing the power of easy communication can disrupt self-identity, world views and indeed all systems of acting, feeling and thinking.

There are long lists of the symptoms of culture shock which include cognitive, emotional, physiological and other reactions. Some researchers have attempted to specify personal factors that seem to predict who and how much individuals suffer from culture shock like Openness, Neuroticism, Language proficiency and tolerance for contradiction (Spencer-Rodgers, Wolliams & Peng, 2010).

There are many rich personal accounts and helpful advice procedures for people to develop better "emotional resilience" to move between cultures

Table 1

Traditional theoretical approaches to culture shock. Adapted from Zhou et al. (2008)

Theory	Epistemological origin	Conceptual formulation
Grief and Bereavement	Psychoanalytic tradition	Sees migration as experience of and adaptation to loss
Locus of Control	Applied social psychology	Control (Internal/External) predict migration adaptation
Selective migration	Socio-biology	Individual fitness and motivation predicts adaptation
Expectations	Applied social psychology	Expectancy-values relate to reasons for migration and adjustment
Negative life-events	Clinical psychology	Migration involves many stressful life changes,
Social support	Clinical psychology	Social and emotional support offers a buffering effect
Value difference	Social psychology	Implicit and explicit value differences lead to poor adaptation
Social skills and culture learning	Social psychology	Lacking social skills may cause constant communication problems

Table 2

Contemporary theories of intercultural contact. Adapted from Zhou et al, (2008)

Theory	Conceptual Framework	Theoretical Premise	Factors affecting adjustment	Intervention guidelines
Stress and Coping (Affect)	Cross-cultural travellers need to develop special coping strategies to deal with the stress of migration	All life changes are constant but inherently stressful	Adjustment factors involving personal (demographic, personality, values) and situational (e.g. social support)	Training people to develop robust stress-coping and management skills
Culture Learning (Behaviour)	Cross-cultural travellers need to learn culturally relevant social skills to communicate in their new settings	Social interaction is a skilled performance which has to be learnt and practiced	Culture specific variables: knowledge about a new culture, language/ communication competence, social intelligence cultural distance.	Preparation, orientation and culture learning, especially behavioural-based social skill training as well as social and emotional intelligence
Social Identification (Social Cognition)	Cross-cultural transition have to adjust to changes in cultural identity and inter-group relations	Sense of personal and group dentity is a fundamental issue for all travellers	Cognitive variables knowledgeable of the host culture (History, Religion,Etiquette) beliefs/attitudes between hosts and sojourners, cultural similarity, cultural identity	Enhancing self-esteem, overcoming barriers to inter-group harmony, emphasising inter-group similarities and identity

(Abarbanel, 2009; Azeez et al, 2004; Barrett, 2009; Bourne, 2009; Green, 2006). This includes what people in educational and work environments can and should do to lessen the experience of culture shock (Guy & Patton, 1996).

Culture shock has been studied in many groups including tourists (Cort & King, 1979; students (Gaw, 2000; Sayers & Franklin, 2008, Willis, 2009;

Xiaoqiong, 2008) and working people (Guy & Patton, 1996). The costs of expatriate failure have encouraged researchers to try and understand causes as well as reduce the amount of culture shock that results (Pires, Stanton & Ostenfeld, 2006)

Some researchers have developed and tested simple models to try to predict who suffers most from culture shock (Kaye & Taylor, 1997). Shupe (2007) proposed a model to understand international student conflict. However the most sophisticated model has been proposed by Zhou, Jondal-Snape, Topping and Todman (2008).

They suggested that there are essentially three contemporary theories in the area: Stress and Coping (cross-culturally travellers need to develop coping strategies to deal with stress because life changes are inherently stressful); Culture Learning (cross-cultural travellers need to learn culturally relevant social skills to survive and thrive in their new settings); and Social Identification (Cross-cultural transition may involve changes in cultural identity and inter-group relations).They propose that there are both individual level (person and situation factors) and societal level variables (society of origin and society of settlement) that jointly determine stress and skills deficit which in turn determines stress coping and skills acquisition. Following this, they noted how culture differences in learning practices and procedures leads to mismatching, misunderstanding and misery as students go abroad to further their education.

There are few psychometric tools specifically trying to measure culture shock. Rudmin (2009) reviewed various measures of acculturation and acculturative stress of which there are a number. However, Mumford (1998) devised and validated a short 12 item measure divided into Core items and Interpersonal stress items

Culture shock is conceived as a serious, acute and sometimes chronic affective reaction to a new (social) environment. However there are other closely related "shocking" experiences. These include:

- *Invasion shock*: this occurs in places where tourists or other visitors suddenly appear in large numbers in a particular setting and overwhelm the locals who become a minority in their own living space. Because the "invaders" retain their cultural morals (of dress, social interaction) they can surprise, frustrate and offend the locals. In this sense they have culture shock without actually going anywhere. Pyvis and Chapman (2010) noted how home students can feel culture in their home country but at an institution

that accepted many overseas students

- *Reverse culture shock:* this occurs when returning to one's home culture to find it different from that which was recalled. In this sense, you can never go home again because it does not exist. It is about readjusting; reacculturating and reassimilating in the home culture (Gaw, 2000)
- *Re-professionalisation and Re-licencing shock*: this occurs when trained professionals do not have their qualifications accepted by a host country and have to be retrained and accepted (Austin, 2007; Austin, Gregory & Martin, 2007)
- *Business Shock*: this is the realisation that so many of the subtle business practices vary considerably from one culture to the next (Balls, 2005; Pukthuanthong & Walker, 2007)
- *Race culture shock*: This concerns being a racial minority in an instution within ones country. Class and race specific styles of dress, speech etc can seriously shock people who do not expect them (Torres, 2009)

The educational sojourn and culture shock

Although the practice of students travelling from one country to another has been established for centuries, particularly in Europe, it is not until comparatively recently that they have become the focus of study (Ward, Bochner & Furnham, 2001; Miller & El-Aidi, 2008). There are various books exclusively on foreign students which look at the psychology of their experience (McNamara & Harris, 1997; van Tilburg Vingerhoets, 1997).

Culture-learning and its effects on the ethnic identity of foreign students remain the concerns the along with gender issues, staff-student relationships and learning preferences, and styles of different groups. There is also an increasing interest in the social networks of foreign students, both while on sojourn and after returning home. Studies have also looked at the cross-national networks that some of these individuals join as a result of having studied abroad and at the mediating function that these individuals and their networks fulfil in bridging the various cultures to which they have been exposed. Many of the studies now employ a longitudinal design.

Much of this research suggests that many students feel classic alienation especially feelings of powerlessness,

meaningless, and social estrangement while being surrounded by the "superficial pleasantries" of their hosts. Most of the research studies have been aimed at looking at the affective, behavioral and cognitive consequences of cross cultural transition in sojourners and have attempted to establish which individual, interpersonal, social, structural and economic factors best predict adjustment.

What are the implications for helping foreign students, or travelers of any kind. *First,* that counselling should be proactive, not reactive and seek out international students who may be vulnerable. *Second,* guidance services should be continuous and comprehensive, not simply confined to orientation sessions soon after arrival. *Third*, that alternative, less stigmatised approaches should be available through less formal and clinical contacts, such as interest or friendship groups. *Fourth*, students should be encouraged to become involved in their own adaptation process as well as the education process as a whole. *Fifth,* the idea of the buddy system, so long used in the American army should be established. *Sixth,* students could be encouraged to feel a certain amount of empowerment through communication workshops set up for them. *Seventh*, counsellors should be sensitive and trained in culture differences, specifically the presentation of psychological problems. Indeed there are so many orientation programmes now available at universities that there is an active research programme in measuring their efficacy (McKinlay *et al.*, 1996).

It is perhaps no surprise that educational institutions have established orientation and counselling programmes for their international students. Some studies have reported incidence of fairly severe breakdown. For instance, Janca and Helzer (1992) in a 25 year retrospective analysis of the psychiatric morbidity of foreign students in Yugoslavia, traced 63 foreign and 120 domestic students who were hospitalized, and found high rates of paranoia and depressive reactions. Of the foreign students admitted, 67% showed paranoid delusions, 62% anxiety, and 52% anxiety which they took as evidence of the correlational between "psychiatric morbidity and maladaptation to the new living conditions" (p. 287).

One area of research that is theoretically important is the work on foreign student friendship networks. Bochner and his co-workers (Bochner, McLeod & Lin, 1977; Furnham & Bochner, 1986) have shown some interesting trends in the friendship networks of overseas students. In a study of foreign students in Hawaii, Bochner *et al.* (1977) developed a *functional* model of overseas students'

friendship patterns, stating that the sojourners belong to three distinct social networks. These are: A *primary, monocultural* network consisting of close friendships with other sojourning compatriots. The main function of the co-national network is to provide a setting in which ethnic and cultural values can be rehearsed and expressed. A *secondary, bicultural* network, consisting of bonds between sojourners and significant host nationals such as academics, students, advisors and government officials. The main function of this network is to facilitate instrumentally the academic and professional aspirations of the sojourner. A *third, multicultural* network of friends and acquaintances. The main function of this network is to provide companionship for recreational, `non-cultural' and non-task-orientated activities.

Many argue, that the amount of social support, rather than who provides it is more important. Thus Pantelidou and Craig (2006) found the quality of social support significantly reduced culture shock in Greek migrant students. Others, however, place more emphasis on the *source* of support and its functions of social support. Thus help from a host-national network is important because through it foreign students can learn the social skills of their culture of sojourn. Help from the co-national network is important because through it foreign students can maintain their culture of origin. The theory predicts that the well-being of foreign students depends on them having access to both types of networks. However, the evidence suggests that most foreign students do not belong to a viable host-national network.

Conclusion

Various patterns in the literature have begun to emerge. Although there are no grand theories attempting to explain this phenomenon, various concepts have been put forward to predict the quality, quantity and chronicity of sojourner distress through culture shock One such concept is the *culture-distance concept*, which states simply that the absolute amount of difference or distance (defined both objectively and subjectively) between a sojourner's own and the host culture is directly proportionally related to the amount of stress or difficulty experienced. Another concept relates to social support and has been described as *the functional friendship model* which suggests that various friendship networks (host, bicultural and multicultural) serve important psychological functions, which in turn help a sojourner over numerous difficulties.

Once again, studies highlighted both intra- and inter-individual factors that related to sojourner adjustment. Psychological research into sojourner adjustment to culture shock is comparatively new. Large-scale, multi-factorial, longitudinal studies, which are theory-derived, may help considerably to identify the problems of increasing numbers of sojourners the world over. It is a complex and difficult area in which to do good academic research one of increasing importance as geographic mobility increases all around the world.

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Cultural encapsulation of children's friendships: A manifestation of prejudice or pride?

Encapsulamiento cultural en las amistades de los niños: ¿Una manifestación de prejuicios o de orgullo?

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Abstract

The overarching purposes of this paper are to consider the ways in which friendship between children and adolescents can be understood and to offer suggestions for how schools can facilitate such friendship. The paper begins by providing some general perspective on the immigrant experience. It continues with some basic definitions of friendship and culture. The history of research on intercultural friendship is considered next, in both quantitative terms – the extent of intercultural friendship– and qualitative terms –the different features of intercultural and intracultural friendship. The paper concludes with the author's views about how intercultural friendship should be best understood and with suggestions for how to encourage it.

Keywords: Immigration, intercultural friendship, school, children, adolescent

Resumen

Los dos grandes objetivos que persigue este trabajo son, por un lado, considerar las variadas maneras en las que la amistad entre niños y adolescentes puede ser entendida y, por otro, proponer sugerencias acerca de como las escuelas pueden facilitar tal amistad. El artículo se inicia con una perspectiva general sobre la experiencia de la inmigración. Continua con algunas definiciones de lo que entendemos por amistad y cultura. El siguiente apartado trata sobre la historia de la investigación en amistad intercultural, tanto en términos cuantitativos –la importancia de la amistad intercultural– y cualitativos –las diferentes características de la amistad intercultural e intracultural. El artículo finaliza con el punto de vista del autor sobre como la amistad intercultural debe ser entendida y con algunas sugerencias sobre como fomentarla.

Palabras clave: Inmigración, amistad intercultural, escuela, niños, adolescentes

Mahatma Ghandi is quoted as saying that no culture can live if it attempts to be exclusive. His Indian successor Jawaharlal Nehru is quoted as saying that culture is the widening of the mind and of the spirit. Wise as the leaders of probably the world's most diverse country were, they failed to resolve many of the conflicts among the cultural groups in their country. Writing at a time of great international conflict, a very prolific member of the mental-health community, Jacob Moreno, pioneer of sociometry, insisted that cultural conflicts cannot be solved at the macro-level but can be resolved at the level of interpersonal relationships (Moreno, 1953). His technique of psychodrama is based on getting individuals to take on new roles in their interpersonal relationships, and, thereby, increasing their understanding of themselves and others. This technique has been applied widely to relationships between insiders and outsiders. In the context of this paper, the outsiders are generally children and adolescents from immigrant communities; the insiders are children of the majority host culture.

The overarching purposes of this paper are to consider the ways in which friendship between children and adolescents can be understood and to offer suggestions for how schools can facilitate such friendship. The paper begins by providing some general perspective on the immigrant experience. It continues with some basic definitions of friendship and culture. The history of research on intercultural friendship is considered next, in both quantitative terms – the extent of intercultural friendship and qualitative terms – the different features of intercultural and intracultural friendship. The paper concludes with the author's views about how intercultural friendship should be best understood and with suggestions for how to encourage it.

Immigration changing the populations of host countries

Recent years have seen tremendous and unprecedented migration of peoples around the world. According to the Migration Policy Institute, an authoritative non-governmental agency that compiles information about migration in all countries, there are well over 400 million immigrants worldwide, with over half of them in the 10 countries with the largest immigrant populations. It is very probable that more people have migrated from one country to another in the past 100 years than in the entire previous history of the world. In the country that has received the highest single number of immigrants, the

United States, immigrants constitute 13% of the population. The proportion is of course much higher in the country that has received the highest number of immigrants per capita, which is Canada; Canada has over 7 million immigrants, 21% of its total population of 34 million. Spain is the country with the ninth highest number of immigrants of any country in the world, with over six million immigrants, about the same as France and the U.K.

Although characteristics of the peoples involved in immigration do vary, there are some general trends that can be supported statistically. Immigration generally brings people from societies in which there is greater emphasis on collectivism than there is in the host country and in most cases a more hierarchical authority structure. Beyond that, there are many differences among immigrants. Some emigrate voluntarily from their home countries, hoping to secure somewhat better opportunities for themselves; others are driven by oppression, war and poverty. Some immigrants are highly educated; many others are not (Arends-Toth & van den Vijver, 2009; Berry & Sam, 1997). Immigrants often gravitate to large cities in which there are other immigrants from the same country.

Host countries vary in terms of how they regard the cultures of immigrants. There is a difference between the *melting pot* approach in the United States, in which the single collective culture is supposed to reflect some combinations of the cultures it is composed of, and the multiculturalism policy of Canada, which provides for the maintenance of distinct cultures within the country. The term *integration,* used often in Europe, is defined in the dictionary as a process in which elements are combined to form a whole; this concept is alien to the multiculturalism of such countries as Canada. The idea of intercultural friendship seems logically to be more of an inherent part of a process of integration or of the creation of a melting pot than a feature of a multicultural society, where some encapsulation of different cultures can be expected.

What is friendship?

The concept of friendship is being increasingly banalized in the era of Facebook. In counterpoint with their peer relations in larger groups, children form close friendships. According to many philosophical writings as well as the findings of studies on what children expect of their friends, intimacy is the feature that distinguishes a close friendship from relationships with other peers. This is traced most clearly

in a book on friendship by the Spanish philosopher Juan Entralgo (1989). Children and adolescents also expect their friends to keep secrets, to provide social support at times of difficulty, to take their side against third parties and to resolve disagreements equitably and with minimal conflict. Children typically become friends with children they encounter at school, in their neighborhoods or in leisure activities, in other words, children who are available to enjoy common pastimes. However, according to the principle of homophily, it is often a shared characteristic that cements the friendship. This may be a physical characteristic, particular talent or strength, or a psychological or behavioral characteristic such as aggression or shyness. At the most basic level, forming a friendship with another person of the same culture is a manifestation of the homophily principle.

Psychologists once believed that children were incapable of close friendship until their cognitive development reached a stage at which they could understand how other children's thinking about a situation was different from their own. However, careful observational studies have revealed that children as young as two or three years form emotional attachments with friends long before they can verbalize any description of their friendships. At all ages, girls and women are more oriented to relating in intimate ways to close friends than are boys and men. However, boys and men also enter into close friendships that are important to them (Benenson, Apostoleris & Parnass, 1997; Bukowski, Newcomb & Hartup, 1996; Howes, 1988; Schneider, 2000).

Many of these features of friendship may vary by culture. Thus, one factor that may affect the ethnic diversity of an adolescent's friendships is whether different cultures vary in their idea of friendship. Krappmann (1996) noted in a review of the literature on cross-cultural differences in children's understanding of friendship that children in almost all societies have very similar concepts of friendships as a supportive, intimate relationship. Similarly, Wissink, Dekovic, and Meijer (2009) found no difference in trust and frequency of contact between the friendships of Dutch, Turkish, and Moroccan adolescents. However, Schneider (1993) suggested that due to their dissimilar social framework, different cultures have different expectations of friends. This is supported by Schneider, Fonzi, Tani, and Tomada's (1997) findings of significantly less conflict and more stability in the friendships of Italian adolescents than Canadian, and also by Benjamin's and Schneider's (2001) findings that adolescent friendships

in Taiwan displayed less conflict, but were more seriously threatened by conflict, than those in Canada. The difference may be that Italian and Taiwanese cultures are more collectivistic, while Canadian culture is more individualistic.

There are many discovered differences in social norms between collectivist and individualist cultures that may relate to the formation and maintenance of close, stable friendships. Members of a collectivistic culture may tend to communicate in a manner that is subtle, indirect, highly contextual, and relatively non-expressive (Bruneau & Ishhii, 1988; Hall, 1976). There are also clear distinctions drawn by members of collectivistic cultures between distant and close relations such as casual versus good friends (Chang & Holt, 1991). People from collectivistic cultures employ less self-disclosure with all relational partners, including close friends (Gudykunst & Nishida, 1983; Won-Doornink, 1985). Meanwhile, Aristotle and Kant considered self-disclosure and mutuality as characteristics of the ideal friendships (Veltman, 2004). Members of individualistic cultures are generally observed to be more direct in their communication styles, have greater interpersonal distance between their conversation partners, and tend to be socialized more toward independence (Gudykunst et al., 1996). These habits could be perceived as aggressive by members of a collectivistic culture who see directness and independence in relations as signs of confrontation and coldness, and so might hinder formation of friendships. Also, minority groups from cultures that emphasize interdependence (e.g., Mexican Americans) tend to be relatively more cooperative than European American children (Eisenberg & Fabes, 1998). LeTendre (1996) found that East Asian children and adolescents are pressured to favour harmony and avoid competition, but must balance this with pressure for scholarship and success in work and school. Non-Asian friends may not understand or empathize with these diverse pressures, and so these friendships may not provide closeness and support the way culturally similar friends could.

In some cultures, including many societies from which immigrants to Western countries originate, parents and teachers have a great deal to say about whom children befriend and what friends can do. In some societies, cousins and other relatives are so close that they can be considered almost friends. It is sometimes found that friendship is not as strong or intimate in very family oriented societies as in other countries, as in some research from Indonesia (French, Lee & Pidada, 2006). However, in other

societies where family ties are strong and where adults and their institution regulate children's lives very extensively, friendship has a specific function as a refuge for confidentiality and any thoughts of non-conformity (Schneider, Lee & Alvarez-Valdivia, in press).

Friendship: Not always a good thing

In philosophical writings, friendship is always admirable and desirable, as it usually is in the social worlds of children, adolescents and adults (Veltman, 2004). However, there is also the "dark side of friendship" – friendship as a negative influence, friendships that lead to delinquency and substance abuse, friendships that may harm the individuals involved. Sometimes, parents regard children from other cultural groups as negative influences and dissuade their children from becoming members of those groups. An example is the Comorian community of Marseille, who were studied by Alles-Jardel, Schneider and Boutry (2002). Immigrants from the Comoros Islands are known for their valuing of education and achievement, which differentiates them from many members of the other African Muslim communities with whom they share the poorer neighborhoods of Marseille. For that reason, Comorian parents actively dissuade their children from becoming friends with non-Comorian children and adolescents from "la rue".

