



Multidisciplinary Journal of Educational Research

Volume 7, Number 2

Hipatia Press

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An Investigation of Dispositional Resistance, Change-specific Resistance and Change-related Information: The Case of the “4+4+4” Educational Reform in Turkey

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Date of publication: June 15th, 2017

Edition period: June 2017-October 2017

To cite this article: Kalman, M., & Bozbayindir, F. (2017). An Investigation of Dispositional Resistance, Change-specific Resistance and Change-related Information: The Case of the “4+4+4” Educational Reform in Turkey. *Multidisciplinary Journal of Educational Research*, 7(2), 125-155.
doi: 10.17583/remie.2017.2622

To link this article: <http://dx.doi.org/10.17583/remie.2017.2622>

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An Investigation of Dispositional Resistance, Change-specific Resistance and Change-related Information: The Case of the “4+4+4” Educational Reform in Turkey

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Abstract

The purpose of the current study was to investigate teachers' attitudes towards change, dispositional and change-specific resistance, and their perceptions of change-related information, within the context of the recent system-wide educational change, widely known as “4+4+4 Reform Initiative”, in Turkey. The researchers conducted a correlational quantitative study. The sample of the study consisted of 402 primary and middle schools teachers selected randomly. Research results indicated that teachers resisted to the recent change cognitively, affectively and intentionally, respectively. The highest resistance level was associated with cognitive resistance. Teachers' perceptions of change-related information were at the “disagree” level. The paper ends drawing implications for educational reform initiatives in Turkey.

Keywords: educational change, the 4+4+4 education system, teachers' attitudes toward change, dispositional resistance to change, change-related information

Una investigación sobre la resistencia al cambio, la resistencia específica al cambio y la información relacionada con el cambio: El caso de la reforma educativa "4 + 4 + 4" en Turquía

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Resumen

El propósito del presente estudio fue investigar las actitudes de los maestros hacia el cambio, su Resistencia, el cambio específico y sus percepciones de la información relacionada con el cambio, en el contexto educativo actual conocido como "4 + 4 + 4 Reform Initiative", en Turquía. Los investigadores realizaron un estudio cuantitativo correlacional. La muestra del estudio consistió en 402 maestros de escuelas primarias y secundarias seleccionados al azar. Los resultados de la investigación indicaron que los maestros se resistieron al cambio reciente cognitiva, afectiva e intencionalmente. El nivel de resistencia más alto se asoció con la resistencia cognitiva. Las percepciones del profesorado acerca de la información relacionada con el cambio estaban en el nivel de "desacuerdo". El documento termina trazando implicaciones para las iniciativas de reforma educativa en Turquía

Palabras clave: el cambio educativo, el sistema educativo 4 + 4 + 4, las actitudes de los maestros hacia el cambio, la resistencia al cambio, la información relacionada con el cambio

-Nothing endures but change-
Heraclitus (540 BC-480 BC)

Some internal and external overpowering factors such as the need to remain competitive, environmental demands and changes, technological developments, globalization and state policies force today's organizations and individuals to change (Reio, 2005; Liu & Perrewé, 2005; Van Dam, Oreg & Schyns, 2008). Knowledge production has reached an unprecedented level with the inception of the information age, and it has taken such a form that the extent of knowledge generated even in the last three decades has exceeded that produced since the origin of humankind (Gedikoğlu, 2005). Regardless of its name, form or the way it occurs, e.g. reform, transformation, innovation etc., change is likely to provide many opportunities for organizations and individuals. Once implemented properly, change can be a means of fostering a sense of mastery, accomplishment, professional growth; development, increasing resources, correcting past failures and cultivating new and long-term effective patterns of behavior (Fullan, 2007; Lewis, 2011; Newton & Tarrant, 1992). Failing to respond to change might impinge on the relationship between the organization and its environment (James, 2011). This is because change functions as a means of communication between organizations and/or individuals, and their broader environments.

The increasing globalization of the world has made change inevitable for all of the organizations, including educational organizations. Fullan (2010) argues that educational systems are loosely coupled, fragmented, overloaded, and faced with inertia, over the course of time. Therefore, in educational systems, change could serve a two-fold purpose; a) to improve the quality of learning and teaching processes in schools, thus making them more effective (Akşit, 2007), and b) to help them overcome friction and inertia, and prevent entropy from reigning schools.

Armenakis & Harris (2009) argue that change is a knotty phenomenon and suggest that it has to be treated seriously by both organizations and individuals. Understanding the nature of change, therefore, is critical for successful implementation of change (Harris, 2002). Despite its benefits for the organization, change could encroach on time, effort, energy and

extensive investments due to some misled, unnecessary or flawed changes (Lewis, 2011). For these reasons, every single phase in a change or reform initiative must be considered carefully by top management and policymakers, and any attempts requiring a change in critical tasks within the organization must be preceded by a caveat on its outcomes for the organization. Change or reform initiatives need to be built on a sound rationale to avoid devastating damages in the beginning and later phases of change. Harris (2002) proposes five questions to be considered by change leaders in the pre-change process: how important is this change?, how necessary is this change at this time?, what priority does the change have?, how will others view this change and respond to it?, what will be the main benefits from this change? (p.38). These questions and their answers could help change leaders act responsibly in terms of planning, initiating and implementing an incoming change, and truly see the pros and cons that the change will bring.

The New 4+4+4 Education System

Advances in technology and information have altered expectations from education, and forces of globalization and knowledge-based economies have transformed how schools and educational systems operate (Reyes, 2014). The Turkish education system is no exception. To keep up with changing dynamics around the world, a recent system-wide change was put into practice in the education system in Turkey so as to educate individuals to be fully equipped with the required skills and knowledge of the information age.

The recent educational change is widely known as the “4+4+4 Education System”, and this new system covers 4 years of elementary education, 4 years of middle school education and 4 years of secondary education. The change was launched in 2012 and put into practice in the academic year of 2012-2013 and is still ongoing. Along with extending the basic compulsory education from 8 years to 12 years, this new system brought about change in some other aspects of the system, such as division of school facilities, new elective courses, and the reopening of religious and vocational middle schools. The “4+4+4 system” aimed at increasing the schooling and raising

the society's education level, decreasing the existence of disparities between various regions across Turkey, and making Turkish education more democratic and flexible, by offering some novelties at various levels (e.g. elective courses like Kurdish, Zaza and the Life of the Prophet Muhammad) to meet socio-cultural demands of citizens and students from education (MONE, 2012).

Critical Issues in the Change Process

Change literature has dealt with some critical issues regarding the quality and success of the change initiatives ubiquitously. Borrowing from computer science, the terms, "software" and "hardware" can be utilized as lenses in understanding reform and/or change initiatives. No matter how high the quality of the screen, monitor, and keyboard of the computer are, it does not mean anything without properly-operating software. As such, organizational aspects which could be considered as software would include culture, beliefs, attitudes etc., and need to be dealt with during the change process, because physical infrastructure, time and money do not warrant success and attainment of organizational goals, *per se*, during the change process.

One critical issue in the change process is *the human side of change*. More often, organizational change aims at altering some key variables in organizations, which might influence the members of the organization and their work behaviors (Jimmieson, Terry, & Callan, 2004). As the members of the organization are faced with uncertainty, rather than what they are already familiar with (Robbins & Coulter, 2012), their attitudes toward change affect their stance on the change. As change may bring about unfamiliar circumstances, breaking work routines and building on organizational memory, change may be embraced enthusiastically by organizational members under some circumstances, however, in others, it may be opposed to.

As a pivotal predictor of the success and quality of change, employee attitudes towards change have been investigated more than many other topics related to change (Rafferty, Jimmieson, & Armenakis, 2013). The success of change relies heavily on employee attitudes (Miller, Johnson & Grau, 1994). Lau & Woodman (1995, p. 549) posit that employee attitudes

are “an outcome of a cognitive understanding of change guided by the person's change schema”.

Some key concepts related to change are widely investigated to shed light on employee attitudes towards change. These can be viewed as elements of the human side of change. One of these key elements is *readiness for change*. Holt, Armenakis, Harris, and Field (2007) define readiness for change as;

... a comprehensive attitude that is influenced simultaneously by the content the process, the context and the individuals (i.e., characteristics of those being asked to change) involved and collectively reflects the extent to which an individual or a collection of individuals is cognitively and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo... (p. 326).