What is culture?

There are cultural differences in much more than the understanding of friendship. Table 2 displays a number of major definitions of culture.

Selected definitions of culture

- Center for Advanced Research in Language Association, University of Minnesota
  "Culture is defined as the shared patterns of behaviors and interactions, cognitive constructs, and affective understanding that are learned through a process of socialization. These shared patterns identify the members of a culture group while also distinguishing those of another group."
- Hofstede, G. (1984). National cultures and corporate cultures. In L.A. Samovar & R.E. Porter (Eds.), Communication Between Cultures. Belmont, CA: Wadsworth.
  "Culture is the collective programming of the mind which distinguishes the members of one

category of people from another." (p. 51).

- Kluckhohn, C., & Kelly, W.H. (1945). The concept of culture. In R. Linton (Ed.). The Science of Man in the World Culture. New York. (pp. 78-105).
  "By culture we mean all those historically created designs for living, explicit and implicit, rational, irrational, and nonrational, which exist at any given time as potential guides for the behavior of men."
- Lederach, J.P. (1995). Preparing for peace: Conflict transformation across cultures. Syracuse, NY: Syracuse University Press.
  "Culture is the shared knowledge and schemes created by a set of

Table 1

Percentages of Cross-Ethnic and Cross-Racial Friendships among U.S. Minority-Group Adolescents Participating in a National Health Study (n=33256). Source: Kao & Joyner, 2006 (by permission, John Wiley and Sons)

Ethnic Group	% Same Group	% Different Ethnic Group, Same Race	% Different Ethnic Group, Different Race
Mexican	58	24	18
Cuban	56	18	26
Puerto Rican	60	22	18
Central American	56	21	23
Chinese	67	23	10
Filipino	68	24	80
Japanese	83	10	70
Indian	58	20	22
Korean	68	15	17
Vietnamese	63	24	13

people for perceiving, interpreting, expressing, and responding to the social realities around them" (p. 9).

- Parson, T. (1949). Essays in Sociological Theory. Glencoe, IL. "Culture...consists in those patterns relative to behavior and the products of human action which may be inherited, that is, passed on from generation to generation independently of the biological genes" (p. 8).

As is evident from these and many other definitions, culture goes far beyond the superficial features of different societies. It involves people's shared understanding of the world around them. Hence, children of different cultures may bring from their cultural heritages very different ways of understanding most events they encounter together. This may limit the common perspective on things that friends usually share.

Immigrant families often (but not always) take pride in their cultures of origin. In many cases, they try to maintain their cultures in spite of the pressure to assimilate into the host culture. Immigrant children face many challenges in learning to function in both their cultures of origin and the host culture. This involves *code-switching,* learning to move seamlessly from the thinking, values, and expectations of the different cultures that they encounter in different aspects of their daily lives – school, home, and community (Auer, 1995).

Cultural identity refers to the individual's identification with his or her own culture. It is one aspect of the emergence of individual identity over the course of development. In multicultural societies such as Canada, cultural identity among immigrant children and adolescents is clearly correlated with psychological adjustment. This is true in more homogeneous societies as well, although simultaneous identification with the host culture may make the immigration experience less stressful (Costigan, Koryzma, Hua & Chance, 2010). Cultivating friendships with members of the same cultural group is one clear way of achieving and maintaining cultural identity. This was demonstrated directly in an interesting study in the Netherlands conducted with children of Dutch and Turkish origin. Verkuyten (2007) demonstrated that in-group favouritism in friendship choice was associated with the collective self-esteem of each cultural group.

These European findings mirror a heated debated that has gone on for the past 25 years among African-American scholars. The late Professor John Ogbu of the University of California at Berkeley used the term "oppositional identity" to describe the cultivation of

African identity that is crystallized by not participating in activities that are valued by Whites and cultivating a an intra-ethnic social circle (Fordham & Ogbu, 1986). In disagreement with the value of this oppositional identity, other scholars, armed with empirical data, have discovered that pride in one's one culture is associated with more favourable views of members of other cultures, not with negative views (Phinney, Ferguson & Tate, 1997). It has also been argued by many scholars that the ability to from friendships with people of other cultures provides preparation for success in school, and then in work, in multicultural societies (e.g., Laframboise, Coleman & Gerton, 1993).

Intercultural Friendship: History, Theory and Reality

Interest in the study of intercultural friendship, especially inter-racial friendship, became an important focus of interest following the racial desegregation of schools in the Southern United States. Achieving racial equality in schooling was the official reason for the Supreme Court's decision in 1954 declaring that separate schools for black and white pupils were not acceptable under the law; segregated schools were completely eliminated by 1970. Many educationalists and social scientists hoped that the desegregation of schools would break down color lines in interpersonal relationships as well. Allport's (1954) influential social contact theory was invoked in fostering hope that the increased contact between members of the different races would result in the end of prejudice. According to social contact theory, the best antidote to prejudice is regular, positive contact with members of the other group. Extended to friendship, the theory posits that regular positive contact will lead to friendships that cross racial and cultural lines.

However, racial desegregation was followed by an informal, unplanned process of racial resegregation. Although they were enrolled as pupils in the same schools, African American and Americans of European origin did not often become each other's friends. At the time, prejudice surely accounted for at least some of the skittishness by children in their relations with pupils of the other races.

Sixty years later, racial encapsulation persists. Table 3 contains more recent data from a nationwide study of adolescents in the U.S. As shown, very few close friendships cross ethnic and cultural lines, and even fewer cross racial lines. This is by no means an isolated finding. an overwhelming number of studies of children's

friendship patterns indicate a high degree of ethnic/racial encapsulation (Boulton & Smith, 1996; Durojaiye, 1969; Hallinan & Williams, 1989; Khmelkov & Hallinan, 1999; St John, 1964; Thirkell & Worrell, 1989). Ueno (2009) suggested that racial encapsulation occurs because youth receive greater acceptance of their racial backgrounds from same-race friends than cross-race friends. Studies conducted in the United States indicate that greater inter-ethnic contact (as in a more diverse school) increases the probability of a child interacting with members of different ethnic groups and of developing intergroup ties at the personal level (Hallinan & Smith, 1985; Hallinan & Teixeira, 1987b; Joyner & Kao, 2000). However, even taking inter-ethnic contact into account, Kawabata and Crick (2008) found differences among ethnic groups in the degree of ethnic encapsulation in the friendships of elementary school students from the American Midwest. In a study of elementary-school students in Montreal, Aboud, Mendelson, and Purdy (2003) found an even greater degree of same-race preference than that shown in similar American studies. Studies from Great Britain similarly confirm a pattern across the school years of racial encapsulation in friendship (Boulton & Smith, 1996; Durojaiye, 1969; Jelinek & Brittan, 1975). Research on this issue is currently being conducted in Barcelona by Professor Ibis Alvarez and her colleagues.

Documenting patterns of racial encapsulation even further, many studies indicate that even when schoolchildren do form friendships with children of other cultures; those friendships are very often limited to the school settings. Only sometimes do friends of different cultures share extracurricular activities; even less frequent is bringing to one's home a school friend of a different culture (Dubois & Hirsch, 1990). Studies from both Germany and Canada indicate that a cross-ethnic friendship is not likely to last as long as a friendship with a fellow member of the same group (Feddes, Noack & Rutland, 2009; Schneider, Dixon & Udvari, 2007).

Recent research in Western Europe has illuminated some of the peer group processes associated with the ethnic encapsulation of children's friendships. Shocking findings in a recent study from Northern Italy indicated that children in elementary school, four to seven years old, who formed friendships with members of the African minority community in their classrooms, did so at the cost of a decline in their own popularity with their peers (Castelli, De Amicis & Sherman, 2007). A recent longitudinal study conducted in Germany with

German and Turkish students revealed that many of the benefits of inter-ethnic friendship depends on whether or not the peer group regards inter-ethnic friendship as normal (Feddes, Noack & Rutland, 2009). Another perspective on peer group process that influences inter-ethnic friendship is offered by Eisenberg and her colleagues (2009), who, based on their work on inter-ethnic friendship in Indonesia, suggested that children turn to members of out-groups for friendship when they are rejected by their own group.

To this day, most researchers view friendships as indicative of tolerance, and thus, inter-ethnic friendships as mechanisms to increase integration and engender positives attitudes towards other races and cultures (Aboud, Mendelson, & Purdy, 2003). That said, similarity has been found to be paramount in formation of friendships (French, Pidada, Denoma, McDonald, & Lawton, 2005), and race is a salient factor (and possible dissimilarity) for children as young as three years of age (Clark & Clark, 1947).

Another perspective on the nature of inter-ethnic friendships could emerge from a focus on majority-minority status and in-group vs. out-group effects. Eisenberg and Sallquist (2009) suggested that children turn to members of out-groups for friendship when they are rejected by their own group. Thus, children with inter-group friendships may be more poorly adjusted, lack in social skills, and have poorer friendships than children with more in-group friendships. This, and nothing to do with culture, could explain why inter-ethnic friendships have often been found to be more superficial and transient than intra-ethnic friendships.

Cognitive processes have also been associated with racial encapsulation in adult friendship; the same processes may apply to children and/or adolescents. People are known to have expectations for how they will be perceived by their partners in a conversation, which may vary by culture. In a social-psychology experiment conducted with university students, Wout Murphy and Steele (2010) assessed participants' expectations prior to conversation. If a Black student was going to converse with a White student, the Black student expected to be perceived positively only if the White student in question was known to have an inter-racial network of friends. No such effect was evident in the expectations of the White students. Jaasma (2002) asked elementary-school studies to describe a positive experience and a negative experience with a member of a cultural group other than their own. A common theme in the descriptions of negative experiences is the fear of

not being understood by members of other cultures.

The School Context and Intercultural Friendships

Some of the processes associated with the cultural encapsulation of friendship choice have nothing to do with culture. Hamm, Brown and Heck (2005) call for a revision of Allport's social contact theory, which maintains that positive social contact between groups results in reduced prejudice. They call for greater attention to contextual factors, including school factors. They note that members of minority and immigrant groups are often behind in basic academic subjects. In many schools, this means that they are assigned to classes for pupils of lesser academic ability. Therefore, they will not have contact with successful fellow pupils of the host culture. If members of immigrant groups do not speak the language of the host country well, they will have difficulty engaging in the supportive conversation that is a major feature of friendship.

Some Canadian schools and universities have found that students of immigrant backgrounds do not enjoy the same extracurricular activities that members of the host culture do. At the University of Toronto, for example, it was discovered that immigrant students do not often participate in Canadian football, which is similar to American football. European football or soccer, however, appeals to many Canadians of both immigrant and Anglo-Western European cultural background.

Within schools, friendship circles may be based on socioeconomic status, which may be a more powerful predictor of friendship choice than immigrant status. Indeed, one of the very few studies in which adolescents were found to have as many friends with other cultural groups as their own was conducted in a neighborhood in Toronto populated by recent immigrants from different parts of the world who engaged in very similar types of work (Smith & Schneider, 2000).

A competitive goal structure in a school environment is thought to inhibit intercultural friendship. Schopler and his colleagues, working with adults, established that interactions with members of another ethnic group are dramatically more competitive than interactions with one's own group (Schopler et al., 1993). This "discontinuity effect" discussed in social psychology literature is based on the assumption that competitiveness with a member of an out-group is beneficial to one's own group (Insko et al., 1988). However, in a more cooperative classroom,

competitiveness need not bring benefits to anyone, as discussed in the following sections.

Children Relate Differently to Intra-Ethnic and Cross-Ethnic Friends: An Observational Study

Relatively little research attention has been devoted to the ways in which children relate differently to friends of their own cultural group and to friends from other ethnic groups. One method of studying the quality of friendships is by having the friends rate the quality of their relationships in questionnaires. We are aware of three studies in which this has been applied to comparisons of intra-ethnic and cross-ethnic friendships, all from Canada. In two of the studies, cross-ethnic friendships were rated as lower in intimacy than intra-ethnic friendships (Aboud, Mendelson & Purdy, 2003; Schneider, Dixon & Udvari, 2007). The exception, once again, is the study mentioned earlier by Smith and Schneider (2000) who found little cultural encapsulation of friendship in a Toronto area where there were many recent immigrants of similar economic status.

We have recently completed the analysis of data from one of the very few studies in which the interactions of inter-ethnic and cross-ethnic friends were observed directly. We wanted to see in particular whether competition would occur between friends who were of different cultural background even when there was no immediate benefit in either competing or cooperation. Based on the literature, we hypothesized that, even in the absence of any incentive, there would be more competition between inter-ethnic friends than friends of the same ethnic group.

The participants were 390 early adolescents (206 males, 184 females) selected from two English-speaking junior high schools. One school was in Montreal, the other in Toronto, both in mostly middle-class neighbourhoods. Grade 7 is the first year of junior high school; the typical Grade 7 student is 13 years old. There cultural origins were Anglo-Western European, 126 participants; East Asian, 87; Central Asian, 53; Middle Eastern, 43; Southern European, 42; Eastern European, 13; and 22 pupils could not be classified.

Each participant was asked to declare which pupils he or she considered to be close friends from a roster of participating students at his or her school. Next, participants were asked whether any of these were the participant's best friend in the whole world and, if not, who the participant's best school friend was. Dyads were formed on the basis of these nominations, pairing participants who

had indicated reciprocally that they were best friends in the whole world.

We used a task developed by Butler (1989). The dyads of friends were provided with a complicated graphic image, and given the prohibitively difficult task of reproducing it on a sheet of paper. The task was chosen as something inherently enjoyable, fairly difficult, and novel enough that participants would have no prior experience on which to base their performance. Experimenters told participants that they wanted to see how well they could perform the task independently, though were informed that they were allowed to look at their friend's work. After 5 minutes, participants were asked to stop, after which point the dyad was separated and each child individually interviewed by the experimenters. Interviews typically lasted 10 minutes, with discussion centred on asking the participants why they looked at their friend's work. Participants were shown part of the video, particularly moments when they glanced at their friend's work. They were then reassured that it was all right, and reminded it was allowed for them to look at their friend's work. They were then asked to discuss why they did so. The results are displayed in Table 4. Please note that the reasons provided to explain the glances are more important than the data on the

Table 2

Number of Glances and Reasons Given for them by Gender and Ethnic Composition of the Dyad (Dyad Means)

Scale	Co-Ethnic Friendship		Inter-Ethnic Friendship	
	Male (n=110)	Female (n=92)	Male (n=80)	Female (n=72)
Average number of glances	5.7 (2.0)	4.3 (3.9)	6.0 (2.3)	4.7 (3.1)
Mastery Reason (%)	74	37	58	18
Comparison Reason (%)	45	29	61	45

number of glances and that the total percentage can be greater than 100 because children may have glanced at their friend's work both in order to compare their relative performances and to find out how to do the task

As shown in the table, our hypothesis about social comparison was confirmed: Both boys and girls explained their glances at the work of friends of different cultural background in terms of comparison. When they glanced at the work of a friend of the same culture, it was explained as an attempt at finding out how to do better

Adaptive Value of Both Inter-Ethnic and Cross-Ethnic Friendships: A Proposition

In conclusion, we believe that inter-ethnic and cross-ethnic friendships are useful to children and adolescents in different ways. Given the many similarities in the ways that members of the same culture think, it is inevitable that many friendships will be between members of the same cultural group. This appears to facilitate cultural identity, which we see as a positive thing. Ethnic encapsulation does not necessarily indicate prejudice although it can be a product of prejudice in some situations, which schools should strive to avoid.

At the same time, inter-ethnic friendship provides the opportunity for intensive positive contact with a member of another group. Befriending a member of another cultural group provides preparation for competent social functioning in a world where many societies are becoming increasingly multicultural.

Therefore, we propose that, once a child has proven capable of finding friends from within his or her cultural group, he should be encouraged to make at least one good friend from another culture. This is inspired from the literature on same-sex and cross-sex friendships (see Kovacs, Parker & Hoffman, 1996). In that literature, it has been found that children who cannot form a friendship with a member of the same sex are at risk for maladjustment. However, assuming that a child already has a friendship with a child of the same sex, also having a friendship with a member of the opposite sex is correlated with adjustment and maturity.

How Schools Can Help

There are many ways in which schools can help facilitate harmonious intra-ethnic and cross-ethnic friendships. The first is by including in the curriculum and school calendar material designed to help pupils

understand each other's cultures. Another important school factor is a cooperative environment, avoiding competition between members of different cultures wherever possible. This can be accomplished by means of avoiding competition in general. As well, members of the host culture can be paired with immigrant children as a way of both providing help and facilitating positive contact.

Other aspects of the schooling of immigrants may indirectly facilitate inter-cultural understanding and inter-cultural friendship in indirect ways. This includes the provision of specific help for immigrant children in academic areas and in the host language.

In these ways, schools can help pupils take small steps that will help them live and work better in tomorrow's multicultural societies. Perhaps civil wars between rival ethnic groups in such places as the former Yugoslavia and far too many other places would be fewer if the potential soldiers had friends of the ethnic groups that became their enemies.

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Children's resilience, loneliness and hope: The Positive Psychology perspectives

Resilencia infantil, soledad y esperanza: Perspectivas de la Psicología Positiva

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Abstract

In this paper, we shall present theoretical approaches and new research on the implications of positive psychology for understanding children's resilience, happiness, and hope. Young people keep contacts with family, friends, "friends of friends" and total strangers. Social networking has been growing in richness, enabling diverse routes to challenge the social isolation. Yet, many children and adolescents continue to feel alone even among friends. Our responsibility is to sensitize families and schools to the children's distress and to promote innovative research as well as prevention and intervention programs, among others. In this paper, we shall discuss the predictive roles of individual and systemic risk and protective factors (such as family support and schools' empowerment) within the positive psychology approach, in order to provide clarification of developmental trends.

Keywords: Resilience, lonelines, hope, children, positive psychology

Resumen

En el presente artículo abordaremos enfoques de carácter teórico y nuevas investigaciones acerca de las implicaciones de la Psicología Positiva en el entendimiento de la resiliencia en niños, la felicidad y la esperanza. La población juvenil entabla contactos de carácter familiar, con amigos, con "amigos de amigos" e incluso con desconocidos. Por otro lado, las redes sociales online son una potente herramienta para habilitar rutas que desafíen el aislamiento social. Pero todavía son muchos los niños y adolescentes que continúan sintiéndose solos, incluso entre amigos. Nuestra responsabilidad es sensibilizar a familias y escuelas de la angustia y la aflicción que presentan estos niños así como fomentar la innovación en la investigación y diseñar programas de prevención e intervención, entre otras iniciativas. En este trabajo, argumentaremos acerca de los roles predictivos del individuo, del riesgo sistémico y de los factores de protección dentro del marco de la Psicología Positiva con la intención de aportar una mayor clarificación de las tendencias del desarrollo.

Palabras clave: Resiliencia, soledad, esperanza, psicología positiva

Introduction

Defining and enhancing human wellness has a rich philosophical and psychological tradition. Today, the study of positive mental health along with human strengths has become the focus of positive psychology. This approach challenges the exclusive focus on pathology that dominated the psychological sciences in the past, and that lacks the appreciation for the positive segments that make life worth living.

In this paper, I shall present theoretical approaches and new research on the implications of positive psychology for understanding children's resilience, happiness, and hope. In my recent book "Lonely children and adolescents" (Margalit, 2010), I proposed the developmental implications of loneliness and hope for children and adolescents in our technological saturated environments that emphasized social need to stay connected, with extended possibilities for interpersonal communication. Nowadays young people keep contacts with family, friends, "friends of friends" and total strangers. Social networking has been growing in richness, enabling diverse routes to challenge the social isolation. Yet, many children and adolescents continue to feel alone even among friends. My goals in writing this book were to sensitize families and schools to the children's distress and to promote innovative research as well as prevention and intervention programs. In my talk, I shall discuss the predictive roles of individual and systemic risk and protective factors (such as family support and schools' empowerment) within the positive psychology approach, in order to provide clarification of developmental trends.

Resilience

Resilience refers to individuals' capacity for coping successfully and functioning competently, despite exposure to a severe hardship (Luthar, Cicchetti, & Becker, 2000). It deals with dynamic interactions between risk and protective processes. The paradigm shift from a reductionist problem-oriented approach underlying the deficient models to the comprehensive empowering models is becoming a prevalent theme across academic disciplines and the helping professions. Employing these empowering models does not deny deficiencies and difficulties; however, the problems are examined within wider multidimensional, dynamic perspectives.

At the beginning, the resilience conceptualization celebrated the identification of "resilient children"

who were successful regardless challenging risk factors. In the second stage, research examined their unique qualities, proposing linear models: i.e., a larger number of risk factors predicted excessive levels of maladjustment outcomes. Similarly, a larger number of protective factors predicted well-being. Risk factors were defined as the individual's characteristics and developmental difficulties or environmental hazards that increased their vulnerability to experiencing negative outcomes. Among the identified protective factors were proposed personality characteristics (i.e., high self-esteem), children's academic success, social competencies, intellectual performance, and the presence of secure relationship with adults (i.e., parents and out-of the family mentors) and (Cicchetti & Rogosch, 2009).

Recent research challenged the former belief that accumulated risk factors predict increased maladjustment. A model shift focused attention on the dynamic interplay of risk and protective factors over developmental stages within different contextual conditions (Belsky & Pluess, 2009), and on approaches such as the salutogenic paradigm. Antonovsky (1987) coined the term "salutogenesis" from salus, the Latin word for health, to emphasize the focus of his model on health rather than on disease. The salutogenic paradigm focuses on the identification and examinations of factors that may contribute to a dynamic movement of individuals along the health experiences of the ease/dis-ease continuum. In line of this approach, we assume that many children experience loneliness at some time, but nobody is completely lonely or fully connected. Children and adults alike dynamically move along this lonely/not lonely continuum. Interventions do not attempt to "repair" the lonely individuals, but to help them to move along this social relations' continuum.

The salutogenic approach has currently a central role in health promotion research, and supported by the World Health Organization (WHO) (Tellnes, 2009). The ability to identify and use internal (personal) and external (contextual) resources for effective coping with challenges was conceptualized as the Sense of Coherence construct (Antonovsky, 1987). This is a global orientation that expresses the extent to which individuals have confidence that their internal and external environments can be treated as structured and predictable; that resources are available to meet increased demands; and that these demands can be considered challenges worthy of energy investment and engagement.

The sense of coherence has been widely studied in different cultures. A longitudinal study (more than 30 years) indicated that child-centered parenting in adolescence and a stable career line in adulthood were directly associated with a high Sense of Coherence at age 42 (Feldt, Metsäpelto, Kinnunen, & Pulkkinen, 2007). Antonovsky pointed out that people with a high Sense of Coherence tend to treat stressors as challenges. Their coping with life stressors were more successful than those with lower Sense of Coherence.

Thus, the trends towards resilience paradigms emerged through the growing realization that many children were able to overcome personal difficulties and familial challenges, reaching successful adjustment regardless of their hardships. It should be emphasized that people seldom experience an isolated problem. Individuals who are at risk on one dimension tend to be at risk on multiple dimensions. Usually multiple risk factors tend to interact in different ways. In order to understand the impact of the risk we need to address to the simultaneous interacting effects of multiple risk factors at once. Protective variables also do not act separately or in isolation, but they operate in interactive patterns in order to buffer individuals against the effects stressful situations (Beasley, Thompson, & Davidson, 2003). Research proposed several models of resilience, and their descriptions will exemplify the complexity of the interactions among factors. For example:

The protective models: Personal strengths and/or resources can moderate or reduce the effects of risk factors on outcomes. The connections between the risk and the outcomes will be decrease when the protective factors are present.

The challenge model: This model suggested that moderate levels of the risk might be related to greater positive outcomes. For example, Youngsters who experienced many family conflicts may feel distressed. However, a moderate amount of family conflicts may provide youth with enough opportunities to learn from the resolution of conflicts, to develop emotional inoculation, and to be prepared to face future challenges.

Traditionally risk and protective factors reflect the individuals' past and present functioning. The hope theory (Snyder, 2002) extend our perspectives by providing the future outlook.

Hope theory

Snyder (2002) assumed that human actions are inherently goal directed. He defined hope as a cognitive set of beliefs based on a reciprocally derived sense of successful (a) agency thinking (goal-directed determination) and (b)

pathways thinking (planning of ways to meet goals). High-hope individuals are convinced in their ability to produce multiple routes to their goals. Their greater repertoire of pathways thinking contributes to a higher probability of accomplishing the desired goals. In school environments, the hope predicted effort, academic performance and achievements even for children with learning disabilities (Lackaye & Margalit, 2006). Hopeful children reported lower loneliness.

Loneliness

The loneliness is a painful emotional experience that affects children's current quality of life and represents a developmental risk for their future. It signals the existence of a failure in the valued area of interpersonal relationships. Loneliness does not mean that children do not have friends and social networks. However, it means that they feel excluded and socially alienated. Loneliness is a subjective experience that reflects a mismatch between children's needs and their social environments (Margalit, 2010). The study of loneliness is in fact the study of children's interrelations, including their self-perceptions in terms of how the children view others and themselves, how others view them, and how they feel about these perceptions and conceptions. Peplau and Perlman's classic definition (Peplau & Perlman, 1982) presented loneliness as an unpleasant experience when individuals perceive a discrepancy between the desired and accomplished patterns of their social networks. The loneliness experience is a global indicator of dissatisfaction from the quality and/or the quantity of individuals' social interrelations. Two children may be alone, but one child may experience loneliness, while the other child wishes to stay alone. Children may have many friends, and yet feel very lonely. They can be in a large crowd, in a family gathering or a social party, and yet feel alienation from the group.

The following general statements present the commonly accepted results from several loneliness studies:

- Loneliness is a distressing negative emotional experience that has clear cognitive segments.
- Loneliness is a subjective experience that may not be supported by objective situations.
- Loneliness is a reaction to unfulfilled needs: (1) for intimacy and/or (2) for social belonging.
- Loneliness is transient and a temporary state for many individuals, yet chronic states for others.
- Loneliness 'runs' in families, disclosing the joint impact of genetic and environmental factors.

- Loneliness is different from solitude. Solitude is considered as a pleasant and even desirable situation that may promote a creative experience or provide an opportunity for rest from stressful realities.
- Loneliness is different from depressive mood. Loneliness represents attempts to approach others, while depression represents withdrawal tendencies to avoid negative feelings.

Developmental perspectives

Children understand and report their loneliness from early developmental stages. Their needs for relatedness can be identified even before entering school. Self-perceptions such as Sense of Coherence, social self-efficacy beliefs, hope expectations and attribution styles were consistently related to loneliness experiences. We examined the loneliness of children with typical development as well as children with special needs, and especially with learning disabilities.

Children whose development is marked with academic challenges such as learning disabilities are at an increased risk for lower self-competence, deficient social skills, and higher levels of loneliness. The study of children's loneliness requires the consideration of environmental conditions that promote or discourage individuals' abilities and the likelihood of experiencing satisfying human connections.

Children learn their first social interactions within their families through developing intimate relations with parents and siblings (Le Roux, 2009). The breakdown of the nuclear family, the rising divorce statistics and the increasing mobility of modern society all contributed to increased loneliness until it reached epidemic proportions in our time. The nature of parent-child interactions have been considered the roots of social competence, providing children with the confidence, knowledge, and experience that serve as the basis for later social growth and peer relations.

The attachment conceptualization predicted different levels of social connections (Mikulincer & Shaver, 2009). From early developmental stages, infants needed intimacy and continuous contacts with their parents. Gradually they develop their independence and autonomy. The dynamic conceptualization of attachment relations was expressed through the youngsters' successful struggles for a satisfactory balance between staying very close to their parents and negotiating their personal distance, independence and autonomy. Various aspects inside families, such as the cohesion and supportive

relations among family members, communication styles, siblings' conflicts and parental social activities provided guidance for their children's social development. Parents' Sense of Coherence, the family's strengths and capacity for successful adjustment (Al-Yagon & Margalit, 2009), and parental hopes and coping abilities, all joined together and related to children's functioning within environments that either promoted their capacity to form meaningful companionship or may encourage social isolation. Children's characteristics, strengths and disabilities interacted with familial factors, predicting loneliness at home and at school.

Teacher–child relationship quality and feelings of closeness and confidence further affected the tendencies for social connections (Rimm-Kaufman & Pianta, 2000). The distinctiveness of students' interpersonal closeness to teachers predicted wellbeing (Al-Yagon & Margalit, 2006). Children's unique characteristics such as learning disabilities contributed to their vulnerability to loneliness at school. Overall, children's school adjustment was facilitated by obtaining close relationships (attachment) with their teachers, whereas teacher–child conflicts predicted the children's poorer adjustment and the development of alienation in classes.

Children with learning disorders, behavior problems and attention difficulties often reported higher levels of loneliness as related to their emotional distancing by their teachers. In addition, these children also expressed lower levels of hope for changing their school situation and many felt alienated at school.

Peer relations have been considered an important challenge for boys and girls during different developmental stages. Loneliness emerged not only because of the lack of friends, but sometimes also as a result from problematic friendship relations (Waldrip, Malcolm, & Jensen-Campbell, 2008). Several negative qualities of friendship such as jealousy, conflicts, aggression and victimization may extend the impact of developmental risks. Thus the quality of interpersonal connections with friends and classmates may be treated both as an important index.

Research showed that children do not have to be exceptionally popular or well liked to avoid feeling lonely, but peer rejection and social skills' difficulties clearly contributed to loneliness. However, not all the children with difficulties were lonely. The value of positive self-perceptions and hope orientation were recognized as protective factors and as predictors of resilience and effective coping with challenges.

Loneliness in different cultures

The personal expressions of loneliness differed across cultures and social attitudes. If the community viewed a given behavior as acceptable or even desirable, then parents and teachers would attempt to encourage its development and enable its expressions. Surprisingly, comparative research clearly demonstrated the universality of the loneliness experience. Children who were socialized under different social and cultural backgrounds experienced similarly the feelings of loneliness and social distress (Rubin, Coplan, & Bowker, 2009). Young children with learning disabilities in different cultures such as Israel, China and USA expressed higher levels of loneliness. The internet environment provided new social opportunities of establishing connections. Future studies have to clarify the contradictory trends between limitless connectivity due to Internet and Cell communication, the blurring boundaries between private and public environments, and the remaining distress of social isolation. The results of several studies revealed the irrelevance of the generalized approaches regarding the global impacts of online communication and relations. They have to be treated as an inseparable part of their overall social behavior (online and offline) in order to achieve consistent and meaningful answers.

Hopeful thinking and expectations seemed to boost effort investment in social and academic challenges not only for typical developing children, but also for those children and adolescents with learning disabilities (Lackaye & Margalit, 2006). We performed several studies that included typical developing children and children with learning disabilities. Samples consisted of several age groups from elementary schools (10 years old), to middle schools (12-13 years old) and high school students (16-17 years old). The studies examined the contributions of individual and familial variables for the prediction of the loneliness as a developmental risk and the sense of coherence as a protective factor. Family cohesion and children's hope contributed to the explanation of the risk and protective outcomes. The results of studies showed that children develop their relatedness and independence in different contextual conditions, moving along different developmental paths, adaptable to their families' variability.

In conclusion, within resilience paradigm, children's characteristics and familial distinctiveness jointly and dynamically contributed to behavior understanding. Prevention and intervention programs are currently being developed using the resilience

paradigm to promote hopeful thinking, reduce social alienation and enhance wellbeing (Margalit, 2010). Short and extended workshops are currently in their initial developing stages with promising results in pilot studies. Their description will be detailed in my presentation and provided in the book on children loneliness (Margalit, 2010).

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No new skills without existing skills, but these skills are both practical and conceptual

Ninguna habilidad nueva sin las habilidades ya existentes, pero estas habilidades son prácticas y conceptuales

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Abstract

The title of my presentation reformulates the central postulate of Piaget's theory: that a new structure can only be built on the basis of an existing structure related to the same kind of problem. I will first explain how Piaget used this postulate as the foundation for his work on the birth of intelligence. Then I will illustrate this process by means of the development of prehension behavior. I will examine several oppositions between practical intelligence and conceptual intelligence, and reconsider the use of the terms "practical" and "conceptual" to differentiate between systems of knowledge at different levels of development. My research on the construction of simple tools by children aged 4 to 9 years old will illustrate in more detail the process of developing new skills on the basis of pre-existing skills (that are simultaneously practical and conceptual). I will conclude my presentation by discussing some problems in the history of scientific and technical knowledge that are comparable to those discussed in relation to practical and conceptual skills in child development.

Keywords: Prehension behavior, practical intelligence, conceptual intelligence, skills development.

Resumen

El título de este artículo reformula el postulado central de la teoría piagetiana: Una nueva estructura puede ser construida sólo sobre la base de una estructura existente asociada al mismo tipo de problema. Explicaremos como Piaget se sirvió de este postulado para elaborar su trabajo sobre el nacimiento de la inteligencia. Después, ilustraremos este proceso por medio del desarrollo del comportamiento de prensión. Examinaremos las confrontaciones entre la inteligencia práctica y la conceptual y reconsideraremos el uso de los términos "práctica" y "conceptual" para diferenciar entre sistemas de conocimiento en los diferentes niveles de desarrollo. Esta investigación sobre la elaboración de herramientas básicas para niños de 4 a 9 años ilustrará detalladamente el proceso de desarrollo de nuevas habilidades sobre la base de habilidades prexistentes (que son simultáneamente prácticas y conceptuales). Concluiremos el trabajo discutiendo sobre algunos problemas en la historia del conocimiento científico y técnico que son comparables a aquellos relacionados con las habilidades prácticas y conceptuales en el desarrollo infantil.

Palabras clave: Comportamiento de prensión, inteligencia práctica, inteligencia conceptual, desarrollo de habilidades.

"The human triumph was to turn [the hand] into the ever-skillful servant of human technical intelligence." André Leroi-Gourhan

Introduction

Prehension under visual control, as performed by one-year-old babies, is a new skill that must be considered to be both cognitive and motor/perceptual. In developing this new skill, the baby acquires complex procedural knowledge or motor skills, as they are generally known, namely prehension. Simultaneously, the baby acquires what is generally known as knowledge, such as shape and size constancy by the age of 3 months, and object permanence (A-not-B situation) between the ages of 8 and 12 months. And of course, both kinds of acquisition have emotional, affective, social and linguistic dimensions.

At birth, forms of these different skills already exist, such as precocious prehension, grasping, looming, perceptual constancy and early forms of object permanence (described as a "practical" by Piaget (1936)). It is easy to understand how "pre-existing skills" and "new skills" have led researchers to stake out opposing epistemological stands: preformist, extractionist, constructivist. To avoid such dichotomies, we must first:

- Admit that pre-existing skills are different from constructed skills
- Admit that pre-existing skills are what initially allow babies to interact with their environment
- Admit that pre-existing skills play a role in the construction of new skills (similar to "architect" genes in embryogenesis)
- Consider that new constructed skills are not conceptual skills alone
- Finally, understand that pre-existing skills must also have resulted from something. Preexisting reflex skills have a phylogenetic and embryogenetic history in the course of which essentially inseparable conceptual skills and practical knowledge had to be involved

The role of existing structures in the construction of new ones: Piaget's perspective

Among the numerous determinants of human behavior that invite examination, the existence, importance and roles of the kinds of behaviors known as "pre-existing behaviors" or "precursors" of the acquisition of behaviors that we will describe as "new" is one of the most important.

Infant development is usually characterized by the successive

appearance of "new" behaviors, such as the first smiles, first steps, first words, first sentences, etc. The child's development of behaviors is generally described as a transition from one state, where the behavior is considered to be absent, to another state in which the behavior is considered to have been acquired, potentially distinguishing among different levels of expertise or degrees of automatization.

However, it is often forgotten that, for any "new" behavior, such as walking, talking, reading, writing, etc., there are pre-existing behaviors ("precursors" or "prerequisites"), whose structure or organization partially determines the behavior to be acquired or, at the very least, constitutes a necessary but not sufficient condition for its acquisition.

To deal with this problem, I will start with two of Piaget's postulates:

- No new structures without existing structures
- no structure without a genesis (in Nther words, every structure has a genesis)

We should note that Piaget often minimized the complexity of existing structures or behaviors out of a fear of preformism. From my point of view, the complexity of existing structures does not necessarily negate the newness of constructed structures. On the contrary, it appears to me that the initial complexity of pre-existing behaviors determines the diversity of environmental aspects that may become involved in this construction and the diversity of kinds of processing that the subject may carry out.

Thus, a newborn, for example, has automatic reflex structures (constructed during the course of phylogeny and embryogenesis) that effectively ensure his adaptation to a variety of situations. From this perspective, he can be considered to be "competent" or "mature." Nevertheless, this adaptation is only relative and these inherited structures are poorly adapted to handle many other situations for which the baby does not have satisfactory solutions. In this context, Piaget speaks of disequilibrium between the baby's pre-existing structures (or capacities) and the problematic situations he encounters and to which he must adapt. In his view, these states of disequilibrium trigger a process of re-equilibration.

I will illustrate the reconstruction of a new structure on the basis of an existing structure by examining prehension behaviors.

An illustration: Prehension behaviors

Prehension behaviors are complex behaviors that must coordinate a

number of elementary skills: visual tracking of a moving object, moving the hand closer and manually capturing the object.

The genesis of this behavior was described in the 1930s by Halverson (1931). Halverson situates the emergence of a more or less adult-like prehension skill, characterized by a perfectly integrated pattern, at the age of 12 months. A preexisting prehension skill in the newborn had already been described at the beginning of the twentieth century, by Halverson himself among others. This skill, referred to as precocious, was only demonstrated experimentally in the 1970s and 1980s, in particular by Hofsten (1982). Precocious prehension achieves the three main functions of this complex activity: visual capture of the object, extension of the arm and, simultaneously, opening and then closing of the hand aimed at the object.

Starting from this pre-existing skill, which is manifested by the baby in her first days of life, the later development of prehension behaviors involves the progressive dissociation of the initial coordinations; it is a matter of decoupling, broken synergies, partial pattern individualization, inhibition of reflexive and automatic reactions, etc.(Mounoud, 1983; Mounoud, 1993; Mounoud, 1994). It is as if the baby were initiating an experimental process through these dissociations.

These descriptions in terms of breakage or inhibition were followed by new descriptions in terms of composition, coordination, integration, synergy, and sequencing, which manifest the emergence of skills that are often described as conscious and voluntary.

Based on this illustration, we can recapitulate our descriptions as follows:

- At birth, precursor behaviors exist that are described as automatic or reflexive
- At the start of the second year of life, behaviors appear that are described as "voluntary" or consciously controlled.

I have merely outlined the history of prehension. One can observe the later stages of the development of prehension during the second, third and fourth year, particularly in activities involving embedding of objects: first simple embeddings that require differentiated but combined action by both hands (second year); then complex embeddings of objects of different sizes that require sequences of actions to be planned, which occurs in the third and fourth year (Greenfield, Nelson, & Saltzman, 1972). These are examples of what I call complex prehension. Schematically speaking, one can say that initial pre-existing behaviors mainly depend on the subcortical

structures that are responsible for automatic regulation; new, consciously controlled behaviors are primarily subserved by cortical structures and conscious attentional regulation systems (Shallice, 1991). These are the structures that make it possible to construct new representations and new programs.

Distinctions between two types of intelligence or knowledge

Since the start of the twentieth century, psychologists have contrasted two kinds of knowledge or intelligence, usually described as practical, concrete or situational intelligence and conceptual, representative or verbal intelligence. Among other things, these two types of intelligence are used:

- To compare levels of development:
  - Either among species, such as great apes and humans (Köhler, 1917; Köhler, 1927)
  - Or within a single species to characterize the stages of phylogeny in ethnographic studies of the development of the first tools (Homo habilis and Homo sapiens) (Leroi-Gourhan, 1964);
- To compare the stages of ontogeny (Piaget, 1936; Rey, 1934; Wallon, 1945)

The oppositions between practical knowledge and conceptual knowledge have most often been used in the past to distinguish between different stages in the development process. They have also been used to compare coexisting systems of knowledge that are considered to be different in nature and clearly dissociated, such as technical knowledge vs. scientific knowledge, a problem that I will address in the last section of my presentation.

Piaget (1936) made use of both concepts (differences in the level and nature vs. difference in nature). On one hand, he contrasted the sensorimotor intelligence (not symbolic) constructed by the baby and the representative intelligence (symbolic) of the older child; the latter (new) derives from the former (existing). On the other hand, he considered that, beyond the sensorimotor stage, which ends around the age of 18 months in his view, sensorimotor intelligence continues to develop and becomes practical intelligence, which continues throughout the lifespan under verbal or conceptual reality.