Holt et al.'s (2007) definition implies that individuals with high levels of readiness for change have a tendency toward embracing and implementing change cognitively and emotionally and seeing it as a positive process. However, those with low levels of readiness for change are more likely to feel anxious and exhibit negative feelings.

Resistance to change is another key element examined in terms of change recipients' attitudes towards change. The term ‘resistance to change’ can be traced back to the human psyche (Reeves, 2009), and it has an *unconscious origin* (James, 2010). In the related literature, resistance to change is associated with some negative feelings, such as anxiety, insecurity, feelings of loss, and struggle (Newton & Tarrant 1992; Harris, 2002). Negative feelings may accelerate the process of feeling a threat to one's sense of identity, self-esteem, and self-worth (James, 2011) and could lead to change avoidance (Yukl, 2010).

Oreg (2006) argues that individuals' perceptions regarding change are one of the elements underpinning resistance to change. In addition to this, change recipients' general confidence about handling change successfully plays a significant role in their reactions to change (Yukl, 2010). Individuals with high levels of change-related self-efficacy are less likely to experience distress by feelings of inadequacy, unlike those with low change-related self-efficacy (Jimmieson, Terry, & Callan, 2004). Those individuals with lower

levels of self-efficacy are likely to think that they cannot cope with change. Focusing on the cognitive underpinnings of change, Lau & Woodman (1995) postulated that an individual's schemas about change are directly affected by individual-level factors related to change.

An elaborated and multifaceted analysis of resistance to change is required to get a wider picture of resistance to change. Piderit (2000) operationalized a multidimensional conceptualization of resistance to change, in order to examine change recipients' attitudes towards change through cognitions, emotions and intentions/behaviors. In the cognitive dimension, employees' response to change may range from positive beliefs (i.e. change is essential for the organization to succeed) to negative beliefs (i.e. this change could ruin the organization). In the affective dimension, employee responses may range from positive emotions (i.e. happiness, excitement) to negative emotions (i.e. anger, fear). In the intentional/behavioral dimension, responses to change may range from positive intentions of supporting change or negative intentions of opposing it. Using such a conceptualization facilitates exploration of different responses to different dimensions and “enhances accuracy in predicting employee behaviors” (Piderit, 2000, p. 789), at least for change-related contingencies. Likewise, Elizur and Guttman (1976) suggested a tripartite conceptualization composed of cognitive, affective and intentional/behavioral components (Bouckenooghe, 2010). In addition to these components, Schiffer (2011) asserts that there might be physical responses to change, such as burnout or stress-related disorders.

Information about change includes communicating information about the change to the recipients. Many researchers have emphasized the role (and importance) of receiving information in the change process (Reio, 2005; Liu & Perrewé, 2005; Wanberg & Banas, 2000; Sloyan & Ludema, 2010; Oreg, 2006; Jimmieson, Terry, & Callan, 2004). Providing information about the change is likely to reduce negative feelings, increase awareness and readiness, by preparing individuals for what is impending. However, providing information does not necessarily apply to all change initiatives. Harris (2002) proposes that information, which may affect individuals and organizations profoundly, must be communicated. To illustrate, provision of information may be pertinent to a whole-system change. Then it becomes a

moral imperative to inform the recipients about the change since changing the whole system results in changes in every context people work (Fullan, 2006), and an alignment is needed between the goals of reform initiatives and intrinsic motivations of stakeholders in such cases (Fullan, 2011). However, the recent change in Turkish education system is inconsistent with Harris' (2002) and Fullan's (2006) advice as the change was initiated abruptly without prior implementation and formal announcement of it to the change recipients, albeit being a system-wide change.

Figure 1 demonstrates change-specific resistance and the inverse relationship between change-specific resistance and some variables.

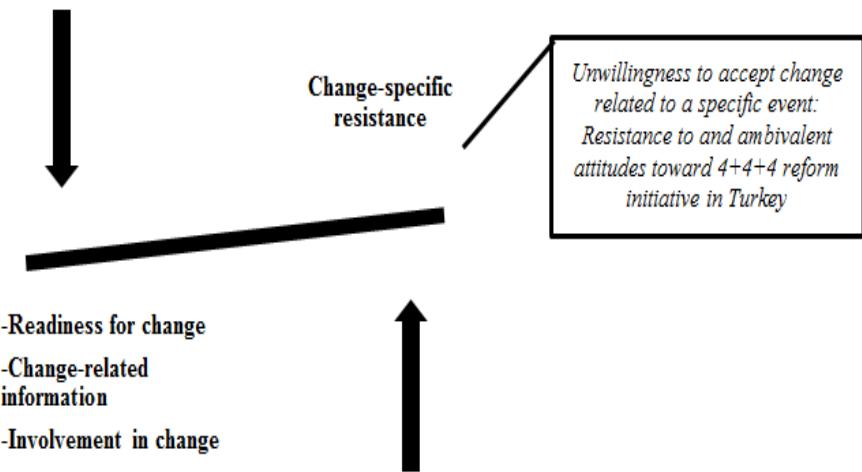


Figure 1. Change-specific resistance and the inverse relationship between change-specific resistance and some variables (these variables are by no means exhaustive).

Figure 1 shows the inverse relationship between change-specific resistance and readiness for change, involvement in change, and change-related information. The increase in the level of these variables could result in a decrease in the extent of change-specific resistance.

Individuals' attitudes towards change might also be influenced by some other variables such as their general attitudes towards change (Lau & Woodman, 1995), such as personality traits (Oreg, 2003; Oreg, 2006; Oreg et al., 2008) and variables in the environment (Van Veen, Sleegers, & Van de Ven, 2005). Among these variables, personal characteristics of change recipients' reactions to change have been exhaustively studied previously (Oreg, Vakola, & Armenakis, 2011). Reviewing literature about the resistance to change personality trait, Oreg (2003, pp. 681-682) identified six sources of *dispositional resistance* to change: a) reluctance to lose control, b) cognitive rigidity, c) lack of psychological resilience, d) intolerance to the adjustment period involved in change, e) preference for low level of stimulation and novelty and f) reluctance to give up old habits.

Dispositional resistance and its components are elucidated in Figure 2.

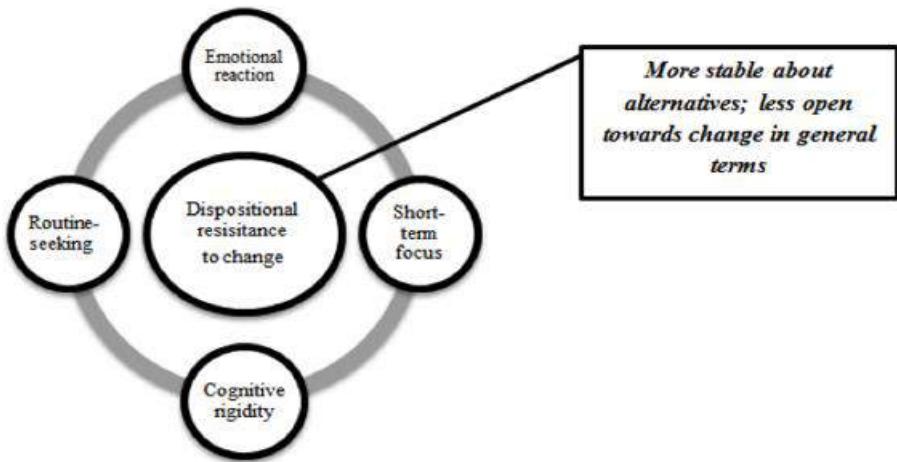


Figure 2. Dispositional resistance to change and its components

As can be seen in Figure 2, dispositional resistance to change has four components: emotional reaction, routine-seeking, short-term focus and cognitive rigidity. Oreg et al. (2008) argue that dispositional resistance to

change might have an impact on individuals' stance in resisting or avoiding change.

The purpose of the present study was to explore the relationship between teachers' perceptions of the "4+4+4 Educational System", by treating it as a specific change event, and their dispositional resistance towards change in general, and change-related information about the new system using preliminary data collected about seven months after the implementation of the change.

Methodology

Research Design

This research is a correlational quantitative study of teachers' attitudes towards the change in the Turkish education system. The aim of the quantitative correlational studies is to determine the existence and level of change, between two or more quantitative variables (Karasar, 2009). These studies help clarify our understanding of important phenomena by identifying relationships among variables (Fraenkel, Wallen, & Hyun, 2012). Table 1 demonstrates the research variables and the research questions.