Piaget's theory appears to focus primarily on a validation of sensorimotor activities, which he considered to be the origin and foundation of conceptual intelligence: "Thought proceeds from action in its essential mechanism, which is the system of logical and mathematical

operations, and it is therefore by analyzing elementary actions and their progressive internalization or mentalization that we will reveal the secret of these concepts" (Piaget (1950) pp. 21–22, our translation). However, we know that, other than the sensorimotor period, Piaget only studied and valued the development of what he called representative intelligence (or thought or reasoning); he had little interest in what he called practical intelligence. When Piaget started his work on the history of human knowledge (his epistemology), he was interested above all in the history of thought, which, in his view, was related to language. When he stated that sensorimotor intelligence, which is nonverbal and non-symbolic, continues throughout the lifespan as practical intelligence, independently of representation or conceptual intelligence, we can see how little inclined he was to include practical and technical knowledge in the history of thought.

Around the same time, Rey (1934) developed a point of view that was similar, albeit somewhat symmetrical, to Piaget's approach (which he had become aware of when he read the manuscript of The Origins of Intelligence in Children, which Piaget lent him). He contrasted the development of practical behaviors, "which allow us to solve most daily life problems," and of rational thought, considered as the "more or less fortunate consciousness related to relationships directing activity" (p. 222). Nevertheless, Rey, unlike Piaget, considered that rational thought could facilitate practical behavior. Moreover, he insisted that, once practical behaviors had been elaborated, they could then be automatized, and this automatization was accompanied by the withdrawal of active intelligence.

Ever since 1968, when I wrote my doctoral dissertation (Mounoud, 1970; Mounoud, 1977), I have questioned the idea of using the opposition between "practical" and "conceptual" to differentiate between systems of knowledge of different kinds and/or levels, for example with or without symbolic representation.

On the other hand, I considered that the use of the adjectives "practical" and "conceptual" could be appropriate and necessary to define two complementary and concomitant modes of functioning that are involved in learning any skill:

- An approach that is characterized by practical exploration and experimentation activities intended to identify certain aspects and dimensions of a problematic situation. Recall that such explorations are partly governed by pre-existing skills
- A concomitant approach that

is characterized by the use of deductive and inductive activities to plan the material or mental actions to be performed

Once a certain level of expertise has been acquired, new skills can become automatized and no longer necessarily require recourse to all the processes and activities that allowed them to be built up; they no longer need conscious reactivation and rely on shortcuts or routines (what Rey described as the withdrawal of active intelligence).

Changing the significance of the opposition between practical knowledge and conceptual knowledge, which is so strongly anchored in the history of psychology and the social sciences, is no easy matter. I think that the idea of a diachronic difference in development levels and of a profound diachronic or synchronic difference between practical and conceptual knowledge is still deeply ingrained. From my perspective, it is preferable to view them as two complementary, and hard to separate, approaches to the construction of new skills.

The construction of simple tools by children aged 4 to 9 years old

Before I illustrate my point with some examples, I will briefly comment on methodology. Some experimental situations are better than others for shedding light on the origin of the transformations of knowledge that children undergo during their development. For example, in recent years, I have used the priming paradigm with naming or category decision tasks to study the role of action perception or evocation in object recognition in children aged 5 to 12 years old and young adults (Mounoud, Duscherer, Moy, & Perraudin, 2007; Perraudin & Mounoud, 2009). This type of paradigm is very good at highlighting the major changes in the course of development but it does not provide any information on the mechanisms underlying them. On the other hand, a word association paradigm using action verbs that I have also used with children aged 5 to 11 and young adults allows one to collect data concerning the origin of the observed changes (Duscherer, Khan, & Mounoud, 2009; Duscherer & Mounoud, 2006).

In my view, the scenarios that are most useful for studying the origin of changes are those that first allow the child to assess her performance in terms of success or errors and then allow her to complete or correct her performance, in other words, to regulate it and to change her representation of the situation. It cannot be denied that practical problem-solving situations are ideal for this purpose. That is why I became interested in experiments involving the construction of simple

tools to solve practical problems (Mounoud, 1970). I should, however, point out that tools represent a unique class of objects that mediate between the subject's actions and the situations in which they are used. One can define a tool as any object that the subject associates with his action to carry out a task. Thus, the tool constitutes a sort of intermediary between subject and object: it is associated with the subject's actions, which it transmits to other objects, it is substituted for certain actions of the subject whose functions it performs, and finally it is in a complementary relationship with the objects to which it is applied.

The bottle

The first experiment I carried out is not a new one. I took the material from a test by Rey (1934) called "Choix et confection d'instruments" (choosing and making instruments), inspired by an experiment he had carried out earlier for his thesis.

The test, which is administered to children aged 4 to 8 years old, consists of constructing a hook-like tool from

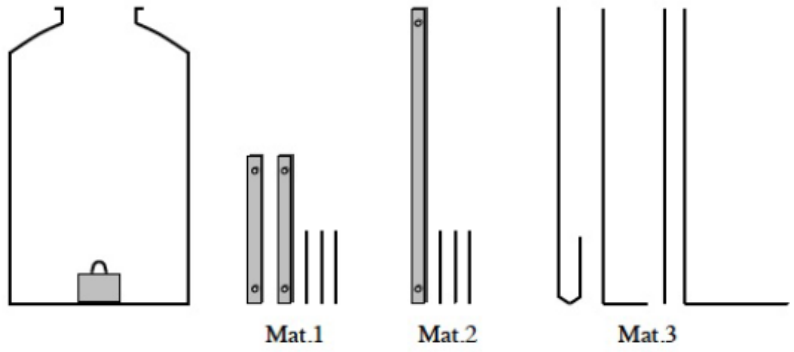

Figure 1. The bottle containing the cube with a ring and the three sets of material.

different materials to remove a small cube topped with a ring from inside a narrow-mouthed bottle, cf. figure 1. The task requires subjects to solve three problems and indirectly achieve three goals by using a tool: reach the cube, hook it, and extract it.

The sets of materials are presented to the subjects in decreasing order of complexity.

The first set of materials (Mat. 1), which is the most complex, comprises two short sticks of equal lengths (10 cm each), which together are as long as the bottle is tall (20 cm) and

which are pierced laterally with small holes at each end; there are also three flexible metal wires (5 cm each). The solution consists in attaching the two sticks together with one of the wires and then attaching a second wire to the bottom and bending it to make a hook with which to catch the cube by its ring. The second set of materials (Mat. 2) comprises a stick the same length as the bottle, which is pierced laterally with a small hole at one end, and of three flexible metal wires. The solution consists in attaching one wire to the end of the stick and bending it appropriately.

The third set of materials (Mat. 3) is composed of four metal rods of the same length as the bottle. Three of them are curved at the end, but each curve is different and only one is appropriate for the purpose; the fourth rod is straight. The goal, therefore, is not to build but to choose a tool and then try it out.

The experiment takes place in three steps:

1. The bottle containing the cube with a ring on it is presented alone. The subject is asked to think about ways to get the cube out (anticipation of tools). Only half of the subjects experienced this first phase in order to control for a potential role of anticipation on their later performance.
2. Then the three sets of materials are presented successively (in the order 1- 2-3) until the subject succeeds in removing the cube.
3. After the subject succeeds, he is again presented with the materials with which he did not achieve the goal (in the order 2-1).

For steps 2 and 3, subjects are asked to explain why they failed or succeeded.

Anticipation of tools

I will examine the first step in the experiment, referred to as "anticipation of tools" and then discuss the choices and attempts made by the youngest children with the four rods in Mat. 3, which provide some additional important information. The analysis of the methods anticipated by the children for performing the test appears to me to be essential for understanding their later behaviors.

The children suggested some very different classes of tools. Although we can hypothesize that the anticipated tools reflect the concepts whereby the children assimilate the situation, it is still possible to misunderstand the meaning of the tools if we do not ask the children how they would use them. The classes of tools mentioned and the ways in which the subjects wanted to use them define different relationships

between the subject and the object in terms of the properties attributed to the tool and to their own actions. In the anticipation phase, it was not only the kinds of tools that changed but also the functions fulfilled directly by the subjects through their actions.

The anticipatory responses given by the children changed considerably with age.

They moved from sticks or rods, typical of 4-year-old children, to shovels and spoons at 5 years old, then to pincers or tongs at 6 years old, ending up with fishing rods, with a line and a hook, at 7 and 8 years old.

These different kinds of responses enable us to characterize the main changes in the children's understanding of the situation over the course of their development, and especially which aspects of the situation are taken into consideration in the different anticipations.

Tools in class 1 (suggested mainly by 4-year-old children), of the stick or rod type, address the problem of reaching the cube.

The tool has the role of lengthening the arm. This role is relatively minimal in relation to the participants' actions intended to grasp the cube and remove it from the bottle. When they are given the four rods in Mat. 3, children of this age usually choose the straight one. When one of the other three rods is tried, it is generally turned around and the curved part is identified as a handle. When they use the straight rod, the children engage in numerous manipulations to try and remove the cube by pressing it against the bottle's sides or by trying to insert the rod into the ring. These children often explain their failures by saying "it would work, but I can't do it", believing that the tool would fulfill the function attributed to it and the failure was due to their own actions. When they are asked if there is some way to remove the cube, the answer is often "we need a longer rod".

Tools in class 2 (suggested mainly by 5-year-old children), of the shovel and spoon type, address the problems of reaching and grasping the cube in order to take it out of the bottle. After the cube is reached, it is the grasping action that is assigned to the tool; reaching and grasping are integrated, and extraction must be achieved by the subject's action. The instrument is no longer simply an extension of the arm but is also an extension of the hand. Consequently, the proportion of the solution that relates to the subject's action is reduced. When given the four rods in Mat. 3, most children choose the tightly curved one and say "because it has a hook".

Although they follow directly after the first two classes, the next two classes are quite different from them. When the attribution of different

functions gives rise to a tool that reproduces the series of actions that make up the prehension schema, then, because of the internalization of actions, it will lose the signs of its origin and become a whole that has properties independent of the action and that can, consequently, transmit that action.

Class 3 (suggested mainly by 6- and 7-year-old children) comprises pincer-type tools. A pincer is a tool that, in the subjects' view, possesses an essential quality: it reproduces and transmits at distance the action that one performs on it. The children have therefore moved on from simulation of the action to transmission of the action by the tool. This is a radically new concept that marks the appearance of what we can call a true tool. Thus, the action itself again plays a predominant role, since the pincer, in effect, only reproduces it; this allows the children to ignore the tool's role, when they make their comments: "I open the tongs and then I take the piece of wood [cube]," said Dub(5;11); Fra(7;1) said, "I will grab it [the cube] and then I'll pull out the pincers." These comments clearly show that the dissociation between their own actions and the properties of the object is not complete. Nevertheless, the children are concerned about the relations between the tool and the material set-up: Bal(8;0) said that "something thin enough to get in and take it" was needed; Fra(7;1), after thinking about using a pincer, then abandoned the idea, stating, "no, it's too big"(= wide).

This search for complementarity between the tool and the situation leads children to class 4 tools (mainly suggested by 7- and 8-year-old children), of the fishing rod type (rod + line + hook), which mark the end of the development process. Although complementarity with the setup was still general and relative in the previous class—in particular, the ring on the cube was ignored—the ring becomes crucial at this stage and the children start thinking about hooks. In their anticipations, the subjects completely dissociate the functions the tool fulfills (reaching and grasping) from the actions it transmits (extraction). Here is a good example: Lon(8;11) drew a fishing rod and made the following comments: "a stick, a string 10 coming down, a hook, then it hooks on." He then explained how he would use it: "I thread it through [the ring], and then I pull up."

In a way, the various anticipations can be considered to be innovative and creative; nevertheless, they illustrate a change in cognitive development that is comparable to the change observed by means of the other experimental techniques (constructions and explanations of choices).The anticipations, constructions and

choices are determined by profound changes in the children's understanding and representations of the situation. In my view, they depend more on age than on individual di_erences, although such differences do of course play a role.

The trap

The second experimental situation that I studied consisted in asking children aged 4 to 9 years old to move a small cube located behind different obstacles by means of a tool. This is a situation that belongs to the class of "detour behaviors" (Mounoud, 1970; Mounoud, 1996) (Mounoud,1970,1996).

As we all know, there are different ways to get around an obstacle. In babies, for example, it is common to distinguish between "manual detours" (executed with the arm) and "locomotor detours" (executed with the whole body) (Lockman & Ashmead, 1983). As well, a manual detour can be executed with or without an intermediary that extends the arm, as Guillaume and Meyerson (1930) showed experimentally. This kind of situation was revisited by Diamond (1988) and Diamond and Gilbert (1989) under the name of "object retrieval."

The equipment used in my experiment takes the form of a box (without a lid) with a rectangular base measuring 25 x 30 cm and a height of 4 cm. One of the sides of the box has a 5- cm-wide opening and two partitions (v and h) are added on the inside, making a little entrance corridor. Three squares of different colors (c1, c2, c3) are glued to the bottom of the box. A small black wooden cube with 1-cm sides is placed in different locations (p1, p2, p3 and p4), cf. figure 2. The

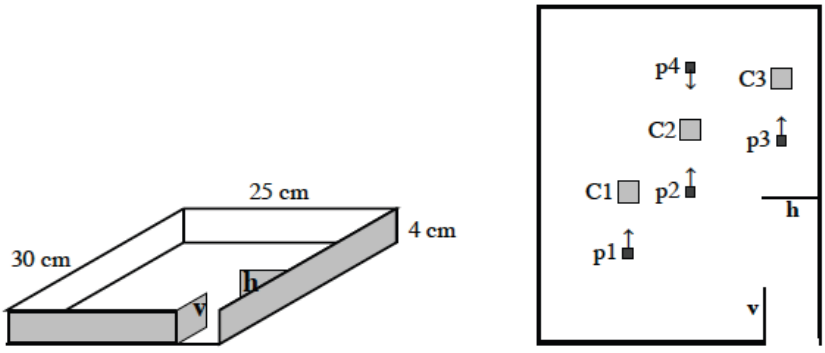

Figure 2. The rectangular box (the "trap") in perspective and in projective plan.

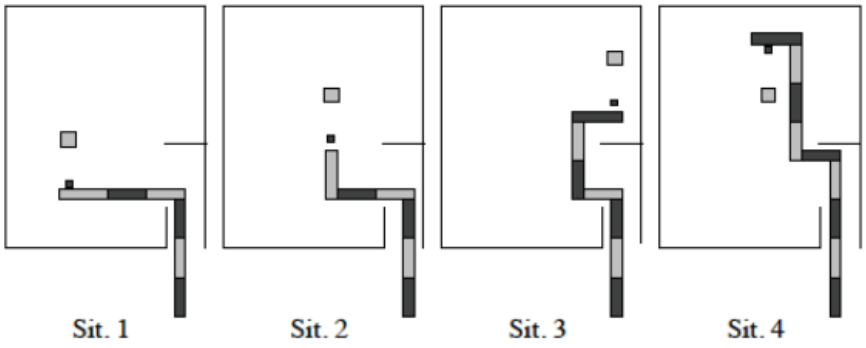

Figure 3. Instruments allowing to solve each situation.

task consists of moving the cube from one of these positions to the target that is located just "above" or "below" it, by using a tool that the subject must build in advance.

Four situations may be presented: from p1 to c1 (sit. 1), from p2 to c2 (sit. 2), from p3 to c3 (sit. 3) and from p4 to c2 (sit. 4), cf. figure 3. These movements must be carried out using tools (bent rods) that are operated from outside through the side opening, after the instrument is inserted into the box. The displacement is always the same (5.5 cm). Only the nature of the detours that must be made to reach the cube varies. We should point out that the various possible detours the tool could take to reach the cube are not necessarily appropriate to move it, given the relationships between the different segments of the tool and the layout of the box.

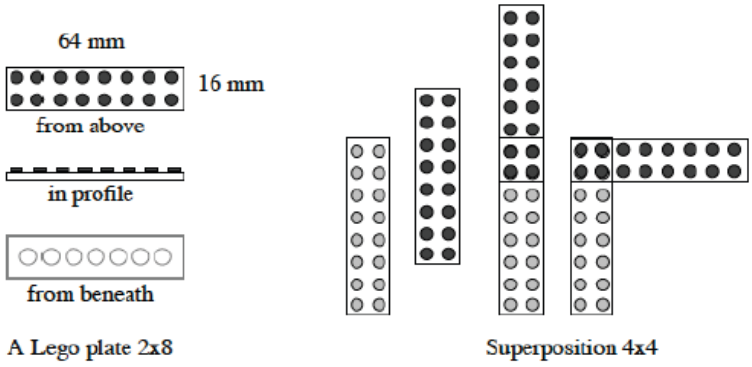

Figure 4. The lego plates structure and assembling.

The tools are made out of Lego pieces, namely small rectangular plastic plates, all identical, 16 x 64 mm in size, which can lock into each other with a push-button system, either to extend each other or at a right angle. The plates are recovered of two lines of height buttons above them; beneath the plates are scooped out, creating an empty space surrounded by very thin walls; in this space seven tubes are aligned, cf. figure 4.

After the subjects are asked to describe the set-up, they are told that they will need to move the cube from its initial position to the colored square by using a tool they will build and operate from outside the box. In the anticipation phase, they are then asked what they would need to have in order to move the cube at a distance. Then it is suggested that they build "something" with the Lego pieces that will allow them to carry out the task. All children are familiar with Lego. Nevertheless, given the specific use they are making of it in the experiment and the large number of possibilities for assembly, they are told that they will use only one kind of Lego piece and that the pieces have to be assembled either in a straight line or at a right angle with an overlap of 16 x 16 mm (4x4 buttons), cf. figure 4. The subjects are told that, once the tool has been inserted into the game, it has to 13 be moved from the outside, without going over the partitions. To ensure that the youngest children understand these instructions, we put a transparent cover on top of the box once the tool has been inserted. The tool is constructed and corrected outside the box. Children were asked about the four situations in the order 1 to 4, with the first one partially acting as a demonstration.

To better understand the degree and nature of the organization the children were capable of, they were asked about the reasons for their failures and the corrective measures they took.

Four classes of behaviors were defined on the basis of the children's constructions and corrections. Each class is representative of a particular age.

Class 1 behaviors are characteristic of 4-year-old children (90% of their constructions). It can be subdivided into two groups:

1. The most rudimentary constructions are simple rectilinear segments ("we need something long") to which the subject imparts rotation movements in order to get around obstacles. Subjects often attribute failures to their own actions. Corrections consist of the addition or removal of elements to lengthen or shorten the instrument at its distal end. Modifying the tool exclusively by adding or removing pieces at its distal end reveals a conception

that, as we will see, differs sharply from the modification of the different parts of the tool or their relations

2. Next we see the appearance of bent constructions: "we need something that will turn". The various segments are added one by one after successive trials. Thus, the tool is built in stages. Corrections again consist in adding and removing segments, always at the tool's distal end.

Class 2 behaviors are characteristic of 5-year-old children (50% of their constructions). Again, these are bent constructions built in successive stages after trials, but all of these constructions end in a vertical segment intended to push the cube in the desired direction ("it pushes" or "it can push"). Each segment has a

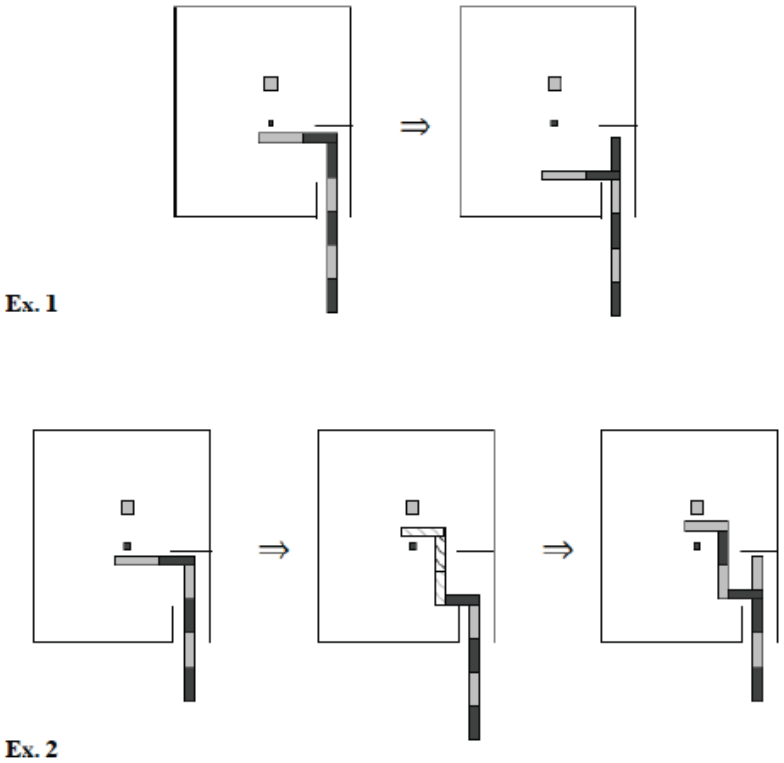

Figure 5. Examples of typical corrections (class 3) for sit.2.

specific role: lengthen, circumvent, reach, push. The tool's design is, in a sense, fragmented; corrections are always made at one end of the tool. Several of the subjects would completely destroy their construction and start again from scratch. One of them restarted his construction four times, but each time, he ended up with the same unsatisfactory result!

Class 3 behaviors are characteristic of 6-year-old children (80% of their constructions). From the outset, the tool is built as a whole (without an end segment intended to push with). "I take the tool, then it turns, and then I push", said one subject. "It turns and you can push", said another. The children's corrections fall into two subgroups:

- Children often attempt to shorten the first segment of their tool (the "handle") when they run into the horizontal obstacle. The goal, in their view, is to remove the limitation on their pushing movement. This correction, which inevitably has no effect, is repeated several times (incorrect inference), and the children do not attempt to move the tool away from the obstacle in order to analyze the relations among the other segments and the setup. After that, these children, unable to identify the source of their tool's limitations, systematically attempt to shorten and lengthen the different segments. This could be called a "scientific" method!
- Afterwards, the corrections start to take into consideration the relations between the parts of the tool and the set-up. Without adding or removing elements, the children then try to change the relative positions of the two parts of the tool, cf. figure 5.

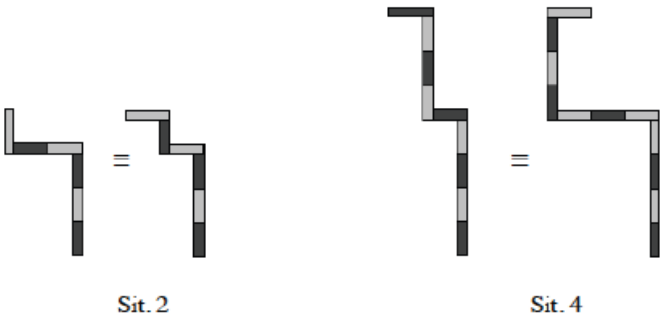

Figure 6. Examples of equivalent instruments outset.

Class 4 behaviors are characteristic of children aged 7 and over (60% of their constructions). As in class 3, the tool is constructed as a whole right from the outset. However, no corrections are made on the tool's first segment (or "handle"), as was the case in class 3; instead, lengthening the handle is recognized to have no effect on the tool's mobility. Subjects anticipate the exact location where the instrument must be placed in the set-up in order to be operated. They are able to explain the equivalence of two tools with different shapes, cf. figure 6.

Schematically, the general development of behaviors can be characterized in two major phases. The first phase is characteristic of 4- and 5-year-old children, and includes the first two classes of behaviors; it shows us:

- How children gradually abandon the idea of being able to directly transmit all their actions to the tool, which is seen as simply an extension of their arm (absolute transmission)
- How subjects discover, throw the various movements imparts to their tools, the functions fulfilled by their actions (lengthen, avoid, push), which are then assigned to the tool. The tool is substituted for the action; in other words, it is assumed to have some sort of power. One could say that the tool is "lengthening", "avoiding", "reaching" or "pushing." The children become conscious of these aspects in the course of their action, step by step. As in the bottle experiment, the tool that is built reproduces the process that includes moving the cube.

In a second phase that is characteristic of children aged 6 to 9, which includes the last two classes of behaviors, the tool acquires an overall meaning and loses its fragmented character. It is seen as a whole. But at first, the difficulty of correctly manipulating the tool in the box in such as way as to move the cube is attributed to the "inappropriate" length of a segment (part of the tool). This difficulty will then be attributed to the relations between the different elements of the set-up, which leads the child to correct the relations among the tool's different parts.

To sum up, in the first phase, the tool gradually loses its initial power of absolute transmission insofar is it substitutes for the child's actions, which it is supposed to "perform." Conversely, in the second phase, the tool regains transmission power in that the child becomes able to consider the properties of the tool and of the action that she is imparting to it.

I will now make my interpretation more explicit. At the age of 4 years,

there is no doubt that children are able to solve complex detour problems in a manual or locomotor manner. They then possess developed systems of knowledge—pre-existing skills that bring their inferencing and planning capacities into play. Placed in conditions that make it impossible to act directly and that require an intermediary, children aged 4 and up, with their new representation capacities, are able to gradually conceive of objects that not only transmit action but partially substitute for it to perform specific functions. In such situations, children show the ability to gradually delegate to the tool certain characteristics of their actions. This constitutes the construction of a new skill.

Summary

Starting from Piaget's postulate concerning the genesis of new structures, I have presented a conception of cognitive development in which pre-existing skills are indeed necessary for the development of new skills, but in which skills at all levels are considered as simultaneously having practical and conceptual components.

This conception differs from that of Piaget (1937), who described the reflex structures preceding the origin of intelligence as "practical" and the new sensorimotor structures as "objective" or "mental." Piaget ruled out the possibility of describing sensorimotor intelligence as conceptual, given that in his view concepts depended on language and characterized a representative intelligence that only developed later. He situated the appearance of the first true concepts at 6 or 7 years old.

Whereas Piaget's theory does appear to emphasize the crucial role of material actions in the origin of knowledge, to the point of considering actions as the origin of logical thought, actions nonetheless seem to lose their central role after the baby's first 18 months of life, as they become internalized and thought takes center stage. Tools are created by modifying conceptions and construction methods generated by the results obtained during trials. Thus, when a first tool, whose construction was guided by a subject's initial conception, proves to be faulty, it will result in a change in the initial conception, and this will continue recursively until an appropriate concept for the tool emerges along with the necessary construction abilities, and success is achieved.

Scientific and technological knowledge: Historical perspectives

In this last section of the paper, I would like to draw a parallel between practical and conceptual skills in the course of child development and technological and scientific knowledge over the course of history. I was much impressed by my accidental discovery of three recently published books, with titles that were bound to attract my attention and pique my curiosity:

- Le savoir de la main: Savants et artisans dans l'Europe pré-industrielle (What the hand knows: scholars and artisans in pre-industrial Europe) (Halleux, 2009)
- The mindful hand: Inquiry and invention from the late Renaissance to early industrialisation (Roberts, Schaffer, & Dear, 2007)
- Lieux de savoir: Les mains de l'intellect (Places of knowledge: The intellect's hands)(Jacob, 2011)

I am sure you will understand how astonished I was by these titles, given that researchers in the cognitive sciences have paid little attention to practical or procedural knowledge, other than in animal studies—which says a lot.

In general, technological or craft achievements and artistic works may have been admired and valued but they were not considered to be related to scientific activities or experimental procedures. Instead, these domains were treated as being completely separate from each other. The divisions between scientific knowledge and technological knowledge, introduced into the Western philosophical tradition by the ancient Greeks, were strengthened by religious ideologies, as well as by social and political factors. Today we are witnessing a resurgence in such reconciliations, and the recent appearance of several publications about "intelligent hands" suggest that there is a quest for recognition of the importance and complexity of practical activities, and more generally, activities related to actions. This can be called a reversal or even a revolution. While scientific activities have often been considered to be humanity's most prestigious activities, different in nature from technical, pragmatic or manual activities, we are finally witnessing the recognition of the "intelligence of the hand." These major changes in point of view may reflect a real reversal in the relationship between science and technology, as in "La technique et le temps" (technology and time) (Stiegler, 1994).

A brief overview of the books mentioned above and of one somewhat older book on the history of

technologies will reveal the change in our approach to this great divide.

History of technologies (Gille, 1978)

We will start by presenting a fourth book Histoire des techniques: technique et civilisations, technique et sciences (Gille, 1978), which clarifies the points of view that existed in the 1970s. While he states that making a clog and solving an equation are part of the same process, Gille struggles with the value of technological know-how. Even though technological know-how is the result of experimentation and gives rise to reasoning, in his view it is still located at a different level from scientific knowledge, as if it were somehow less reliable or less valid.

In his chapter on technological knowledge, Gille describes the historical development of different kinds of know-how, in particular related to ballistics, breaking strength of beams, millwheels, levers, etc. Somewhat disconcertingly, he considers this kind of knowledge to be related to construction methods and not to theoretical knowledge.

Regarding the study of beam flexion, Gille refers to a series of works starting in the first century BCE and continuing until the nineteenth century. The work of Vitruvius (1st century BCE), and earlier work reported by Vitruvius, consisted of a series of ordered experiments, with systematic variations of certain factors, such as diameter, fittings, etc., in order to determine beams' resistance to pressure or their elastic line. Then Gille skips forward to the fifteenth century to discuss the work of Alberti (1401–1472) and Leonardo da Vinci (1452–1519), each of whom made systematic experiments to research beam resistance to flexion or traction; they succeeded in developing some arithmetical formulae that were applicable, but not provable. Gille describes Leonardo da Vinci's reasoning as intuitive, then as analogical, and speaks of approximations. The problem was revisited by Galileo (1564–1642), then by Hooke (1635– 1703), and finally—and definitively according to Gille—by Coulomb (1736–1806) and Navier (1785–1836). Thus, Gille maintains, it took 21 centuries to derive a general theory of the problem and formal answers that are applicable in all cases.

As this example shows, Gille adopted a rather rigid position, which posits a distinction between practical and scientific knowledge, based on a criterion of degree of generalization. From this point of view, it looks as though it took 21 centuries of producing technological knowledge before knowledge that could be described as scientific finally emerged. This is an

extreme illustration of the transition from pre-existing knowledge to new knowledge! In my view, it is more a case of a succession of knowledge states that we can describe as scientific and that were increasing in elaboration, on the basis of experimental methods that were originally technological, as Halleux was to point out 30 years later.

What the hand knows (Halleux, 2009)

This book Le savoir de la main: savants et artisans dans l'Europe pré-industrielle (Halleux, 2009) (What the hand knows: scientists and craftmen in preindustrial Europe) is original and full of ideas, but a bit di_cult to delimit! Halleux's central thesis is to attribute craft origins to what is known as the Scientific Revolution . He dedicates a long chapter to the technological origin of the scientific method (in which "the experiment is induced with the aim of control," Claude Bernard, cited by Halleux, p. 105, our translation). William Eamon (1994) in his book Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture argue that "new science" of the seventeenth century has its roots in the practical activities of artisans, alchemists, and common healers.

Thus, the activity of assayers in mines to determine the content and composition of ores was mentioned as early as 2000 BCE in Mesopotamia. Sensory observations— touch, taste, odor, etc.—were complemented by observations of the e_ects of actions on the object (induced observations): scratching metal with a touchstone, exposing an alloy to fire, using aqua fortis, etc. Then combinations of these methods appeared, along with an increase in the kinds of sampling, culminating in a definition of metals and conclusions concerning their structure (Middle Ages). In the field of medicine, the practice of trials ended in a so-called empirical approach (Galen, 2nd century CE). In the Middle Ages, "successful trials" (expertus probatus) were recorded in collections of recipes, called experimenta.

Halleux also discusses scale models, used by the Greeks and Romans to simulate the behavior of a machine, which are undeniably experimental tools, even though the experimenters of that period were unable to change the scale of their models! In Halleux's view, the experimental method is rooted in these tentative "trials" and "trade secrets". But starting with the Scientific Revolution, there was a reversal, as the "new science"" gained on the "technicians". Over many centuries, the "useful arts" had developed and encouraged the

practice of experimentation; however, starting in the eighteenth century scientists deemed it indispensable to codify knowledge, give technicians and engineers new training, and encourage the creation of educational institutions: "having mastered its physical-mathematical toolkit, the new science undertook to subjugate the arts and crafts" to "establish their practice on certain bases" (p. 187, our translation).

The mindful hand (Roberts et al., 2007)

In this book (Roberts et al., 2007), the authors examine in more depth the relations between science and technology in Europe during the period that starts with the Scientific Revolution (sixteenth century) and ends with the Industrial Revolution (nineteenth century).

Broadly, the Scientific Revolution has been seen as the arrival of scientific reasoning based on an intellectual or conceptual reflection process, whereas the Industrial Revolution was characterized by the practical application of earlier "scientific discoveries". This reductive dichotomy between the "intellectual" and the "practical" is reconsidered in this work on the basis of examples illustrating the complexity of the relations between intellectual and craft knowledge during this time. They include the importance of the work done in optical lens polishing workshops in the sixteenth and seventeenth centuries, and the indispensable intellectual developments needed to implement the great drainage schemes (England and Netherlands) in the seventeenth century; the problems to be solved included the large-scale adaptation of "practical" solutions developed to irrigate and drain gardens (we have already noted the problems that can be caused by changes of scale when one moves from a scale model to real-world implementation).

In the eighteenth century, at the same time as the superiority of scientific knowledge over technical know-how was being trumpeted, scientists were still very dependent on the craftsmen who made the instruments they needed for their work! Finally, in the nineteenth century, the division between scientific and technological knowledge was strongly reinforced by the social and economic context. The affirmation of the preeminence of intellectual knowledge became an argument of authority, enabling manual workers to be controlled. The economic stakes became equally crucial, as the appropriation of scientific knowledge made it possible to profit from technological applications.

This book sheds light on the intimate interpenetration of intellectual knowledge and technical know-how in evoking their interactions.

Science and technology (Russo, 1978)

To enrich our understanding of these interactions between science and technology, let us also examine one of the chapters from Histoire des techniques: technique et civilisations, technique et sciences; the chapter was written by François Russo and is titled "Science et technique" (Russo, 1978). Russo also speaks of the interpenetration of science and technology, which he attributes to the fact that science too is an "action": it questions nature and subjects it to numerous transformations. Russo considers that an act of "doing" (know-how) depends on true knowledge, which is, however, different from scientific knowledge. It is primarily a form of knowing by doing, expressed in the deed (action)—knowledge that is intended to guide the action and allow technical achievements. According to Russo, experimental procedures are both sources of knowledge (the pursuit of knowledge) and sources of usefulness (the achievement of efficacy). The history of experiments, whether related to scientific or technological activities (which cannot always be determined), should take into consideration the types of actions performed and 21 their objectives in order to highlight the progress made in the attempts to master the objects and phenomena under study.

The intellect's hands (Jacob, 2011)

Jacob's focus in Lieux de savoir: Les mains de l'intellect (Jacob, 2011) is somewhat similar, as he pays particular attention to the actions involved in intellectual practices. The interpenetration of "intellect" and "technology" is analyzed at a different level here than in the works discussed previously. The authors in this collection wanted to "explore the dynamic and dialectical links between hand, gaze and thought in the production of human knowledge" (p. 32, our translation), and to do so by studying concrete activities related to intellectual practices. The authors attempt to show how thought processes take shape thanks to the handling of different objects, such as a workbench, a text, a drawing, a map, a computer—all these different supports retain the signs of mental and manual operations. It is not possible to summarize this work, which ranges from the art of bonsai to the structure of electronic documents, but

it represents an approach that may be particularly fruitful for understanding and accentuating various activities that are often ignored but that participate in producing what is known as human knowledge.

Concluding remarks

The recent changes in how the relations between science and technology are viewed in a historical context resemble, in many ways, to the changes in how the relations between practical skills and conceptual skills are conceived of in developmental psychology.

For one thing, it takes time before scientific knowledge, like conceptual knowledge, is linked to the practical activities from which it arose and that it in turn modifies. For another, technological knowledge, like the procedural know-how that had been considered not to be knowledge at all or to be some fundamentally different kind of knowledge (knowing by doing, expressed in action), has regained its value and finally recognized to be a source of knowledge. Finally, it is interesting to note that both technological activities in the course of history and practical skills in the course of development engage in experiments and could even be considered to be among the origins of what we call the "scientific method."

I am well aware of the complexity of the analogy I have attempted to develop here, but I have found it stimulating. And I would like to end this presentation with a second quotation from Leroi-Gourhan, which appeared in the conclusion of my dissertation 40 years ago: "Not having to 'think with one's fingers' is equivalent to lacking a part of one's normally, phylogenetically human mind" (Leroi-Gourhan (1964), p. 255).

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El análisis de los efectos de la escuela sobre el rendimiento académico en matemáticas: Un análisis multinivel con datos de PISA 2003

Analysing the influence of schools on academic performance in mathematics: a multilevel analysis using PISA 2003 data

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Resumen

Esta investigación, enmarcada dentro del movimiento sobre Eficacia de la Escuela, realiza una explotación parcial de los datos PISA 2003, para el territorio español, obtenidos en la investigación llevada a cabo por la OCDE. El alumnado español que ha participado en el estudio PISA, supone un total de 10.791 estudiantes de 383 centros de Educación Secundaría pertenecientes a varias Comunidades Autónomas. Las variables predictoras que forman parte de la investigación se obtienen de alumno y del centro. La variable de respuesta, desde un enfoque criterial, establece información sobre el nivel de competencias alcanzado por el alumno en matemáticas. Los resultados del análisis multinivel proporcionan diferentes modelos que tratan de explicar la variabilidad observada entre los centros a través de la incorporación de sus variables. El modelo resultante reconoce que las variables de centro: titularidad, porcentaje de alumnas, fomento de actividades matemáticas y compromiso y moral del alumnado se relacionan con el rendimiento en matemáticas.

Palabras clave: Efectividad de la escuela, rendimiento académico, análisis multinivel.

Abstract

Located within the context of assessment procedures and the movement for academic effectiveness in schools, this research represents a partial study of PISA 2003 data for Spain, obtained from the research conducted by the OECD. A total of 10791 Spanish pupils from 383 secondary schools located in various autonomous regions participated in the PISA study. The predictive variables used in the study were obtained from two measuring instruments, one for the pupils and another for the centres, using a criterion approach, the response variable established. Results of the multilevel analysis yielded different models, which attempted to explain the variability observed between centres by incorporating their variables. The resulting model indicated that the centre variables, ownership, percentage of pupils, promotion of mathematics and the pupil variable commitment and morale, were related to performance in mathematics.

Keywords**:** School effectiveness, academic performance, multilevel analysis.

Introducción

La educación es el derecho básico de cualquier persona, por ello las administraciones educativas deben satisfacer este derecho garantizando una educación que responda a sus destinatarios, ampliando y mejorando sus campos de actuación y asegurando tanto el éxito individual como colectivo.

La línea de investigación, dentro de la que incluimos nuestro estudio, pretende la búsqueda de factores que determinan la calidad y la equidad de los aprendizajes, objetivo estrechamente ligado al ámbito de la efectividad de las escuelas, referido al conocimiento del funcionamiento de las mismas "qué" y "porqué" se obtienen unos resultados educativos en un contexto educativo determinado. Pretendemos conocer cómo son las escuelas y saber lo que realmente sucede en ellas, para analizar aquellos factores que las hacen instituciones que trabajan y se programan para la consecución de los logros esperados (UNESCO, 2005a, p. 44).

En este trabajo se construye un modelo de eficacia para el contexto español, con la metodología multinivel, apoyado en los estudios realizados hasta el momento que incluye un amplio número de variables obtenidas en el nivel alumno y en el nivel centro.

La investigación sobre la efectividad de las escuelas

El movimiento de Escuelas Eficaces (IEE), constituye una línea de investigación especialmente interesante para identificar las diferencias entre los centros educativos y distinguir los factores que los hacen organizaciones eficaces, al mismo tiempo que se consideran las variables de los estudiantes y las variables de la escuela (Sammons, 1996).

La literatura de la investigación sobre la eficacia o efectividad de las escuelas (IEE) ha sido extensamente tratada en muchos estudios (Brophy & Good, 1986; Castejón, 1996; Creemers, 1994; Murillo, 2003a, 2003b; Reynolds & Cuttance, 1992; Reynolds et al., 1994; Scheerens, 1992; Wyatt, 1996).