Table 1
Research variables and questions

Variables	Questions
Dispositional resistance to change	<i>Are teachers change-aversive in general terms? Is there a relationship between their attitudes toward the 4+4+4 Education System (a specific change) and change in general terms (for example, openness to adopt new ideas)?</i>
Attitudes towards change (with attribution to 4+4+4 system)	<i>What are teachers' attitudes toward the recent change (4+4+4) in Turkey?</i>
Change-related information	<i>Are teachers informed about the change process (viz. the implementation of the 4+4+4 system)?</i>

The research has three variables as demonstrated in Table 1: *dispositional resistance to change*, *attitudes towards change* and *change-related information*. Dispositional resistance to change as a stable personality trait refers to the role of change recipients' internal inclinations in embracing and resisting change. Change-aversive people are less likely to initiate change voluntarily and more likely generate negative attitudes towards change (Oreg, 2006). According to Oreg (2003), change recipients' internal inclinations towards adopting and resisting change can predict their reactions to specific change initiatives.

Attitudes towards change were used in this research as a variable which elucidated teachers' cognitive, affective and behavioral reactions to the change. This variable specifically measured their change-specific reactions in the case of the 4+4+4 education reform. This type of resistance may stem from the processes followed and outcomes emerged after change initiatives as indicated in the related literature.

Change-related information can be specified as a context-specific pre-change variable which may affect change recipients' attitudes towards change (Wanberg & Banas, 2000). This variable was chosen to be used in this research so as to unearth whether change leaders' approach to providing information in the change process affected teachers' attitudes towards change either in a positive or negative way. Research has shown that change-related information is positively associated with attitudes towards change (Van den Heuvel, Freese, Schalk, & Van Assen, 2017).

Participants and Procedures

The population of the study was comprised of primary and middle school teachers working at schools located in a large city in the Southeastern Turkey, during the academic year of 2012-2013. The city in which the data were collected is the sixth largest province in Turkey. The research was conducted during the first year of implementation of the change (in the second semester of the academic year). The sample of the study consisted of 425 primary and middle school teachers who were chosen randomly. There were 425 questionnaires collected from the teachers. Of these, 23 questionnaires which were incomplete or not filled out properly were

eliminated. Statistical analyses were performed on the data gathered from 402 of the teachers. Frequencies and percentages regarding participants' gender, age, school type and seniority are presented in Table 2.

Table 2

Frequencies and percentages regarding teachers' gender, age, seniority and school type

Gender	f	%
<i>Male</i>	191	47.5
<i>Female</i>	211	52.5
<i>Total</i>	402	100
Age	f	%
<i>Younger than 30</i>	198	49.3
<i>31-40</i>	181	45
<i>41 and above</i>	23	5.7
<i>Total</i>	402	100
School Type	f	%
<i>Primary</i>	201	50.0
<i>Middle</i>	201	50.0
<i>Total</i>	402	100
Seniority	f	%
<i>1-10 years</i>	274	68.2
<i>11-20 years</i>	114	28.4
<i>21 and above</i>	14	3.5
<i>Total</i>	402	100

As can be seen in Table 2, 47.5% of the teachers attending the current study were male and 52.5% of them were female. There were 49.3% of the participants who were below the age of 30, 45% of them were between 31-40 years, and 5.7% of them were 41 years and above. Moreover, 50% of them were primary school teachers, and 50% of them were middle school teachers. Of the participating teachers, 68.2% had 1-10 years of teaching

experience, 28.4% of them had 11-20 years of teaching experience and 3.5% of them had more than 21 years of teaching experience.

Instruments

In the study, the researchers used a personal information form, attitudes toward change scale, dispositional resistance to change scale and change-related information scale, to collect data. For the *Change-related Information Scale*, an exploratory factor analysis was performed. Meanwhile, a confirmatory factor analysis was performed for *Attitudes toward Change Scale* and *Dispositional Resistance to Change Scale* using LISREL 8.20.

Personal Information Form. This form was prepared by the researchers to determine some demographic variables (gender, age, school type and seniority) related to the participants.

Attitudes toward Change Scale. This scale was developed by Oreg (2006) to measure employees' attitudes toward change. The scale was translated into Turkish by five language experts working in the field of English language teaching. In the adaptation study, some minor changes were made in the wording of statements to make them applicable to the recent change in the educational system and to make sure that the concepts included in the scale had the same meaning in Turkish too. The sample items were "*I believed that the change would make my job harder (Cognitive)*", "*I protested against the change (Behavioral)*", and "*The change made me upset (Affective)*". The original three-dimensional factorial structure was confirmed. The dimensions of the scale were affective, behavioral and cognitive resistance to change. In this scale, three factors, consisting of 15 items, had an acceptable fit with the data (RMSEA=.09, NFI= 0.95, NNFI= 0.95, CFI= 0.96, IFI= 0.96, GFI=0 .90). Cronbach's alpha reliability coefficient of the scale was found to be .734.

Dispositional Resistance to Change Scale. This scale was developed by Oreg et al. (2008) to uncover employees' dispositional resistance to change.

The Turkish version of the scale developed by Oreg et al. (2008) was used in this study. The original four-dimensional factorial structure was confirmed. The four dimensions in the scale and sample items were *routine seeking* (I generally consider changes to be a negative thing), *emotional reaction* (When I am informed of a change of plans, I tense up a bit), *short-term focus* (Changing plans seems like a real hassle to me) and *cognitive rigidity* (I often change my mind). The scale was also validated by Güçlü, Özer, Kurt, and Kandemir (2010) in Turkish culture and used in research conducted on teachers (Palos & Gunaru, 2017). In this scale, four factors, consisting of 17 items, predicted by the dispositional resistance to change latent variable, fitted with the data at an acceptable level (RMSEA= .07, NFI= 0.88, NNFI= 0.90, CFI= 0.92, IFI= 0.92, and GFI= 0.92). Cronbach's alpha reliability coefficient of the scale was found to be .776.

Change-related Information Scale. Change-related information was measured using Wanberg and Banas's (2000) modified version of Miller et al.'s (1994) scale. This scale consisted of four items. Exploratory factor analysis indicated that the KMO sampling adequacy coefficient was 0.798, and the result of Bartlett's Test of Sphericity was 778.984 ($p<0.001$). The scale explained 71.70 % of the variance. Cronbach's alpha reliability coefficient of the scale was found to be .864. One sample item on the scale was "*The information I have received about the recent change has been timely*".

Collection and Analysis of the Data

Quantitative data were collected via questionnaires. Before administering the questionnaires, the researchers gave detailed information about the purpose and significance of the study to the participants and assured them that their personal information would be confidential. The questionnaires were administered by the researchers. The SPSS 20.00 program was used in the analysis of the quantitative data. Apart from the means and standard deviations, the Pearson moment-product correlation was used to uncover the relationships between teachers' attitudes towards change (i.e. the recent change in the education system), dispositional resistance to change and

change-related information. Furthermore, a multiple linear regression analysis was performed, to determine the effects of the independent variables (change-related information and dispositional resistance) on the dependent variable (attitudes towards change). Multiple linear regression attempts to predict the dependent variable based on two or more independent variables (predicting variables) associated with the dependent variable (Büyüköztürk, 2008, p. 98). The data of this research met the requirements of multiple linear regression analysis. The data had equal intervals, and it was found that the data were normally distributed. There was a linear relationship between the predicting variables and the independent variables. Durbin-Watson values were equal to 2, which enabled the researchers to conduct a multiple linear regression analysis.

Findings and Interpretation

Means and standard deviations regarding teachers' cognitive, affective and behavioral attitudes toward change, dispositional resistance to change and change-related information are presented in Table 3.

Table 3

Means and standard deviations regarding teachers' cognitive, affective and behavioral attitudes toward change, dispositional resistance to change level and change-related information levels

Variables	Means	Stand. dev.
Cognitive	3.302	.778
Affective	3.280	1.068
Behavioral	2.977	1.027
Cognitive rigidity	3.532	.915
Emotional reaction	3.171	1.055
Routine seeking	2.964	.800
Short-term focus	2.605	1.075
Change-related information	2.381	.945

The findings presented in Table 3 indicated that the means of teachers' resistance to change in the cognitive domain were higher than all other dimensions. The cognitive domain was followed by the affective and behavioral domains. Cognitive resistance to the recent change in the Turkish education system was at the highest level, while the lowest level was related to behavioral resistance. On the other hand, the findings revealed that the highest element of dispositional resistance was cognitive rigidity, while the lowest was the short-term focus. The teachers' perceptions of change-related information were at the "disagree" level. This finding indicated that teachers did not get enough information related to change in the Turkish education system prior to full implementation of the new system.