En la década de los sesenta, el Informe Coleman y el Informe Plowden, realizados en Estados Unidos y Gran Bretaña respectivamente, atribuyen la varianza en el rendimiento a las diferencias sociales, económicas y culturales, considerando la tarea desarrollada por la escuela como una prolongación de los determinantes familiares y sociales. Algunos investigadores (Bowles & Levin, 1968; Hanushek & Kain, 1972), mostraron su desacuerdo con los resultados del estudio de Coleman et al., (1966) y trataron de buscar las razones

que explicaran estas conclusiones repitiendo los análisis (Jencks et al*.,* 1972; Mayeske et al*.,* 1972). Comienza una búsqueda imparable de variables que expliquen las diferencias encontradas en los resultados escolares y permitan reducir las desigualdades educativas.

En Estados Unidos, se iniciaron estudios en las escuelas primarias de bajo nivel socioeconómico pero con un rendimiento satisfactorio, que les llevó a determinar un conjunto de variables que se repetían en los centros y se relacionaban con los procesos escolares (Weber, 1971). Contrariamente se desarrolla el llamado "movimiento de escuelas ejemplares", a partir del estudio de escuelas prototípicas en ambientes poco favorecedores (Ellis, 1975; Venezky & Winfield**,** 1979).

En la década de los ochenta el *Proyecto de mejora de la escuela* (Edmonds, 1981) permite identificar cinco factores relacionados con las escuelas eficaces. Otros estudios marcan la vuelta a las grandes muestras y suponen la consolidación de las investigaciones iniciadas la década de los setenta sobre la eficacia escolar identificándose factores claves de eficacia escolar (Mortimore, Samons, Lewis & Ecob, 1989; Rutter et al*.,* 1979; Teddlie & Stringfield, 1993).

La evolución hacia modelos comprensivos de eficacia (Creemers, 1994; Reynolds, 1994; Schereens, 1990; Slann, 1992; Stringfield & Slavin, 1992), evidencian la necesidad de su desarrollo teórico que proporcione un amplio conocimiento de la participación de las variables implicadas (Creemers & Kyriakides, 2006; Hargreaves, 2001; Luyten, Visscher & Witziers, 2005; McIlrath & Huitt, 1995; Reezigt, Guldemond & Creemers, 1999; Thrupp, 2001).

Las evaluaciones en materia educativa

Las evaluaciones dentro del campo educativo, suponen un instrumento de conocimiento y mejora del sistema educativo que permite disponer de datos para la gestión de los resultados y la eficacia de las escuelas (Bolen, 1997; Braun & Kanjee, 2006; Goldstein & Spiegelhalter, 1996; Sanders & Horn, 1995; Kane & Staiger, 2002; Hanushek & Raymond, 2004; Taylor & Nguyen, 2006). La evaluación entre y dentro de los distintos ámbitos educativos hace observables y tangibles los resultados permitiendo la utilización eficaz de los recursos para alcanzar los objetivos planteados (UNESCO, 2005a), en relación a los resultados obtenidos, facilitando mejoras en la planificación de las reformas educativas (Sarason, 1990; Turner, 2006).

La evaluación educativa experimenta un apreciable desarrollo a partir de finales de la década de los sesenta influida por los mismos

acontecimientos que rodean los estudios de eficacia educativa. Durante las últimas décadas se han puesto en marcha evaluaciones de carácter nacional e internacional para contrastar los resultados del aprendizaje en diferentes materias, proporcionando un contexto más amplio donde poder interpretar los resultados, permitiendo la ampliación y el enriquecimiento educativo.

A nivel internacional, la Organización para la Cooperación y el Desarrollo Económico (OCDE), lleva a cabo el proyecto PISA (Programme for Indicators of Student Achievement) como base para la elaboración de indicadores de resultados de los alumnos. Los ciclos para los estudios de PISA (2000, 2003, 2006, 2009) se dedican, en este orden, a la recopilación de datos en las áreas de lectura, matemáticas y ciencias y de nuevo lectura, para la supervisión de los sistemas educativos a través de la medida de sus competencias.

En España, la evaluación general del Sistema Educativo Español se atribuye al Instituto de Evaluación (IE), creado en 1990. La tarea de evaluación realizada por el *IE*, que cuenta con la colaboración de otros organismos autonómicos, lleva a cabo a nivel nacional las pruebas de evaluación y elabora los resultados generales de diagnóstico, y los principales indicadores de la educación española. Además el *IE,* en colaboración con las Administraciones educativas, coordinará la participación del Estado Español en las Evaluaciones Internacionales.

El análisis multinivel en la investigación sobre eficacia escolar

Los modelos multinivel forman parte de un grupo de modelos de análisis estadístico de datos que viene a consolidarse a principios de los años ochenta (Amador & López 2007), para modelar las relaciones funcionales entre fenómenos y constructos que se desarrollan en varios niveles, entendiendo por nivel una determinada posición dentro de un sistema de inclusión (González-Roma, 2008), suponiendo un importante impulso en el análisis de agrupaciones o clústers en diversos ámbitos (Goldstein, 1998, 2003; Hox, 2002; Peña Brandao, & Puente-Palacios, 2008; Puente-Palacios, 2004, 2009; Puente-Palacios & Borgesandre, 2004).

La línea de investigación de las escuelas eficaces analiza la relación significativa de las características individuales, de factores propios de la escuela y del contexto sobre los resultados o el progreso académico (Cohen, 1982; Crone, Lang, Teddlie & Franklin, 1985; Kreft, 1987; Murillo, 2007; Ribeiro de Jesus & Arie Laros, 2004; Sammons, et al., 1995;

Scheerens, 1999; Teddlie & Reynolds, 2000). Los modelos multinivel reconocen la estructura anidada de los datos educativos y hace posible que los efectos de las variables grupales e individuales, sobre el rendimiento, puedan estudiarse simultáneamente al mismo tiempo que aportan información sobre la dependencia de las observaciones dentro de los grupos, debido a las características comunes que comparten los alumnos que asisten a una misma escuela (BocK, 1988; Fitz-Gibbon, 1991), examinando la contribución de de las variables del nivel individual y de grupo.

El análisis multinivel aporta ventajas metodológicas y estadísticas en su aplicación respecto a los modelos clásicos (Luke, 2004). Sus técnicas han sido desarrolladas para los modelos de regresión lineal (Bryk & Raudenbush, 2002; Goldstein, 1998) aunque permiten corregir la estimación de parámetros y errores estándares, del mismo modo que modela directamente la heterocedasticidad cuando se produce y resuelve un problema de carácter metodológico que hace referencia al análisis del nivel erróneo de los datos junto con las falacias que se derivan en la interpretación de los resultados. Por todo ello, la utilización del análisis multinivel en los datos jerarquizados no resultan una opción sino una necesidad (Subramanian, et al., 2009).

Método

Muestra

Han participado 10.791 alumnos y alumnas de un total de 383 centros educativos, con una edad media de 15.86 años (DT: .28). En cuanto al género 5.547 (51.40%) son chicas y 5.243 (48.59%) son chicos. Del total de centros, el 50’8% son públicos y el 46’8% privados.

Instrumentos y variables

Las variables predictoras que forman parte de la investigación se obtienen de dos instrumentos de medida, uno del alumno y otro del centro. Se ha utilizado una clasificación operativa orientada al análisis multinivel, que agrupa las variables en dos niveles: Nivel 1, variables del alumnado, con información sobre sí mismos y su familia; Nivel 2, variables de centro, cuyos datos son proporcionados por los responsables educativos, generalmente el director.

La variable de respuesta utiliza para su medida una escala de rendimiento que proporciona información sobre las competencias alcanzadas por el alumnado, considerando, desde un enfoque criterial, los niveles establecidos respecto a la proporción de respuestas correctas y sobre la dificultad relativa del ejercicio.

Diseño y análisis de los datos

Para el análisis de los datos se crean dos tipos de índices: índices directos que se forman a través de la recodificación o transformación de las variables (e.g. sexo, índice socioeconómico, estructura familiar, etc…) e índices indirectos creados en base a las respuestas en una escala de tipo Likert, con cuatro alternativas (muy acuerdo =1, de acuerdo = 2, en desacuerdo = 3, muy en desacuerdo = 4), en una escala estandarizada, donde se ha convenido que la puntuación media de los países de la OCDE sea 0 y dos tercios de la puntuación esté entre los valores de -1 y +1. Es decir, PISA establece que la media de los países de la OCDE en cada índice se sitúa en el punto 0 con una desviación típica de 1.

Una síntesis de las variables utilizadas, el tipo de *v*ariable (categórica o continua), la escala o respuestas utilizadas, se presenta en las "Tablas 1" y "Tabla 2*"*, respectivamente para el alumnado y el centro.

Análisis de los datos

Se llevan a cabo análisis descriptivos de todas las variables sometidas a

Tabla 1

Definición y características de las variables del alumnado

Variable (n=1)	Tipo de variable	Definición de la variable
Sexo	categórica	Mujer=0 Hombre=1
Edad	cuantitativa	Nº años y meses
Índice del estatus económico, social y cultural	cuantitativa	Índice: Ingresos+nivel educativo de los padres+numero de libros en casa.
Estructura familiar	categórica	Familia monoparental Familia nuclear Familia mixta Otras

Nivel o grado educativo	categórica	-3 años=tres niveles inferiores a su edad. -2 años=dos niveles inferiores a su edad. -1 años=un nivel educativo inferior a su edad. 0=nivel educativo que corresponde a su edad. 1 años=un nivel educativo superior a su edad.
Nivel educativo esperado (Clasificación Internacional Estándar de la Educación (ISCED)	categórica	ISCED 1: Sin finalizar educación secundaria inferior. ISCED 2: Finalizar secundaria inferior. ISCED 3B, C: Finalizar secundaria superior. ISCED 3A, 4: Finalizar post secundaria superior ISCED 5B: Primera parte de la educación terciaria. ISCED 5A, 6:Educación terciaria completa
Actitudes hacia el colegio	cuantitativa	Índice :(X=0
Relaciones profesor-alumno	cuantitativa	Índice: Mide el bienestar de los estudiantes, a través de la percepción de la ayuda y atención prestada por el profesorado.
Sentimiento de pertenencia al colegio	cuantitativa	Índice: Cuantifica la percepción del alumnado respecto al sentimiento de pertenencia y aceptación desde la comunidad educativa.
Interés y disfrute en las matemáticas	cuantitativa	Índice: Expresa el disfrute, la apetencia y el interés del alumnado hacia las matemáticas.
Motivación instrumental en matemáticas	cuantitativa	Índice: Mide la percepción de del alumnado de la aplicabilidad de las matemáticas a las perspectivas académicas y profesionales.

Autoeficacia en matemáticas	cuantitativa	Índice: cuantifica el grado de seguridad percibida por el alumnado en la solución de las tareas matemáticas.
Ansiedad en matemáticas	cuantitativa	Índice: Mide las percepciones del alumnado, respecto a las matemáticas, sobre la perspectiva de encontrar dificultades y preocupaciones, así como su incapacidad para afrontarlas.
El autoconcepto en matemáticas	cuantitativa	Índice: Mide las percepciones del alumnado sobre su capacidad de gestionar y resolver de forma autónoma las tareas que competen al ámbito de las matemáticas.
Preferencia por situaciones de aprendizaje competitivas	cuantitativa	Índice: Mide las percepciones que el alumnado expresa a través de su capacidad por competir y destacar de forma individual ante la realización de sus tareas.
Ayuda del profesor	cuantitativa	Índice: Cuantifica las percepciones del alumnado sobre la implicación del profesor para completar los aprendizajes.
Ambiente disciplinario	cuantitativa	Índice: cuantifica el ruido, desorden, falta de atención y la pérdida de tiempo en clase por estos comportamientos.

Tabla 2

Definición y características de las variables del alumnado

Variable (n=2)	Tipo de variable	Características de la unidad de medida
Tipo de colegio	cualitativa	Privado/público
Tamaño del colegio	cuantitativa	Nº alumnado matriculado en el centro
Porcentaje de estudiantes de sexo femenino en el centro	cuantitativa	(Total niñas/total alumnado)*100

Ratio profesorado/ alumnado	cuantitativa	Total alumnado/ nº total del profesorado
Ratio profesorado de matemáticas-alumnado	cuantitativa	Total alumnado/ nº profesorado matemáticas
Calidad de las infraestructuras físicas del colegio	cuantitativa	Índice: considera los edificios y patio del colegio; calefacción/ aire acondicionado y sistemas de iluminación; espacio dedicado a la enseñanza (por ejemplo, las clases).
Calidad de los recursos educativos del colegio	cuantitativa	Índice que cuantifica materiales docentes (e.g. libros de texto); ordenadores; programas informáticos; calculadoras; material biblioteca; recursos audiovisuales; materiales y equipos de laboratorio.
Escasez de profesores	cuantitativa	Índice que considera la carencia de profesores de matemáticas cualificados; profesores de otras especialidades cualificados y profesores con experiencia.
Agrupación por capacidad en matemáticas	categórica	1=En ninguna clase 2=En algunas clases 3=En todas las clases
Número de evaluaciones por curso	categórica	<20 20-39 >40

Nº cursos adicionales de matemáticas y actividades diferentes	categórica	Nº de cursos 0 cursos/año académico 1 curso/año académico 2 cursos/año académico / Nº actividades 0 cursos/año académico 1 curso/año académico 2 cursos/año académico 3 cursos/año académico
Compromiso y moral de los profesores		Índice que cuantifica si el profesorado trabaja con entusiasmo, valoran los logros académicos de sus alumnos y se sienten orgullosos de su centro.
Compromiso y moral de los alumnos		Índice para expresar el grado de satisfacción y disfrute en el trabajo educativo; grado de cooperación, respeto y esfuerzo; orgullo y valoración de sus logros.
Comportamiento del profesorado		Índice que expresa las bajas expectativas de los profesores respecto a los alumnos; malas relaciones profesor-alumno; profesorado que no atiende a las necesidades individuales; absentismo del profesorado; profesorado resistente al cambio; profesores demasiado estrictos y que no incentivan a los estudiantes para que desarrollen todo su potencial.
Comportamiento del alumnado		Índice que cuantifica el absentismo escolar, la alteración del orden en las clases; las faltas de asistencia; las faltas de asistencia; el respeto a los profesores; el consumo alcohol o drogas ilegales; la existencia de intimidación o acoso.

Consenso del profesorado	Índice calculado a partir del grado de acuerdo entre el profesorado sobre los criterios pedagógicos.

estudio a través de la distribución de frecuencias para los datos categóricos; la media y desviación estándar para las distribuciones normales; así como la mediana y rango intercuartílico para variables continuas no distribuidas normalmente.

En el análisis de las relaciones entre el rendimiento y las diferentes variables consideradas, se utiliza la técnica de "análisis estadístico por niveles múltiples" (Aitkin & Longford, 1986; Goldstein, 1987; Bryk & Raudenbush, 1992). Esta técnica permite estimar la influencia que determinadas características individuales y de grupo tienen sobre una variable individual (rendimiento en matemáticas). La técnica hace posible la descomposición de la varianza, de la variable de respuesta, en sus componentes "dentro del grupo" (intra-centro) y "entre grupo" ('inter-centros) junto con el análisis de la asociación entre las variables de los respectivos niveles de agregación.

Los modelos multinivel que desarrollamos tratan de poner a prueba varios modelos, para verificar el ajuste de los mismos. Para la interpretación de los sucesivos modelos, además de analizar la significación de los coeficientes, resulta crucial el ajuste de los modelos, al considerar si el modelo propuesto aporta información significativa comparándolo con el modelo previo.

La principal ventaja de la técnica multinivel es que modela simultáneamente los diferentes niveles de variación (estudiante, centro), permitiendo por tanto, saber qué proporción de la varianza del rendimiento se debe principalmente a características del estudiante o del colegio. Se ha utilizado el programa estadístico SPSS/PC, versión 15.0 para la obtención de la base de datos y los análisis preliminares. Para el análisis multinivel se utiliza el programa Mlwin versión 2.11 (Rasbash, Charlton, Browne, Healy & Cameron, 2009).

Resultados

Análisis descriptivos

La variable de respuesta, el rendimiento global en matemáticas

presenta una media, para España de 494.78 (DT=82.14), los valores que mínimo y máximo son 440.59 y 552.60 respectivamente presentando una distribución normal.

Se realiza el análisis descriptivo de las variables predictoras en tablas de frecuencia y porcentajes para las variables categóricas, así como la media y desviación estándar para las variables continuas (véase Tabla 3).

Como resultado del análisis descriptivo, la información obtenida para la muestra española, nos indica que el número de alumnas es ligeramente superior al de los alumnos y la mayoría del alumnado tienen su edad cronológica acorde al curso que realiza excepto una parte significativa que es un año mayor. La edad media es de 15.86 años. La estructura familiar más común es la nuclear y las expectativas educativas se refieren a la terminación de estudios universitarios. El estatus socioeconómico, el autoconcepto en matemáticas y las relaciones entre profesorado y alumnado son ligeramente inferiores a la media de todos los países del estudio PISA 2003. Resultan ser ligeramente superiores a la media las puntuaciones obtenidas en las actitudes hacia la escuela, el sentimiento de pertinencia a la escuela y la ansiedad ante las matemáticas. Los resultados más acordes con la media del estudio internacional responden a las siguientes variables: clima disciplinario, la percepción de la ayuda prestada por el profesor, las preferencias por el aprendizaje cooperativo, junto con la autoeficacia y motivación.

La "Tabla 4", presenta información detallada sobre los resultados del análisis descriptivo para los centros. La mayoría realiza para el control de las evaluaciones más de 20 pruebas al año y reconocen que se hacen agrupaciones según la capacidad del alumnado en algunas y en todas las clases. La realización de actividades o cursos complementarios relacionados con el área de matemáticas es muy escasa en la muestra estudiada.

Tabla 3

Estadísticos descriptivos. Variables del alumnado

Variable	n	
Sexo[No.(%)]		
Chicas=1	10.791	5.547 (51.40)
Chicos=0		5.243 (48.59)

Grado comparado con la moda [No.(%)]		
-3 años	10.791	4 (0.04)
-2 años		259 (2.40)
-1 años		2.576 (23.87)
0 años		7.951 (73.68)
1 años		1(0.01)
Estructura familiar [No.(%)]		
Familia monoparental	10.791	1.402 (12.99)
Familia nuclear		8.814 (81.68)
Familia mixta		260 (2.41)
Otras		221 (2.05)
Pérdidos		94 (0.87)
Expectativas Educativas[No.(%)]		
ISCED 1	10.791	81 (0.75)
ISCED 2		1.248(11.57)
ISCED 3B, C		1.139 (10.56)
ISCED 3A, 4		1.504 (13.94)
ISCED 5B		1.373 (12.72)
ISCED 5A, 6		5.416 (50.19)
Pérdidos		30 (0.28)
Media edad del estudiante años[años (DT)]	10.791	15.86(0.28)
Media del estatus socioeconómico [índice(DT)]	10.687	-0.19(0.98)
Media de las actitudes hacia la escuela [índice (DT)]	10.715	0.12 (1)
Media relaciones del alumno con el profesorado [índice(DT)]	10.713	-0.12 (0.98)
Media sentimiento de pertenencia a la escuela[índice(DT)]	10.713	0.170 (0.576)
Media del interés por las matemáticas [índice(DT)]	10.732	-0.106 (0’96)

Media de la motivación por las matemáticas [índice(DT)]	10.732	-0.044 (1.02)
Media de la autoeficacia en las matemáticas [índice(DT)]	10.699	-0.004 (0.90)
Media de la ansiedad ante las matemáticas [índice(DT)]	10.719	0.231(0.87)
Media del autoconcepto ante las matemáticas [índice(DT)]	10.721	-0.179(0.99)
Media de la ayuda prestada por el profesor de matemáticas[índice(DT)]	10.624	-0.093(1.01)
Media del clima disciplinario en matemáticas [índice(DT)]	10.620	-0.017(0.98)

Nota: SD: desviación estándar. RI: rango intercuartilico

Respecto al tamaño de los centros, su mediana es de 600 alumnos o alumnas, la ratio de profesor alumno es de 12.10 alumnos por profesor y la ratio alumnado profesorado de matemáticas es de 91.71. Además el porcentaje de chicas en los centros es de 49%.

Para el resto de las variables de centro se crean índices que se comparan con la media de los valores de PISA internacional. España se encuentra por debajo de la media en la moral y compromiso, tanto del alumnado como del profesorado y también en los recursos e infraestructuras del centro. En relación a la media global.

Destacables resultan los valores de los índices positivos obtenidos para el comportamiento del alumnado y del profesorado.