The relationship between sub-dimensions of teachers' attitudes toward change, sub-dimensions of dispositional resistance to change, and their perceptions of change-related information is given in Table 4.

Table 4

Correlation matrix of the relationship between sub-dimensions of teachers' attitudes toward change, sub-dimensions of dispositional resistance to change and their perceptions of change-related information

Variables	Information	Routine-seeking	Emotional reaction	Short-term focus	Cognitive rigidity
Affective	-.222**	.237**	.295**	.149**	.121*
Behavioral	-.096	.238**	.128*	.097	.177**
Cognitive	-.001	.222**	.235**	.162**	.088

*p>0.01 , **p>0.05

Table 4 indicated that there was a negative low but significant relationship between affective resistance and change-related information. A statistically significant low but positive correlation was found between affective resistance and sub-dimensions of dispositional resistance to change. Furthermore, there was not a significant relationship between

behavioral resistance and change-related information. Teachers' behavioural resistance correlated with routine-seeking, emotional reaction and cognitive rigidity at a low but significant level; whereas there was not a significant relationship between teachers' behavioural resistance and short-term focus. Teachers' cognitive resistance correlated with routine-seeking, emotional reaction and short-term focus at a low but significant level. However, no statistically significant relationships were found between teachers' cognitive resistance, change-related information and cognitive rigidity (one of the dimensions of dispositional resistance).

The results of multiple linear regression analysis of teachers' affective resistance, dimensions of dispositional resistance to change and change-related information are given in Table 5.

Table 5

Multiple linear regression analysis of teachers' affective resistance, dimensions of dispositional resistance to change and change-related information levels

Variables	B	SD	β	t	p
Constant	2.426	.265		9.156	.000
Change-related information	-.282	.052	-.250	-5.428	.000
Routine seeking	.219	.069	.164	3.193	.002
Emotional reaction	.255	.052	.252	4.902	.000
Short-term focus	5.059	.053	.000	.001	.999
Cognitive rigidity	.019	.059	.016	.324	.746

$$R=.413 \quad R^2=.171 \quad F= 16.296 \quad p=.000$$

As shown in Table 5, a moderately significant correlation was found between teachers' change-related information levels, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity and affective resistance ($R=.413$, $R^2=.171$, $p=0.00$). Teachers' perceptions of change-related information, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity predicted 17% of the total variance of teachers' affective resistance. According to the standardized

regression coefficients (β), affective resistance was predicted by emotional reaction, change-related information, routine-seeking, cognitive rigidity and short-term focus respectively. When t-test results are examined, it can be seen that emotional reaction, change-related information, routine-seeking were significant predictors of affective resistance, but cognitive rigidity and short-term focus were not significant predictors of it.

The results of the multiple linear regression analysis regarding teachers' behavioral resistance, dimensions of dispositional resistance to change and change-related information levels are presented in Table 6.

Table 6

Multiple linear regression analysis regarding teachers' behavioral resistance, dimensions of dispositional resistance to change and change-related information levels

Variables	B	SD	β	t	p
Constant	1.949	.268		7.281	.000
Change-related information	-.127	.052	-.117	-2.418	.016
Routine seeking	.267	.069	.208	3.850	.000
Emotional reaction	.044	.053	.045	.843	.400
Short-term focus	-.035	.054	-.036	-.648	.517
Cognitive rigidity	.138	.059	.123	2.339	.020

R=.291 R²=.085 F= 7.344 p=.000

The results of regression analysis in Table 6 demonstrated that a low-level but significant correlation was found between teachers' change-related information levels, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity and behavioral resistance levels (R=.291, R²=.085, p=0.00). Teachers' perceptions of change-related

information, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity predicted 8% of the total variance of teachers' behavioral resistance levels. According to standardized regression coefficients (β), routine-seeking, cognitive rigidity, change-related information, emotional reaction and short-term focus predicted behavioral resistance, respectively. When t-test results are examined, it can be seen that change-related information, routine-seeking, and cognitive rigidity were significant predictors of behavioral resistance, but emotional reaction and short-term focus were not significant predictors of behavioral resistance.

Multiple linear regression analysis regarding teachers' cognitive resistance, dimensions of dispositional resistance to change and change-related information levels is presented in Table 6.

Table 7

Multiple linear regression analysis regarding teachers' cognitive resistance, dimensions of dispositional resistance to change and change-related information levels

Variable	B	SD	β	t	p
Constant	2.475	.203		12.177	.000
Change-related information	-.020	.040	-.024	-.500	.618
Routine seeking	.151	.053	.155	2.860	.004
Emotional reaction	.129	.040	.174	3.225	.001
Short-term focus	.031	.041	.043	.757	.449
Cognitive rigidity	-.017	.045	-.020	-.385	.701
<hr/>					
R=.284 R ² =.081 F= 6.936 p=.000					

The results presented in Table 7 revealed a low-level but significant correlation among teachers' change-related information levels, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity and cognitive resistance levels (R=.284, R²=.081, p=0.00). Teachers' perceptions of change-related information, their perceptions of

routine-seeking, emotional reaction, short-term focus and cognitive rigidity predicted 8% of the total variance of teachers' cognitive resistance levels. According to standardized regression coefficients (β), cognitive resistance was predicted by emotional reaction, routine-seeking, short-term focus, change-related information and cognitive rigidity, respectively. When t-test results are examined, it can be seen that emotional reaction and routine-seeking were significant predictors of cognitive resistance, but change-related information, cognitive rigidity, and short-term focus were not significant predictors of cognitive resistance.

Discussion and Conclusions

The researchers hoped to explore teachers' perceptions and attitudes towards the recent system-wide educational change in Turkey, and the role of information in their perceptions and attitudes towards change. The research results indicated that the teachers who were resistant to the recent change in the Turkish education system showed their resistance cognitively, affectively and intentionally, respectively. The highest resistance was associated with the cognitive areas. On the other hand, they did not believe that change was communicated to them in advance. Change literature has focused on the reasons for the resistance, overall. As mentioned by Oreg (2006), one reason for resistance to change is the extent to which change is perceived as beneficial or detrimental by change recipients. Consistently, Lau and Woodman (1995) maintain that cognitive understanding of change influences individuals' attitudes towards change. Bovey and Hede (2001) note that individuals create their own interpretations of what is going to happen, how the changes are perceived, and what others are thinking or intending during organizational change. Teachers' beliefs and behaviors, which are of critical importance for educational change (Fullan, 2007), are shaped by their perceptions of what is impending or coming in the future. In some cases, teachers may be eager for change but there may be a mismatch between what teachers expect and what they experience, which may result in their attaching little value to the change as is the case in the recent 4+4+4 education reform (Toprak, 2017).

The second type of resistance was related to the affective underpinnings of the change. According to Piderit (2000), affective resistance included strong positive emotions and strong negative emotions. For this study, it can be stated that teachers who believed that change would result in unpleasant consequences felt negative emotions, like anger, stress, frustration or fear. This may be a consequence of the lack of change-related information. Reio (2011) suggests that negative emotional reactions may be reduced with increased communication and the free flow of information, which could help decrease the uncertainty associated with change.

On the other hand, the lowest resistance level was related to behavioral resistance. This result could demonstrate that teachers did not resist change largely by such behaviors as voicing their dissatisfaction with the new system, protesting it, trying to find ways to prevent the change or making plans to quit their jobs. Oreg (2006) found in his study that there was a positive relationship between behavioral resistance and intention to quit.

Within the given dispositional resistance sub-dimensions, cognitive rigidity was the highest dimension of teacher resistance, while the lowest was short-term focus. It is surprising that the highest resistance dimensions were associated with cognitive domain (i.e. cognitive resistance and cognitive rigidity). Cognitive rigidity is an important dimension of dispositional resistance, and it is associated with stubbornness and unwillingness to think about alternatives (Oreg et al., 2008). Oreg (2003) proposes that cognitive rigidity is one of the characteristics of dogmatic people who are closed-minded and less willing to adjust to new situations. Thus, it may be concluded that teachers with a high level of cognitive rigidity wanted to sustain their traditional ways and methods, instead of revising their existing teaching approaches. Kondakçı, Zayim, and Çalışkan (2013) argue that teacher resistance is caused by an increase in workloads and the feeling of the uselessness of their existing skills and competencies. The finding on the cognitive rigidity may indicate that teachers' resistance was not solely related to the recent educational change in the system.