Análisis multinivel

El modelado multinivel exige un análisis sistemático partiendo del modelo más simple, el "modelo vacío", que no incluye variables predictivas y que permite observar la estimación de los residuales. Este modelo se amplia y perfecciona a medida que se incorporan, progresivamente, variables explicativas en los diferentes niveles para tratar de explicar la variabilidad observada, al mismo tiempo que se comprueba el ajuste de los sucesivos modelos.

Inicialmente, en el modelo vacio, la estimación y partición de la varianza

"intra" y "entre" indica que el 21.4% de la varianza total observada es atribuida a las diferencias entre los centros y el 78.6% a las diferencias entre los individuos.

El gráfico sobre la distribución de los residuales para cada uno de los 383 centros nos permite observar amplias diferencias de los centros (Fig. 1). En la parte izquierda se encuentran aquellos centros con residuos negativos y por lo tanto se interpreta como centros donde el rendimiento está por debajo de la media. En la parte central se sitúan aquellos centros cuya media no difiere significativamente de la media global. En la derecha se observan los centros con una eficacia mayor a la media.

A partir de este modelo estimamos la relación entre el rendimiento y las variables predictoras del nivel 1 (alumnado), antes de permitir su variación en el nivel 2. El modelo obtenido "modelo A", permite averiguar si las diferencias entre individuos y entre centros se reducen con la incorporación de variables explicativas individuales y comprobar el ajuste del modelo en relación al anterior.

Respecto al impacto que tienen las variables del nivel 1 sobre el rendimiento en matemáticas, todos los valores resultan estadísticamente significativos a excepción de las categorías familiares *monoparental* y *otras*, y las categorías *grado-1* y *grado -3* del nivel educativo.

Tabla 4

Estadísticos descriptivos. Variables de los centros

Variable	n	
Titularidad [No.(%)]		
Privado	383	199 (51.96)
Público		175 (45.69)
No contestó		9 (2.35
Número de evaluaciones por año [No.(%)]		
<20	383	31 (8.09)
20-39		159 (41.61)
>40		181 (47.26)
No contestó		9 (2.35)
Pérdidos		3 (0.78)

Agrupación del alumnado por capacidades [No.(%)]		
En ninguna clase	383	31 (8.09)
En algunas clases		204 (53.26)
En todas las clases		130 (33.94)
No contesta		9 (2.35)
Pérdidos		9 (2.35)
Fomento de cursos relacionados con las matemáticas [No.(%)]		
0 cursos/año académico	383	38 (9.92)
1 curso/año académico		233 (60.84)
2 cursos/año académico		93 (24.28)
Pérdidos		19 (4.96)
Fomento de actividades relacionados con las matemáticas [No.(%)]		
0 cursos/año académico		181 (47.26)
1 curso/año académico		167 (43.60)
2 cursos/año académico		12 (3.13)
3 cursos/año académico		2 (0.52)
Pérdidos		21 (5.48)
Mediana del tamaño del centro educativo [índice(RI)]	383	600 (406.5-846.5)
Media del porcentaje de alumnas en centros[% (DT)]	383	49 (0,10)
Mediana ratio profesor-alumno [alumnado/ prof (RI)]	329	12.10 (9.44-16.29)
Mediana ratio profesor-alumno en matemáticas [alumnado/prof (RI)]	322	91.71 (66-133.4)
Media de los recursos (infraestructuras) del colegio [índice(DT)]	368	-0.23 (1.03)
Media de los recursos educativos [índice(DT)]	368	-0’02 (1’006)

Mediana sobre el índice de escasez de profesorado [índice(RI)]	368	-1.20[-1.20- (-0.17)]
Media del consenso del profesorado[índice(DT)]	368	0.07(0.92)
Media del comportamiento del alumnado [índice(RI)]	372	0.20 (1.1)
Media del comportamiento del profesorado [índice(RI)]	372	0.30 (1.02)
Mediana sobre pobres relaciones alumnado-profesor [índice(RI)]	383	0.06 (0.03-0.09)

Nota: SD: desviación estándar. RI: rango intercuartílico

Este modelo que incluye variables explicativas del alumnado, proporciona un modelo de eficacia más preciso al reducir la variabilidad entre los centros de 21.4% a 16.74% al mismo tiempo que permite un mayor ajuste del modelo. La razón de verosimilitud, para el modelo nulo es de 124019.95, y la diferencia con la razón de verosimilitud del modelo 2 es de 12919.77 con gl=28, resultando estadísticamente significativa.

La expansión del modelo anterior, desarrolla el "modelo B", que permite la estimación de las varianzas entre las escuelas respecto de las variables individuales y conocer su distribución en el nivel 2. Se comprueba que hay variación a través de los centros en la relación con el rendimiento respecto a las variables: *sexo*, *edad*, *familias mixtas*, *expectativas académicas ISCED 2*, *actitudes ante la escuela*, *interés y disfrute*, *autoconcepto y percepción de la ayuda prestada por el profesorado*. Definitivamente el "modelo B" disminuye un 5.50% la varianza entre alumnado y un 8.43% la varianza entre escuelas respecto del modelo anterior (modelo A) porque parte de la varianza del nivel 2 es explicada por las características individuales.

Seguimos ampliando nuestro modelo, ahora nos interesa saber si la varianza sin explicar restante en el modelo anterior puede estar relacionada con los predictores de los centros.

La inclusión de variables del nivel escuela permite estimar la relación entre las variables de centro y el

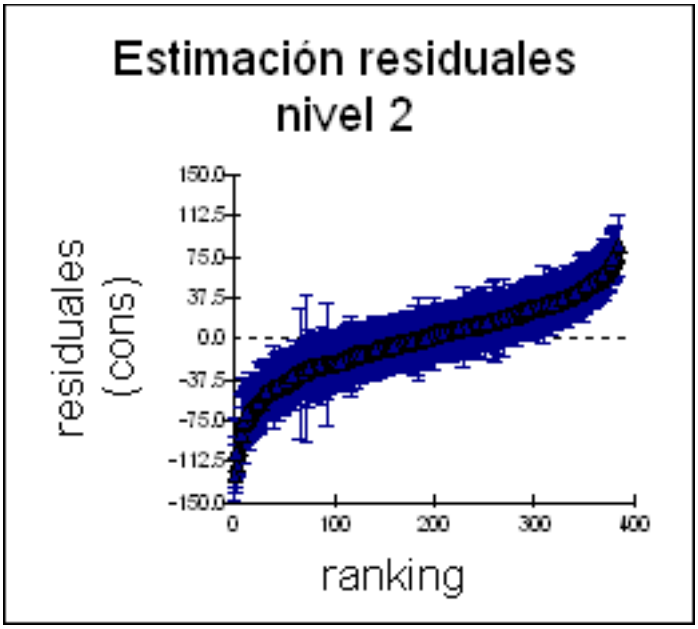

Figura 1. Intervalos de confianza para los residuales en el nivel 2.

rendimiento académico, "modelo C".

Los resultados obtenidos (véase Tabla 5), indican que la media estimada del rendimiento es 428.47, y se incrementaría 14.83 puntos si se tratase de un chico. Al mismo tiempo si su edad fuese tres años superior al nivel educativo que cursa, aumentaría 21.92 puntos y disminuiría 87.09 puntos y 46.20 para dos y un año superior a su nivel. También se observaría una disminución de 17.05 puntos cuando su edad sea un año inferior a su correspondiente grado. Se observa un gran impacto de la variable *expectativas*, con una relación lineal positiva sobre el rendimiento en todos los modelos estudiados. Otras variables del nivel individual que resultan asociadas al rendimiento, indican que por cada punto del *autoaconcepto*, la *autoaeficacia* y la *ansiedad* percibida por el alumnado en matemáticas, respecto del valor promedio, existiría una diferencia de 13.06, 16.81 y -9.83 respectivamente en la puntuación de matemáticas.

Discusión y conclusiones

En la "Fig. 2" se presentan las variables relacionadas con el rendimiento en matemáticas que han resultado estadísticamente significativas tras el análisis multinivel. Se comparan estos resultados con los estudiados en los modelos de Creemers, 2002; De la Orden, 1993;

De Miguel, Mora & Rodríguez, 1991; Fuentes, 1986; Sammons, Thomas & Mortimore, 1997; Scheerens, 2000; UNESCO, 2005.

No han resultado predictores significativos, contrariamente a otros trabajos, el número de *evaluaciones* por curso, el *tamaño* de los centros, el *fomento de cursos* adicionales de matemáticas, las *relaciones entre profesorado y alumando* y la *moral y el compromiso del profesorado*. Resultan significativas, después de controlar los predictores individuales, la *titularidad*, obteniendo los centros privados un mayor rendimiento. Otro factor que mejora el rendimiento matemático es el *porcentaje de alumnas* en los centros, mientras que su *tamaño* parece resultar poco significativo.

El número de *actividades* para el fomento de las matemáticas supone una diferencia significativa en el rendimiento, pero contrariamente no tienen efecto significativo los *cursos* adicionales de matemáticas. En cuanto a al *compromiso y moral* de los estudiantes se observan diferencias significativas en el rendimiento para el alumnado, aunque no para el profesorado. Para el resto de las variables de centro no se observan diferencias significativas.

Tabla 5

Variables explicativas de nivel individual y centro: "modelo definitivo"

Variables	Modelo (C)	
	Coeficientes	Error E.
Expectativas educativas (ref: ISCED 1)	23.91	
ISCED 2		7.21
ISCED 3B, C	29.44	6.81
ISCED 3A, 4	44.30	7.21
ISCED 5B	51.50	7.21
ISCED 5A, 6	73.98	7.21
Relaciones profesor-alumno	-3.39	.69
Sentimiento de pertenencia a la escuela	-2.95	.61
Interés y disfrute en matemáticas	-4.05	.98
Motivación instrumental en las matemáticas	-4.09	.75

Auto eficacia en matemáticas	16.81	.76
Ansiedad en matemáticas	-9.83	.89
Autoconcepto en matemáticas	13.05	.95
Preferencias de aprendizaje competitivo	-3.68	.69
Ayuda prestada por el profesorado	-3.57	.70
Disciplina y participación en matemáticas	3.36	.63
Parte Fija /nivel 2		
Titularidad (Ref público)	11.93	3.61
Porcentaje de alumnas	25.69	12.52
Ratio profesorado-alumnado	-0.63	.33
Nº de actividades matemáticas (ref: 0 activids)		
1 actividad/año	8.40	2.55
3 actividades/año	36.44	14.93
Compromiso y moral alumnado	6.36	1.61
Correlación entre escuelas (%)	12.41	
Correlación entre alumnos (%)	87.59	

Por otra parte hay un amplio número de factores individuales que se relacionan con el rendimiento, del mismo modo que sucede en otras investigaciones, como el sexo, las expectativas, el estatus socioeconómico. Del mismo modo resultan significativas, el autoconcepto, y la autoeficacia percibida por el alumnado respecto a las matemáticas. Es importante señalar en este sentido las variables: interés, disciplina, ayuda percibida, motivación y las preferencias por el aprendizaje competitivo.

Así pues, los resultados obtenidos no sólo ha conseguido alcanzar el objetivo inicialmente marcado, en la elaboración de un modelo explicativo multinivel sobre la eficacia educativa dentro del ámbito Nacional Español, a partir de variables individuales y de variables de centro, sino que la aplicación desarrollada constituye un

conjunto de datos muy flexible para la experimentación y la integración de técnicas estadísticas relacionadas con los modelos lineales jerárquicos y el ajuste de los datos al desarrollo de esta metodología.

Opinamos que aunque esta investigación nos han proporcionado información de aquellos centros que obtienen resultados por encima del rendimiento esperado y compensan las diferencias iniciales de sus alumnos, el "estudio de casos" completaría este conocimiento, al permitir un acercamiento a estas escuelas y a los factores que parecen contribuir al funcionamiento eficaz de las escuelas respecto al rendimiento de los alumnos. Este enfoque estimularía la reflexión y completaría los resultados obtenidos en los estudios cuantitativos realizados, para la construcción de una teoría e investigación empírica realizada dentro del campo de la eficacia educativa.

Otros aspectos que podrían servir de ampliación a estos resultados analizarían si los factores de efectividad encontrados resultan generalizables a otras materias y a otros niveles educativos. En España, en esta línea, Castejón (1996), plantea el análisis del rendimiento y la homogeneidad de los efectos de la escuela a través de las distintas materias, tratando de calcular los coeficientes de correlación lineal entre los índices de eficacia definidos por los residuales estandarizados no ponderados a nivel de grupo en cada una de las calificaciones de las cinco materias obtenidas en junio y septiembre.

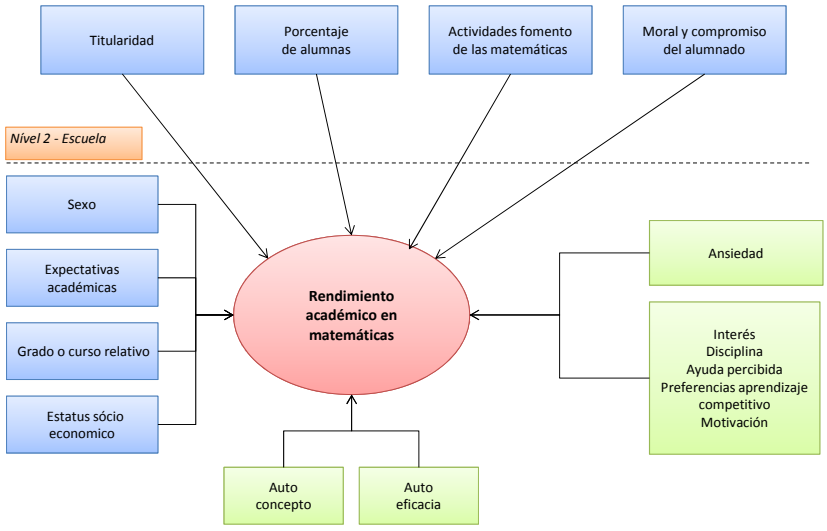

Figura 2. Modelo definitivo, con variables en ambos niveles.

Esperamos que la propuesta de los modelos sobre eficacia, basados en el análisis multinivel, contribuya a apoyar e impulsar el desarrollo de posteriores investigaciones siguiendo con esta metodología y con los indicadores de efectividad de las escuelas.

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¿Difieren las metas de logro, estrategias de regulación y rendimiento académico respecto a las disciplinas de estudios universitarios?

Different achievement goals, strategies of regulation and academic performance as a college disciplines?

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Resumen

Dos son los objetivos de este estudio: a) examinar las relaciones entre las estrategias de regulación, las metas de logro y el rendimiento académico con el fin de discutir el modelo teórico que se plantea y; b) analizar si existen diferencias entre los estudiantes de diversas ramas científicas en cuanto a las estrategias de regulación y metas de logro. Los participantes fueron 234 estudiantes universitarios procedentes de diversas ramas científicas. Los resultados indican que, las variables que se relacionan de forma única con el rendimiento académico son las metas de logro por aproximación y las estrategias de autorregulación. Además, los estudiantes universitarios que presentan puntuaciones más altas en dichas variables (metas de logro y estrategias de autorregulación) pertenecen a las ramas de ciencias de la salud e Ingeniería.

Palabras Clave: Metas de logro, estrategias de regulación, rendimiento académico, estudiantes universitarios.

Abstract

This article presents and discusses two empirical objectives: a) analyze the relationship of achievement goals, regulation strategies and academic performance in college students and b) analyze the existence of significant differences between strategies of regulation and achievement goals respect to subjects of science. The sample consists of 234 Spanish university students belonging to different branches of university scientists. Regarding the first objective, the results indicate that only an approximation achievement goals and self-regulation strategies are related to academic performance. Regarding the second, the results indicate that university students belonging to health sciences and engineering have higher scores on achievement goals and strategies for self-regulation approach. Based on these results we consider for future studies analyzing the relationship between contextual variables and achievement goals, self-regulation strategies and academic performance.

Keywords: Goals achievement; regulation strategies; AGP; higher education.

Introducción

Desde el enfoque constructivista de los procesos de aprendizaje las estrategias de regulación son consideradas como los procesos de autogobierno que permiten a los alumnos desempeñar las actividades de aprendizaje de forma favorable y alcanzar un mayor rendimiento (Paris y Paris, 2001; Schunk y Zimmerman, 1998; Zimmerman, 2000; Salmerón, Gutierrez-Braojos, Fernández, y Salmeron-Vilchez, 2010; Torrano y González-Torres, 2004; Zusho, Pintrich y Cortina, 2003).

Vermunt y Rijswijk (1988), establecen cinco dimensiones que conforman las estrategias de regulación que agruparse en tres dimensiones: (i) Autorregulación de los procesos, resultados y contenidos y; (ii) Regulación externa de los procesos y resultados. Esta dimensión se refiere a un comportamiento que se limita exclusivamente a los datos e indicaciones aportadas desde el exterior (docente, material didáctico), y; (iii) Carencia de regulación. En cuanto a esta dimensión el estudiante tiene dificultades para identificar el objetivo e instrucciones en el aprendizaje.

Los estudios que relacionan las estrategias de regulación con rendimiento académico ofrecen una amalgama de resultados contradictorios. Por ejemplo, los estudios de Vermunt (1992) y Busato, Prins, Hamaker y Visser, (1995) indican que solo altas puntuaciones en estrategias de autorregulación se relacionan con altas puntuaciones en el rendimiento (e.g. Vermunt, 1992; Busato, Prins, Hamaker y Visser, 1995). Asimismo Prins, Busato, Hamaker y Visser, (1996), concluyen que no existen diferencias respecto a la relación que diferentes estrategias mantienen con el rendimiento académico. Y Busato, Prins, Elshout y Hamaker, (1998) y Veenman, Prins y Verheij, (2003) concluyen que las estrategias de autorregulación y las estrategias de regulación externa no se relacionan con el rendimiento académico, pero que existe una relación significativa y negativa entre la carencia de regulación y dicho rendimiento.

Asimismo, existen estudios que concluyen de forma consistente que existen diferencias en las estrategias de regulación en función de la disciplina académica de los alumnos (e.g. Vermunt, 2005; VanderStoep, Pintrich y Fagerlin, 1996).

En suma existen controversias entre los resultados obtenidos en estos estudios que podrían ser explicadas en función de las características de los contextos de aprendizaje. Esto es, nosotros consideramos que el uso de estrategias de autorregulación

facilitan un mayor rendimiento académico siempre que el contexto de aprendizaje (modalidades y modelos de aprendizaje y evaluación) se preste ello.

Metas de logro, estrategias de regulación, y rendimiento académico

Existen evidencias empíricas que indican que las metas de logro pueden influir en el uso de estrategias de regulación y en el rendimiento académico. Las metas de logro, se definen como representaciones mentales fruto de la interacción entre los objetivos personales de los estudiantes y el contexto (Salmeron, Gutierrez-Braojos, Salmeron-Vilchez y Rodriguez-Fernandez, en proceso de revisión).

Según el marco teórico elaborado por Elliot y McGregor (2001) estas metas pueden comprenderse desde un modelo 2 x 2. Este modelo establece categorías en función de: i) el valor, positivo (aproximación al éxito) o negativo (evitación del fracaso); y la definición, intrapersonal (maestría) o normativa (desempeño). La combinación de estas categorías da lugar a cuatro tipo de orientaciones: las "orientaciones de metas de maestría o de aprendizaje por aproximación"; la "orientación de metas de desempeño por aproximación"; las "metas de maestría por evitación" y; las "metas de rendimiento por evitación".

- Metas de maestría o de aprendizaje por aproximación cuyo propósito es alcanzar el éxito en relación a las exigencias de la tarea;
- Metas de desempeño por aproximación, persigue obtener un alto rendimiento teniendo como referente el rendimiento de los otros;
- Metas de maestría por evitación donde el referente es intrapersonal y las motivaciones que impulsan hacia la maestría es evitar el fracaso;
- Metas de rendimiento por evitación" en el que el referente es el rendimiento de los demás y la motivación que impulsan hacia el desempeño es la evitación del fracaso.

Los estudios que han relacionado las metas de logro, las estrategias de regulación y el rendimiento académico presentan conclusiones opuestas y controvertidas. Por un lado, existen estudios que concluyen que existe una relación positiva de las metas por maestría con las estrategias de regulación y el rendimiento académico (Elliot et al., 1999; Pintrich, 2000; Wolters, Yu y Pintrich, 1996). Por otro lado, existen estudios que han encontrado una relación positiva entre

las metas de desempeño, las estrategias de autorregulación y un rendimiento académico elevado (Harackiewicz, Barron y Elliot, 1998; Harackiewicz et al., 2002). Otros estudios concluyen que la relación entre dichos constructos son nulas (Kaplan y Midgley, 1997; Newman, 1998).