Teachers' perceptions of change-related information were at the "disagree" level; this finding suggested that teachers did not get enough information related to the change during the pre-change process. In their study, Wanberg and Banas (2000) found that increased information about

change was associated with greater change acceptance. Likewise, Jimmieson, Terry, and Callan (2004) argue that providing timely and accurate information can lower the negative feelings caused by organizational change. Stressing the importance of information about the change, Sloyan and Ludema (2010) propose that change leaders must communicate information about the change for those who are expected to implement the change. Obviously, providing information about the change may help the teachers prepare cognitively and affectively in the pre-change process. They can have a better understanding of the rationale behind the change.

The statistical analysis revealed a low, negative but significant relationship between affective resistance and change-related information. This finding demonstrated that when the level of change-related information increased, the level of affective resistance decreased. This implicates a reverse relationship between affective resistance and information. According to van Veen and Sleegers (2009), teachers' emotions should be considered because they implement change in schools, and their emotions are likely to provide valuable insight into a deeper understanding of teachers' professional lives in times of reforms. This is of utmost importance as teachers' emotions subsequently influence their learning and development, and ultimately their performance (Reio, 2011). Saunders (2013) maintains that knowledge of how emotions affect teachers in times of change could help in initiating and managing educational change more wisely. Liu and Perrewé (2005) caution that people sometimes leave their organizations as they are unable to overcome the emotional turmoil that they are experiencing during the change process. If teachers do not feel good about change, they are more likely to have negative feelings, and they might feel unmotivated to accept change.

A statistically significant, positive but low correlation was detected between affective resistance and the sub-dimensions of dispositional resistance to change. However, Oreg (2006) found that the resistance to change personality trait had a strong relationship with the affective component. Furthermore, the relationship between behavioral resistance and change-related information was not significant. The teachers' behavioral resistance correlated with routine-seeking, emotional reaction and cognitive

rigidity at a low but significant level; whereas the relationship between teachers' behavioral resistance and short-term focus was not significant. Teachers' cognitive resistance correlated with routine-seeking, emotional reaction and short-term focus at a low, but significant level. Consistently, Van Dam, Oreg, and Schyns (2008) found that personal characteristics were related to employees' resistance to the change. However, no statistically significant relationship was found between teachers' cognitive resistance, change-related information and cognitive rigidity.

A moderate though significant correlation was found between teachers' change-related information levels, routine-seeking, emotional reaction, short-term focus and cognitive rigidity, and affective resistance. Affective resistance was predicted by emotional reaction, change-related information, routine-seeking, cognitive rigidity and short-term focus respectively. In addition, emotional reaction, change-related information, and routine-seeking were significant predictors of affective resistance, but cognitive rigidity and short-term focus were not significant predictors of affective resistance. When receiving change, the recipients generate precursors which result in support for or resistance to change (Armenakis, Bernerth, Pitts, & Walker, 2007).

The results demonstrated that there was a low, though significant correlation among teachers' change-related information levels, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity and behavioral resistance. Behavioral resistance was predicted by routine-seeking, cognitive rigidity, change-related information, emotional reaction and short-term focus respectively. Moreover, change-related information, routine-seeking and cognitive rigidity were significant predictors of behavioral resistance, but emotional reaction and short-term focus were not significant predictors of behavioral resistance. It can be inferred that those who are change-aversive may tend to resist change behaviorally/intentionally. Consistently, Oreg (2006) suggests that some people are more likely to experience negative emotions and to act against organizational changes because of their dispositional inclination. In their study on IT-induced change, Laumer, Maier, Eckhardt, and Weitzel (2016) concluded that dispositional resistance to change had stronger effects on attitudes toward change more than some other variables such as gender, age,

and work experiences. According to Lamm and Gordon (2010), people generally think about how their personal work situation will be affected when making behavioral choices regarding organizational change.

It was found that there was a low, but significant correlation among teachers' change-related information levels, their perceptions of routine-seeking, emotional reaction, short-term focus and cognitive rigidity and cognitive resistance levels. Cognitive resistance was predicted by emotional reaction, routine-seeking, short-term focus, change-related information and cognitive rigidity respectively. Likewise, emotional reaction and routine-seeking were significant predictors of cognitive resistance, but change-related information, cognitive rigidity, and short-term focus were not significant predictors of cognitive resistance. Day (2002) argues that reforms mostly challenge teachers' practices and lead to increased workload. He adds that teachers' identities, which he argues to be central to motivation, efficacy, commitment, job satisfaction and effectiveness, are not addressed in the planning of reform initiatives. These may be some of the reasons why teachers resisted the change.

Overall, the quantitative findings of this study demonstrated that primary and middle school teachers resisted the recent change cognitively, affectively and behaviorally. Despite having low-level correlations with resistance to change dimensions, it could be stated that teachers' dispositional characteristics played a role in their resistance to change. More importantly, change-related information, which was not communicated to the teachers in the change process, may be a reason that the recent change was not regarded as a well-designed change, especially in the pre-change process.

Educational Implications

Because of its complicated nature, change leads to uncertainties, complexities, problems, negative feelings and resistance. It should be kept in mind that most changes are planned or implemented to take individuals and organizations one step forward from the previous state. Even though the ideas and reasons behind change initiatives are highly legitimate and reasonable, macro-, meso- or micro-level actions, or problems, could impede

the intended benefits at certain times. In this sense, policymakers and change leaders need to plan every phase in the change process, involve and inform all the stakeholders, and listen to their voices; and they must anticipate and plan for resistance to change (Shirley & Noble, 2016). More importantly, they must enhance teachers' readiness for change before initiating change as readiness for change is closely linked to the total experiences of teachers in their particular work settings (Kondakci, Beycioğlu, Sincar, & Ugurlu, 2017). They need to conduct pilot studies, collect feedback about the process in the field of implementation, and make corrections if needed.

Further research must focus on the reasons why state authorities and policymakers initiated the recent change without consulting the most key players to obtain their views. What aspects of the new system are welcomed by teachers and school principals, what kinds of problems are faced by teachers in implementing the new system, and how teachers view the advantages of the new system over the former one are some of the topics which require further investigation. In addition, a longitudinal study should be conducted to reveal whether the teachers are right in their reactions to the recent change.

Limitations

This research has several limitations which must be acknowledged. First of all, this study gathered and used cross-sectional data from a large metropolitan city in South-east of Turkey. Therefore, the results of the study may not be generalized to teachers working in other cities across Turkey. Some work-related variables and experiences of the teachers working in this region may have affected their attitudes towards the recent change. The data were collected through self-report measurement instruments; therefore, the results drawn were based on their self-reported views determined through questionnaires.

References

- Akşit, N. (2007). Educational reform in Turkey. *International Journal of Educational Development*, 27, 129-137. doi: [10.1016/j.ijedudev.2006.07.011](https://doi.org/10.1016/j.ijedudev.2006.07.011)
- Armenakis, A. A. & Harris, S. G. (2009): Reflections: Our journey in organizational change research and practice, *Journal of Change Management*, 9(2), 127-142. doi: [10.1080/14697010902879079](https://doi.org/10.1080/14697010902879079)
- Armenakis, A. A., Bernerth, J. B., Pitts, J. P. & Walker, H. J. (2007). Organizational change recipients' beliefs scale: Development of an assessment instrument. *The Journal of Applied Behavioral Science*, 43(4), 481-505. doi: [10.1177/0021886307303654](https://doi.org/10.1177/0021886307303654)
- Bouckenooghe, D. (2010). Positioning change recipients' attitudes toward change in the organizational change literature. *Journal of Applied Behavioral Science*, 46, 500-531. doi: [10.1177/0021886310367944](https://doi.org/10.1177/0021886310367944)
- Bovey, W. H. & Hede, A. (2001). Resistance to organizational change: The role of cognitive and affective processes. *Leadership & Organization Development Journal*, 22(8), 372-382. doi: [10.1108/01437730110410099](https://doi.org/10.1108/01437730110410099)
- Büyüköztürk, Ş. (2008). *Sosyal bilimler için veri analizi el kitabı: İstatistik, araştırma deseni, SPSS uygulamaları ve yorum* (Handbook of data analysis for the social sciences: Statistics, research design, research applications of SPSS and interpretation). Ankara: Pegem Publication.
- Day, C. (2002). School reform and transitions in teacher professionalism and identity. *International Journal of Educational Research*, 37(2), 677-692. doi: [10.1016/S0883-0355\(03\)00065-X](https://doi.org/10.1016/S0883-0355(03)00065-X)
- Fraenkel, J., Wallen, N. & Hyun, H. (2012). *How to design and evaluate research in education*, (8th ed.), New York: McGraw-Hill.
- Fullan, M. (2006). The future of educational change: System thinkers in action. *Journal of Educational Change*, 7, 113-122. doi: [10.1007/s10833-006-9003-9](https://doi.org/10.1007/s10833-006-9003-9)
- Fullan, M. (2007). *The new meaning of educational change* (4th ed.). New York: Teachers College Press.

- Fullan, M. (2010). Positive pressure. In A. Hargreaves et al. (eds.), *Second international handbook of educational change* (pp. 119-130). Dordrecht: Springer.
- Fullan, M. (2011). *Choosing the wrong drivers for whole system reform*. In Seminar Series 204. Melbourne, Australia: Center for Strategic Education.
- Gedikoğlu, T. (2005). Turkish education system in the process of European Community: Problems and solutions. *Mersin University Journal of the Faculty of Education*, 1(1), 66-80.
- Güçlü, N., Özer, A., Kurt, T. & Kandemir, M. (2010). Öğretmenlerin yeni ilköğretim programına ilişkin tutumlarının, epistemolojik inançlarına ve değişime direnme tutumlarına dayalı olarak yordanması. V. *Ulusal Eğitim Yönetimi Kongresi (5th National Educational Administration Conference)*, 1-2 May 2010, Antalya, Turkey.
- Harris, A. (2002). *School improvement: What's in it for schools?* London: RoutledgeFalmer.
- Holt, D. T., Armenakis, A. A., Harris, S. G., & Feild, H. S. (2007). Toward a comprehensive definition of readiness for change: A review of research and instrumentation. In W. A. Pasmore & R. W. Woodman (Eds.), *Research in organizational change and development* (pp. 289-336). Bingley, UK: Emerald Group Publishing Limited.
- James, C. (2010). The psychodynamics of educational change. In A. Hargreaves et al. (Eds.), *Second international handbook of educational change* (pp. 47-64). Dordrecht: Springer.
- James, C. (2011). The importance of affective containment for teacher effectiveness and successful educational change. In C. Day & J. C.-K. Lee (eds.), *New understandings of teacher's work: Emotions and educational change* (pp. 119-134). Dordrecht: Springer.
- Jimmieson, N. L., Terry, D. J., & Callan, V. J. (2004). A longitudinal study of employee adaptation to organizational change: The role of change-related information and change-related self-efficacy. *Journal of Occupational Health Psychology*, 9(1), 11-27. doi: 10.1037/1076-8998.9.1.11
- Karasar, N. (2009). *Scientific research methods* (Bilimsel araştırma yöntemi). Ankara: Nobel Publishing.

- Kondakci, Y., Beycioğlu, K., Sincar, M., & Ugurlu, C. T. (2017). Readiness of teachers for change in schools. *International Journal of Leadership in Education*, 20(2), 176-197. doi: 10.1080/13603124.2015.1023361
- Kondakçı, Y., Zayım, M., & Çalışkan, Ö. (2013). Development and validation of readiness for change scale. *Elementary Education Online*, 12(1), 23-35. Retrieved from <http://dergipark.ulakbim.gov.tr/ilkonline/article/download/5000037802/5000036660>
- Lamm, E., & Gordon, J. R. (2010). Empowerment, predisposition to resist change, and support for organizational change. *Journal of Leadership & Organizational Studies*, 17(4), 426-437. doi: 10.1177/1548051809355595
- Lau, C., & Woodman, R. W. (1995). Understanding organizational change: A schematic perspective. *The Academy of Management Journal*, 38(2), 537-554. Retrieved from <http://www.jstor.org/stable/256692>
- Laumer, S., Maier, C., Eckhardt, A., & Weitzel, T. (2016). User personality and resistance to mandatory information systems in organizations: A theoretical model and empirical test of dispositional resistance to change. *Journal of Information Technology*, 31(1), 67-82. doi: 10.1057/jit.2015.17
- Lewis, L. K. (2011). *Organizational change: Creating change through strategic communication*. Chichester, UK: Wiley-Blackwell.
- Liu, Y., & Perrewé, P. L. (2005). Another look at the role of emotion in the organizational change: A process model. *Human Resource Management Review*, 15, 263-280. doi: 10.1016/j.hrmr.2005.12.001
- Miller, V. D., Johnson, J. R., & Grau, J. (1994). Antecedents to willingness to participate in a planned organizational change. *Journal of Applied Communication Research*, 22, 59-80. doi: 10.1080/00909889409365387
- MONE. (The Ministry of National Education). (2012). *Twelve-year compulsory education: Questions and answers (12 yıllık zorunlu eğitim: Sorular ve cevaplar)*, Ankara. Retrieved from www.meb.gov.tr
- Newton, C., & Tarrant, T. (1992). *Managing change in schools: A practical handbook*. London: Routledge.

- Oreg, S. (2003). Resistance to change: Developing an individual differences measure. *Journal of Applied Psychology*, 88(4), 587-604. doi: [10.1037/0021-9010.88.4.680](https://doi.org/10.1037/0021-9010.88.4.680)
- Oreg, S. (2006). Personality, context, and resistance to organizational change. *European Journal of Work and Organizational Psychology*, 15(1), 73-101. doi: [10.1080/13594320500451247](https://doi.org/10.1080/13594320500451247)
- Oreg, S., Bayazit, M., Vakola, M., Arciniega L., Armenakis, A. A., Barkauskiene, R. et al. (2008). Dispositional resistance to change: Measurement equivalence and the link to personal values across 17 nations. *Journal of Applied Psychology*, 93, 935-944. doi: [10.1037/0021-9010.93.4.935](https://doi.org/10.1037/0021-9010.93.4.935)
- Oreg, S., Vakola, M., & Armenakis, A. (2011). Change recipients' reactions to organizational change: A 60-year review of quantitative studies. *The Journal of Applied Behavioral Science*, 47(4), 461-524. doi: [10.1177/0021886310396550](https://doi.org/10.1177/0021886310396550)
- Paloş, R., & Gunaru, S. A. (2017). The relationship between resistance to change and Romanian teachers' attitude towards continuing education: The moderating role of conscientiousness. Advance online publication. *Journal of Education for Teaching*. doi: [10.1080/02607476.2017.1297043](https://doi.org/10.1080/02607476.2017.1297043)
- Piderit, S. K. (2000). Rethinking resistance and recognizing ambivalence: A multidimensional view of attitudes toward and organizational change. *Academy of Management Journal*, 25, 783-794. doi: [10.5465/AMR.2000.3707722](https://doi.org/10.5465/AMR.2000.3707722)
- Rafferty, A. E., Jimmieson, N. L., & Armenakis, A. A. (2013). Change readiness: A multilevel review. *Journal of Management*. 39(1), 110-135. doi: [10.1177/0149206312457417](https://doi.org/10.1177/0149206312457417)
- Reeves, D. B. (2009). *Leading change in your school: How to conquer myths, build commitment, and get results*. Alexandria: The Association for Supervision and Curriculum Development.
- Reio, T. G. (2005). Emotions as a lens to explore teacher identity and change: A commentary. *Teaching and Teacher Education*, 21, 985-993. doi: [10.1016/j.tate.2005.06.008](https://doi.org/10.1016/j.tate.2005.06.008)
- Reio, T. G. (2011). Teacher emotions and socialization-related learning in the context of educational change. In C. Day & J. C.-K. Lee (eds.),

New understandings of teacher's work: Emotions and educational change, (pp 105-118), Dordrecht: Springer. doi: [10.1007/978-94-007-0545-6_7](https://doi.org/10.1007/978-94-007-0545-6_7)

Reyes, V. C. (2014). How do school leaders navigate ICT educational reform? Policy learning narratives from a Singapore context. *International Journal of Leadership in Education: Theory and Practice*. Advance online publication. doi: [10.1080/13603124.2014.982200](https://doi.org/10.1080/13603124.2014.982200).