Objetivos

En este estudio se plantearon dos objetivos:

- Analizar las relaciones de las metas de logro con las estrategias de regulación y el rendimiento académico en estudiantes universitarios con el propósito de detectar aquellas variables que se relacionan con el éxito en el rendimiento académico en la muestra de este estudio.
- Estudiar diferencias significativas entre las medias de los estudiantes universitarios de aquellas variables relacionadas con el éxito en el rendimiento académico respecto a la pertenencia a una u otra rama científica.

Método

Participantes

En este estudio participaron 234 estudiantes universitarios españoles matriculados en tercer curso de diversas ramas científicas (con 78 estudiantes por cada rama científica): Ingeniería, (51% hombres, 48% mujer); Ciencias sociales (5.1% hombre, 94.9%mujer); Ciencias de la Salud, (25.6% hombre, 74.4% mujer). La muestra fue seleccionada seleccionados por muestreo no probabilístico deliberado y opinático (Hernández, 1998).

Instrumentos de medida

Rendimiento académico. Para su medida se consideró la nota media exacta (con dos decimales) de los estudiantes en sus estudios universitarios en escala de 1 a 10.

Escala de metas de logro 2x2 de Elliot y McGregor (2001). Esta escala está constituida por cuatro dimensiones en las que se agrupan el total de los ítems (12) que la constituyen. Las dimensiones son las siguientes: a) aproximación por maestría; b) aproximación por desempeño; c) evitación por maestría y; d) evitación por desempeño. Las respuestas tienen un formato tipo Likert, con valores comprendidos entre "1"(totalmente desacuerdo) y "5" (totalmente de acuerdo).

***Escala de regulación del aprendizaje de Vermunt* (1998)**: se integra en el Inventario de estilos de aprendizaje (ILS) de Vermunt, (1998). La escala de regulación del ILS está

constituida por tres factores en los que se agrupan el total de los ítems de la misma (28). Los factores de la escala son los siguientes: a) estrategias de autorregulación; b) estrategias de regulación externa; c) carencia de regulación. Las respuestas tienen un formato tipo Likert, con valores comprendidos entre "1"(totalmente desacuerdo) y "5" (totalmente de acuerdo).

Mediante la modelización de ecuaciones estructurales (ver Figura II) se ha analizado la validación de la estructura de ambas escalas (metas de logro y estrategias de regulación). La evaluación de bondad de cada modelo se ha realizado en base a varios índices (Bentler, 1990): i) Chi-cuadrado: valores asociados a *p*, no significativos indican un buen ajuste del modelo; ii) el índice comparativo de ajuste (CFI): valores superiores a .95 indican un buen ajuste del modelo; iii) índice ajustado de bondad de ajuste (AGFI): valores superiores a .80 indican un buen ajuste; iv) error cuadrático medio de aproximación o raíz cuadrada de la media del error de aproximación (RMSEA): v) valores inferiores a .05 indican un buen ajuste del modelo.

Respecto a la escala de metas de

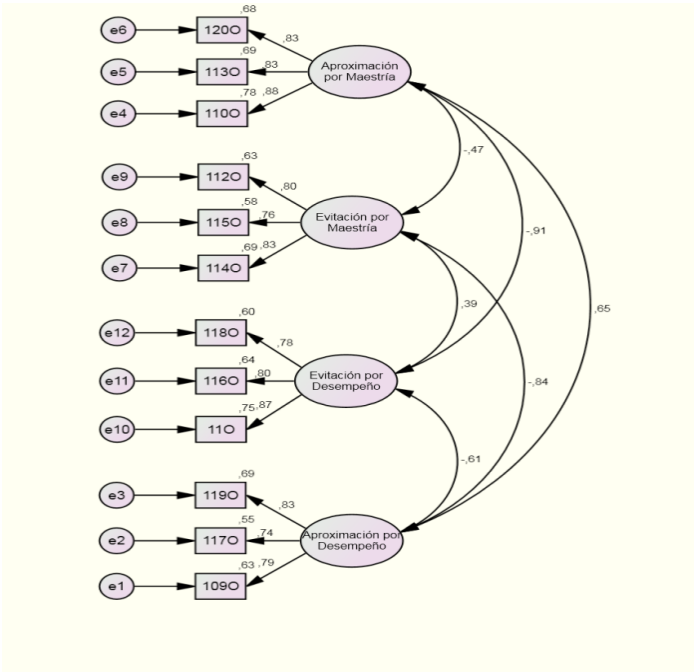

Figura 1. Modelo de ecuaciones estructurales de la escala de metas de logro.

logro (ver Figura 1), los resultados de evaluación del modelo indican un buen ajuste global del modelo a los datos empíricos en todos los índices (ver Tabla 1).

Tabla 3

Índices de bondad de ajuste del modelo de medida

χ^2	D.F.	p	CFI	AGFI	RMSEA
64.59	48	.055	.99	.93	.039

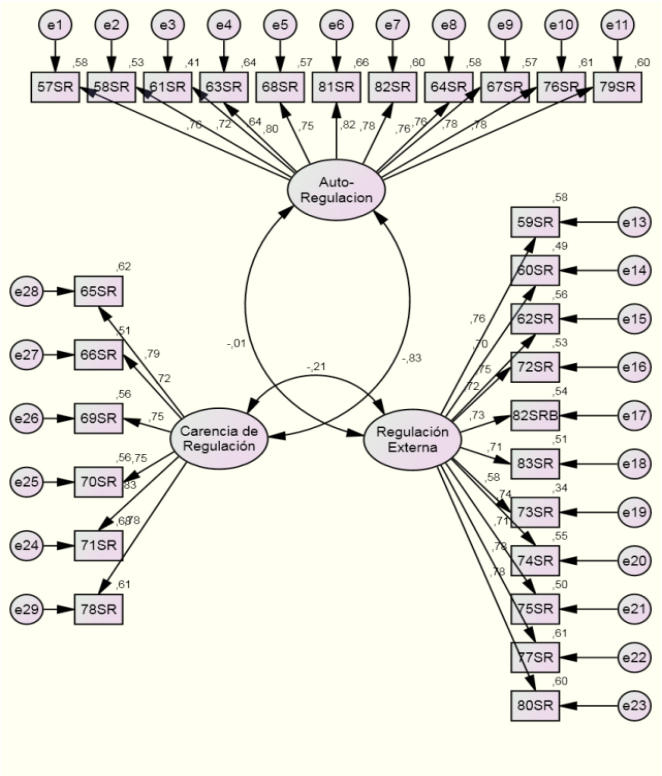

Figura 2. Modelo de ecuaciones estructurales de la escala de estrategias de regulación en el aprendizaje.

Respecto a la escala de regulación, los resultados de evaluación del modelo (ver Figura 2) indican un buen ajuste global del modelo a los datos empíricos en todos los índices (ver Tabla 2).

Tabla 4

Índices de bondad de ajuste del modelo de medida

χ^2	D.F.	p	CFI	AGFI	RMSEA
389.836	347	.056	.99	.87	.014

Se calculó el coeficiente alfa de Cronbach de cada subescala para estudiar la fiabilidad de los instrumentos. Así, en la escala de metas logro se encuentran los siguientes valores (Tabla 3): aproximación por maestría (α= .882); aproximación por desempeño (α= .831); evitación por maestría (α= .836) y evitación por desempeño (α= .853).

Tabla 5

Confiabilidad de los factores que conforman la escala de metas de logro

Factores	Alfa de Cronbach	Ítems-Total
1. Aproximación por maestría	.882	n=3
2. Aproximación por desempeño	.831	n=3
3. Evitación por maestría	.836	n=3
4. Evitación por desempeño	.853	n=3

Los resultados de alfa de Cronbach de la escala de regulación son los siguientes (Tabla 4): estrategias de regulación (α= .937); estrategias de regulación externa (α= .923); y carencia de regulación (α= .896).

Tabla 6

Confiabilidad de los factores que conforman la escala de regulación

Factores	alfa de Cronbach	Ítems-Total
1. Estrategias de autorregulación	.937	n=11
2. Estrategias de regulación externa	.923	n=11
3. Carencia de regulación	.896	n=6

En definitiva, el análisis mediante modelos de ecuaciones estructurales, de las escalas confirma la estructura teórica de las mismas. Además, la fiabilidad queda reflejada en el análisis de consistencia interna de cada uno de los factores que componen cada escala, ofreciendo así un alfa de Cronbach elevado.

Hipótesis

Objetivo I: Exclusivamente las metas de logro por aproximación (maestría y desempeño) presentan una relación de dependencia positiva con las estrategias de autorregulación y el rendimiento académico.

Objetivo II: Existen diferencias en función a la disciplina (Ingeniería, Ciencias de la Salud y Ciencias sociales) de estudios universitarios.

Procedimiento

Primer objetivo: El procedimiento seguido para analizar las relaciones entre las variables de estudio es el siguiente:

1. Análisis de correlación mediante Pearson para realizar un estudio exploratorio de la relación de dependencia entre las variables y seleccionar aquellas que presenten una correlación significativa y positiva con la nota media.
2. Aplicación de un modelo de ecuaciones estructurales para comprobar que el modelo teórico predictor de la nota media se ajusta a los datos empíricos.

Segundo objetivo: Para analizar diferencias significativas entre las medias de los estudiantes matriculados en carreras universitarias de diferentes ramas científicas se aplicó una ANOVA, usando exclusivamente aquellas variables predictivas del rendimiento académico.

Análisis de datos

Relación entre metas de logro, estrategias de regulación y el rendimiento académico

Mediante el análisis de correlación de Pearson se obtiene una correlación significativa y positiva entre las metas de logro por aproximación (maestría y desempeño), las estrategias de autorregulación y el rendimiento académico. Por otro lado, metas de logro por evitación (maestría y desempeño), a carencia de regulación correlacionan significativa y positivamente entre sí. Por último, las estrategias de regulación externa no presentan una relación significativa con la nota media.

Tabla 7

Relación entre metas de logro y estrategias de regulación con el rendimiento académico: Análisis de correlación por Pearson.

Variables	1	2	3	4	5	6	7	8
1.Autorregulación	1	-	-	-	-	-	-	-
2.Regulación Externa	-.213**	1	-	-	-	-	-	-
3.Carencia de Regulación	-.572**	-.229**	1	-	-	-	-	-
4. Aproximación por maestría	.296**	.009	-.208**	1	-	-	-	-
5.Aproximación por desempeño	-.288**	.025	.169**	-.396**	1	-	-	-
6.Evitación por Maestría	.351**	-.003	-.232**	.480**	-.570**	1	-	-
7. Evitación por Desempeño	-.298**	-.049	.252**	-.684**	.280**	-.455**	1	-
8. Rendimiento Académico	.663**	-.020	-.599**	.497**	-.380**	.400**	-.441**	1

*Nota: ** La correlación es significativa al nivel 0,01 (bilateral)*

Diferencias entre ramas científicas respecto: al nivel de dominio en las metas de logro por aproximación y las estrategias de autorregulación.

La aplicación de la prueba de Levene indica que las varianzas poblacionales son iguales: i) Estrategias de autorregulación (Estadístico de Levene, 1.95, p=.145); ii) metas de aproximación por maestría (Estadístico de Levene, 1.32 y p = .269); iii) metas de aproximación por desempeño (Estadístico de Levene, .117 y p= .890).

Los resultados de la ANOVA indican que existen diferencias significativas entre las ramas científicas en las tres variables dependientes (Estrategias de autorregulación, metas de maestría por aproximación y metas de desempeño por aproximación). La estimación de *Eta cuadrado*, como una medida de la magnitud del efecto del tratamiento (Yaremko, Harari, Harrison y Lynn, 1982). Como se observa (Tabla 6) el 14,9% de la varianza en las estrategias de autorregulación es explicada por la pertenencia a una rama científica determinada. Respecto a las metas por aproximación, el 4,3% de la varianza en metas de maestría y el 6,5% de la varianza en metas de desempeño es explicada por la pertenencia a una rama científica determinada. Por tanto, estos resultados deberían ser tomados con precaución debido al bajo valor del tamaño del efecto.

Tabla 8

Diferencias entre las diferentes ramas científicas.

Variables	**Rama científica (n=234)**								
	Ingeniera (*n*= 78)		Ciencias de la salud (*n*= 78)		Ciencias sociales (*n*= 78)		**Valores asociados**		
	M	*SD*	*M*	*SD*	*M*	*SD*	F	*p*	η^2
Estrategias de autorregulación	2.26	.67	2.19	.77	1.62	.76	20.15	.000*	.149
Metas de maestría por aproximación	1.74	.78	2.06	.74	2.10	.77	5.19	.006*	.043
Metas de desempeño por aproximación	1.94	.79	2.3	.76	1.91	.80	8.00	.000*	.065

Nota: * La diferencia de medias es significativa al nivel .05.

En definitiva, los estudiantes Ciencias Sociales de manifiestan un menor uso de estrategias de autorregulación que los estudiantes de Ingeniería y Ciencias de la Salud. Por otro lado, la adopción metas de logro por aproximación independientemente de la valencia (maestría / desempeño), es mayor en los estudiantes de Ciencias de la Salud. Los estudiantes de Ciencias Sociales adoptan metas de maestría en mayor medida que los estudiantes de Ingeniería. Los estudiantes de Ingeniería manifiestan adoptar, en mayor medida, metas de desempeño que los estudiantes de Ciencias Sociales.

Conclusiones

Los objetivos planteados en este estudio fueron los siguientes: i) Analizar las relaciones de las metas de logro con las estrategias de regulación y el rendimiento académico y; ii) Conocer si existen diferencias significativas entre las medias de las estrategias de autorregulación y metas de logro por aproximación de los estudiantes en función de su pertenencia a una u otra rama científica.

Respecto al primer objetivo, los estudiantes adoptan metas por aproximación, activan estrategias de autorregulación en sus procesos de aprendizaje y obtienen un mayor rendimiento (resultados académicos), estos resultados confirman, entre otros, los obtenidos por Wolters, Yu, y Pintrich, (1996); Harackiewicz, Barron y Elliot, (1998); Harackiewicz et al., (2002). Por otro lado, los estudiantes que activan metas por evitación presentan carencias de regulación y presentan un rendimiento académico más bajo.

En cuanto al segundo objetivo de estudio, los resultados, en consonancia con las conclusiones de otros estudios (VanderStoep, Pintrich, y Fagerlin, 1996; Vermunt, 2005), confirman diferencias de las variables que predicen el rendimiento académico en relación a la disciplina académica de los estudiantes. Así, los estudiantes de Ingeniería como los de Ciencias de la Salud manifiestan un mayor uso de estrategias de autorregulación. Los estudiantes de Ciencias de la Salud manifiestan una adopción mayor en cuanto a metas de logro por aproximación, tanto de maestría como de desempeño. Sin embargo, estas conclusiones (en especial, en relación a las metas de logro por aproximación) se han de considerar con precaución ya que el tamaño del efecto es bajo.

Consideramos que para futuros estudios sería relevante el análisis de las variables contextuales, que diferencian entre una y otra disciplina de estudio y que podrían explicar las diferencias en el uso de estrategias de autorregulación.

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Reseñas

De-Juanas Oliva A. (2012). *Universidad y formación del profesorado universitario en el EEES. Reto de nuestro tiempo*. Madrid: Editorial Académica Española. 123 pp. ISBN: 978-3-8473-5864-0

En un escenario social complejo, el profesor De-Juanas nos presenta una completa obra que permite comprender cómo se ha intentado responder a las necesidades de la sociedad actual desde el ámbito universitario en la Unión Europea. Con este propósito, el autor realiza una revisión y síntesis de los principales acontecimientos que han originado el Espacio Europeo de Educación Superior (EEES en adelante). Asimismo, nos presenta las características y funciones de la educación superior actual tras la controvertida Declaración de Bolonia (1999), junto con los nuevos requerimientos que el contexto demanda a la formación y rol del profesor universitario.

El libro está estructurado en dos partes. En la primera, titulada "La Universidad en el tránsito hacia el Espacio Europeo de Educación Superior", De-Juanas nos invita a comprender *los principios y funciones de la Universidad desde diversas* perspectivas y la evolución del modelo de educación superior a lo largo del siglo XX, hasta llegar a la *situación de la Universidad en la actualidad.*

A lo largo de los seis apartados que componen esta primera parte, se describen los *orígenes del marco europeo de enseñanza superior.* Esto, mediante una exposición de los aspectos más relevantes de diversos documentos, normativas e instancias oficiales que acompañaron la creación del EEES y que, a lo largo de los años, han intentado fomentar el reconocimiento académico y la movilidad de estudiantes y profesores en la zona europea. En estas líneas, se invita al lector a hacer un recorrido por los acontecimientos más destacados que rodean al complejo *proceso de Bolonia* que configura lo que hoy entendemos como EEES.

Gracias a la detallada y clara descripción que realiza el autor en torno a cada uno de los *aspectos estructurales del EEES*, el lector tiene la posibilidad de comprender, *la organización del curriculum universitario en base al Sistema*

Europeo de Transferencia de Créditos, el sistema de calificaciones europeas, *el establecimiento de una estructura común por ciclos en la Enseñanza Superior y el suplemento al diploma* (SD). En relación a este último aspecto, De-Juanas rescata los beneficios que el SD reporta a la transparencia, empleabilidad, objetividad y movilidad, permitiendo "un acceso más fácil a las oportunidades de trabajo redundando en una mejora de la empleabilidad a nivel nacional e internacional" (p.33). Posteriormente, se abordan *los sistemas de acreditación* y la *creación de titulaciones conjuntas*, lo que para el autor "representa una apuesta por avanzar en el EEES tanto en profundidad como en integración" (p.38). Esta primera parte finaliza con un apartado destinado a la situación de *la Universidad española en el EEES*, por medio del análisis de diferentes marcos normativos y medidas adoptadas por el estado español en esta materia.

En la segunda parte del libro, titulada "Funciones y formación del profesorado universitario" el autor nos invita a reflexionar y replantearnos *las funciones del profesor universitario* en el escenario actual: función docente, investigadora, transferencia del conocimiento y de gestión. Haciendo especial hincapié en los cometidos docentes y su relación con la investigación, así como en la necesidad de redefinir el rol profesional del profesorado universitario, el autor, resaltando la importancia del contexto, nos señala que:

> Se requiere un cambio en la cultura docente en la Universidad, tanto en la configuración del curriculum como en la incorporación de habilidades, competencias y compromisos cada vez más complejos. Así mismo, este cambio conceptual del perfil profesional del profesorado demanda un nuevo enfoque en la formación docente que permita tener un conocimiento amplio y profundo de su nuevo rol (p.94).

Dentro de los requerimientos del EEES, se ha planteado realizar una revisión de las funciones del profesorado universitario y atender a sus necesidades formativas iniciales y permanentes. El autor aborda estas temáticas, y realiza una revisión del desarrollo profesional del profesorado universitario en la actualidad en cuanto a los procesos y niveles de formación, así como de los *modelos de formación docente*. Rescata el modelo del profesor como *práctico reflexivo* y las propuestas formativas que desde esta mirada se desprenden.

De Juanas nos ofrece un auténtico libro de divulgación, en el verdadero y buen sentido del término, puesto que ofrece una visión completa del panorama que origina el EEES, ayudando al lector a comprender y situarse en este nuevo contexto. Además, como toda buena obra, posibilita continuar profundizando en estas temáticas gracias a un completo y actualizado apartado bibliográfico.

Este libro es una reflexión sobre la Universidad y sus profesores. Convirtiéndose en una guía necesaria para estudiantes y docentes en momentos de transformaciones sociales y educativas. La obra sirve de orientación para todo profesor que busque comprender los acontecimientos que han configurado la situación actual de la enseñanza superior, así como a quienes se encuentran en la toma de decisiones respecto a las transformaciones necesarias que debe realizar la Universidad española.

Como bien expone el autor, se requiere un cambio en el modelo de enseñanza y un proceso educativo centrado en el aprendizaje del alumno, para lo cual, el profesor necesariamente debe adecuarse al contexto y reflexionar sobre su propia práctica para mejorar su quehacer diario. La responsabilidad y funciones que tienen los profesores aparecen en la publicación como puntos de partida para conseguir la calidad educativa.

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