Robbins, S. P., & Coulter, M. (2012). *Management*, (11th Ed.), Upper Saddle River, New Jersey: Prentice Hall.

Saunders, R. (2013). The role of teacher emotions in change: Experiences, patterns and implications for professional development. *Journal of Educational Change*, 14, 303-333. doi: [10.1007/s10833-012-9195-0](https://doi.org/10.1007/s10833-012-9195-0)

Schiffer, E. F. (2011). *Resistance to change: Implications of individual differences in expression of resistance to change*. University of South Florida, UMI 3443923, ProQuest LLC.

Shirley, D., & Noble, A. (2016). The marathon of educational change. *Journal of Educational Change*, 17(2), 141-144. doi: [10.1007/s10833-016-9277-5](https://doi.org/10.1007/s10833-016-9277-5)

Sloyan, R. M., & Ludema, J. D. (2010). That's Not How I see It: How Trust in the Organization, Leadership, Process, and Outcome Influence Individual Responses to Organizational Change. In W. A. Pasmore, A. B. Shani & R. W. Woodman (Eds.), *Research in organizational change and development* (pp. 233-277). Bingley, UK: Emerald Group Publishing Limited. doi: [10.1108/S0897-3016\(2010\)0000018011](https://doi.org/10.1108/S0897-3016(2010)0000018011)

Toprak, M. (2017). Mismatch between teachers' need for change and change in practice: What if what they see is not what they want? *International Journal of Leadership in Education*. Advance online publication. doi: [10.1080/13603124.2016.1272720](https://doi.org/10.1080/13603124.2016.1272720).

Van Dam, K., Oreg, S., & Schyns, B. (2008). Daily work contexts and resistance to organisational change: The role of leader-member exchange, development climate, and change process characteristics. *Applied Psychology: An International Review*, 57(2), 313-334. doi: [10.1111/j.1464-0597.2007.00311.x](https://doi.org/10.1111/j.1464-0597.2007.00311.x)

- Van Den Heuvel, S., Freese, C., Schalk, R., & van Assen, M. (2017). How change information influences attitudes towards change and turnover intention: the role of engagement, psychological contract fulfillment, and trust. *Leadership & Organization Development Journal*, 38(3), 398-418. doi: [10.1108/LODJ-03-2015-0052](https://doi.org/10.1108/LODJ-03-2015-0052)
- Van Veen, K., & Sleegers, T. (2009). Teachers' emotions in a context of reforms: To a deeper understanding of teachers and reforms. In P.A. Schutz and M. Zembylas (eds.), *Advances in teacher emotion research: The impact on teachers' lives*, (pp. 233-251), Dordrecht, Springer. doi: [10.1007/978-1-4419-0564-2_12](https://doi.org/10.1007/978-1-4419-0564-2_12)
- Van Veen, K., Sleegers, P., & van de Ven, P. (2005). One teacher's identity, emotions, and commitment to change: A case study into the cognitive-affective processes of a secondary school teacher in the context of reforms. *Teaching and Teacher Education*, 21, 917-934. doi: [10.1016/j.tate.2005.06.004](https://doi.org/10.1016/j.tate.2005.06.004)
- Wanberg C. R., & Banas J. T. (2000). Predictors and outcomes of openness to changes in a workplace. *Journal of Applied Psychology*, 85, 132-142. doi: [10.1037/0021-9010.85.1.132](https://doi.org/10.1037/0021-9010.85.1.132)
- Yukl, G. A. (2010). *Leadership in organizations*, (7th Edition), Upper Saddle River, New Jersey: Prentice Hall.

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Lecturers' perceptions on the effectiveness of in-service training programs at a selected public sector organization in Namibia

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Date of publication: June 15th, 2017

Edition period: June 2017-October 2017

To cite this article: Pieters, L., & Kapenda, H. (2017). Lecturers' perceptions on the effectiveness of in-service training programs at a selected public sector organization in Namibia. *Multidisciplinary Journal of Educational Research*, 7(2), 156-183. doi: 10.17583/remie.2017.2526

To link this article: <http://dx.doi.org/10.17583/remie.2017.2526>

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Lecturers' Perceptions on the Effectiveness of In-service Training Programs at a Selected Public Sector Organization in Namibia

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Abstract

The training programs, irrespective of their scopes and time frames, aim to enrich the skills, knowledge level and attitude of participants so that they eventually enhance organizational performance. The training institution investigated in this study did not have a training evaluation policy at its inception. Hence, the aim of this paper is to report on the lecturers' views on the effectiveness of in-service training at one of the public sector organizations in Namibia. The study adopted a quantitative approach and a total of 27 (11 males and 16 females) academic staff participated in it. The results indicate that the majority of respondents are of the view that the institution does not conduct training need assessments. They also expressed that the in-service training programs provided by the institution do not empower them to become better teachers. It is thus recommended that the institution provides in-service training programs that specifically improve lecturers' pedagogical skills in this regard.

Keywords: lecturers' perceptions, in-service training programs, effectiveness of training, public sector organizations, Namibia

Percepciones del Profesorado sobre la Eficacia de los Programas de Formación Continua en Organizaciones del Sector Público en Namibia

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Resumen

Los programas de formación, independientemente de sus alcances y plazos, tienen por objeto enriquecer las habilidades, el nivel de conocimiento y la actitud de los participantes para que eventualmente mejoren su desempeño profesional. La institución de formación investigada en este estudio no tenía una política de evaluación de formación en su inicio. Por lo tanto, el objetivo de este documento es informar sobre las opiniones del profesorado sobre la efectividad de la formación en servicio en una de las organizaciones del sector público de Namibia. El estudio adoptó un enfoque cuantitativo en un total de 27 personas (11 hombres y 16 mujeres) del personal académico participante. Los resultados indican que la mayoría de los encuestados opinan que la institución no realiza evaluaciones sobre las necesidades de formación. También expresaron que los programas de formación que ofrece la institución no les permiten ser mejores profesores. Así pues, se recomienda que la institución proporcione programas de capacitación que mejoren específicamente las habilidades pedagógicas del profesorado en este sentido.

Palabras clave: percepción docente, formación continua del profesorado, eficacia de la formación, organizaciones del sector público, Namibia

The training programs, irrespective of their scopes and time frames, aim to enrich the skills, knowledge level and attitude of participants so that they eventually enhance organizational performance. The extent to which this enhancement could be realized is the measure of the effectiveness of any training program (Otero, 1997). The training institution investigated in this study did not have a training evaluation policy and the evaluation of staff performance was based on the following outcomes: successful students' intake and registration, submission of student attendance records, class reports, the number of entries of students in performances and examinations, the presentation and quality level of staff- and student performances. The aim of the institution at that point in time was to increase the range of subject genres on offer and to increase the number of students to widen the scope of its programs. Lecturers were encouraged to develop new models of tuition, such as group teaching, that were previously not practiced. In-service training was offered in the adaptation of individual student teaching to group tuition. Currently, as part of its capacity building program, lecturers are enrolled for formal and informal courses at reputable institutions (locally and internationally) to upgrade their knowledge and teaching skills. Despite all these efforts, some lecturers still demonstrate little improvement on their teaching and administration skills (E. Junius, personal communication, May 23, 2013). Hence, the objective of this study was to investigate lecturers' perceptions on the effectiveness of the in-service training programs offered at their institution. To reach this objective, the study follows the following sequence. Firstly, the study presents the literature review followed by methods of the study. Next is the presentation of results followed by the discussions. Lastly are the conclusions and recommendations to strengthen the effectiveness of in-service training at the public sector organizations in Namibia.

Literature Review and Theoretical Framework

This section presents an over view of the theoretical framework focusing on the Brinkerhoff Evaluation Model and its suitability to this study. The literature review section focuses on the role of training provided to

employees, advantages of training provided, strategies to facilitate the transfer of training and some factors, which influence transfer of training.

The Brinkerhoff's Evaluation Model

A number of training evaluation models exist such as: Kirkpatrick's 4 Levels of Training and Evaluation Model, the Warr, Bird, and Rackhams' Content, Input, Reaction and Outcome (CIRO) Model, Anthony Hamlin's 5 Level Training Evaluation Model, Jack Phillip's Return on Investment (ROI) Evaluation Model, Content, Input, Process and Product Evaluation (CIPP) Model. Kirkpatrick's Model, according to Topno (2012), focuses on measuring four kinds of outcomes that should be a result from a highly effective program. The CIRO model ultimate evaluation attempts to assess the impact of training on departmental or organizational performance in terms of overall results (Topno, 2012). According to Ahmad and Din (2009) Hamblin's Five Levels of Evaluation Model attempts to obtain feedback on the effects of a training program, and to assess the value of training in light of that information. Phillip's ROI Evaluation Model, translates the worth of training into monetary value. This model provides trainers a framework to view ROI both from human performance and business outcomes perspectives (Topno, 2012). Stufflebeam's CIPP Model's purpose of evaluation is to provide timely information in a systematic way for decision-making and thus to improve the functioning of a program (Topno, 2012).

According to Esposito and Freda (2015), the choice of which the evaluation model uses depend on many factors. Nevertheless, this study adopted the Brinkerhoff six stage evaluation model. Brinkerhoff's training evaluation model is simple; it can be implemented in a short time frame and can produce verifiable evidence of the effect of training or the lack of it. Credit is given in case when the impact is successful and weaknesses are pinpointed in the system, then the feedback is directed to those who can address the problem. This model does not apply complex statistical analysis, but rather highlights factual accounts of the best results the program is capable of achieving (Brinkerhoff, 2005). Thus, the Brinkerhoff model evolved from the Kirkpatrick's model and he added two levels at the beginning of Kirkpatrick's model (Otero, 1997).

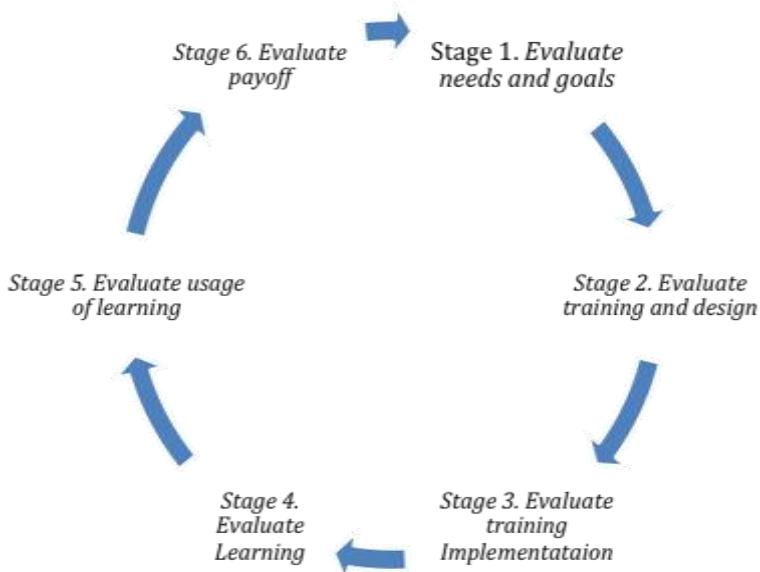


Figure 1. Brinkerhoff's six- Stage Model of Evaluation. Adopted from Otero (1997). Training as a development tool.

The six stages of the Brinkerhoff model borrowed from Otero (1997) are presented and discussed.

Stage 1: Evaluate needs and goals. According to Otero (1997) the data collected at this stage will forecast whether on job behavior should be changed through a training intervention. The data collected at this level is used to evaluate and prioritizes the needs, problems and weaknesses of the organization and establishes the training goals that are worth pursuing. The analysis at this stage provides a skeleton for establishing the value of training and determines its prospective payoffs. This stage is directly linked to the other stages of evaluation and helps to determine whether it was worthy to pursuit the training (Otero, 1997).

Stage 2: Evaluate training design. Otero (1997) argues that the strength and weakness of each proposed training design is analyzed and the design embodies a combination of the best elements of several designs. The analysis and adequacy of training methods, strategies, materials, trainer, and venues selected is conducted to select the best and appropriate training design. The design should have a clear definition and all stakeholders in the training program must be readily available and clearly understand the various components of the strategy. The training plan adopted and materials selected must also reflect the environment in which training will take place and the demographics composition of participants (Otero, 1997).

Stage 3: Evaluate training implementation. This stage, according to Otero (1997), monitors the training activities and collects comments on the reaction and level of satisfaction of the participants. This stage assesses any inconsistency between what was planned for the training and what is actually taking place. Any training deficiency encountered at this level will require trainers to refer back to the training design in Stage 2 and make alterations. Evaluation techniques at this level include; interviewing participants for more information, selecting trainees who, because of their know-how or leadership qualities, are able to provide thoughtful comments on the training at this stage.

Stage 4: Evaluating learning. This stage determines the level of training and improvements that took place. According to Otero (1997), if adequate learning occurred than one can expect that the training received will be applied at the work place and the planned results should be achieved. The data collected at this stage are used to review and perfect the activities and plans that will ensure the preferred transfer of training. Evaluation at this stage includes gathering evidence that proves that the skill, knowledge and attitude level of participants have improved.

Stage 5: Evaluating the usage of learning. The evaluation at this stage takes place at the workplace (Otero, 1997). Evaluators should take into consideration that actual transfer of training may not take place the way it is

planned. Evaluation at this stage determines the effective and ineffective ways in which the acquired knowledge, skills and attitude are being applied and suggests the ways of improving the program to achieve the expected transfer of new knowledge, skills and attitude.

Stage 6: Evaluation payoff. Stage 6 assesses the value the changes have brought to the organization and whether this value was worth the effort given and resources committed. The value of the training event is measured by recording the benefits, evaluating their values, and matching them to the training costs. To determine whether the training has paid off, it is imperative to show that evaluation at this stage is linked to stage one ([Otero, 1997](#)).

The Suitability of Brinkerhoff's Model to Training Institutions

The Brinkerhoff model suits the training evaluation process, specifically at the institution investigated in this study. Successful business stories can be compared and contrasted with factors that impede training application ([Brinkerhoff, 2005](#)); since the model evaluates the impact of training interventions and communicates the results in a meaningful way to the clients. The Brinkerhoff model is inclusive and focuses on meaningful business results and increases support for performance interventions. The model is simple, can be implemented in a short time frame and produces verifiable evidence of the effect of training or the lack of it. Credit is given in case the impact is successful, weaknesses are pinpointed in the system and feedback directed to those who can address the problem. The model highlights factual accounts of the best results the program is capable of achieving ([Brinkerhoff, 2005](#)). Brinkerhoff's model can thus be utilized meaningfully to evaluate and improve training programs.

The Role of Training Provided to Employees

Training is one of the most prevalent techniques used for enhancing the productivity of individuals and communicating organizational goals to new personnel ([Arthur, Bennett, Edens, & Bell, 2003](#)). The critical role of

training is to improve human capital performance and ultimately organizational productivity (Obisi, 2011). The common goal of an organization is to grow from strength to strength and training ensures that each employee performs his or her job using the correct techniques and in doing so, helps the organization to achieve its objective (Florence, 2011). Training is a practical and vital necessity because it enables employees to develop and rise within the organization and increases the market value, earning power and job security of an employee. According to Kohlrausch and Rasner (2014, p. 339), “workplace training should be an instrument to make employees feel secure” specifically because “after the school-to-work transition, workplace training is one means for employees to invest in their human capital and their job-specific skills.” Therefore, training helps to mold employees’ attitude and help them make a meaningful contribution to the organization (Obisi, 2011). McNamara (2013) and Cole (2002) agree that training involves an expert working with participants (students) to transfer skills, behavior and knowledge, to improve the current job.

Training is a learning process which is aimed at impacting behavior, knowledge and skills to enable employees to execute their work tasks better. Khan et al. (2011) argue that training is the most important factor of employee performance and has a distinct role in achievement of organizational goals by incorporating the interest of the organization and the workforce. Training impacts on the return on investment and increases the effectiveness and efficiency of both employees and the organization because of employees who have more work experience, skills, and competencies. According to Coetzer (2006) the implementation of new technology, products or processes, usually requires the acquisition of new knowledge and skills. Therefore, in order to survive, organizations must monitor their external environment and adapt to the changing environment. In light of the above, the view of the authors is that training helps to manage changes in organizational structures caused by mergers, acquisitions, rapid growth, downsizing and outsourcing. These training programs are also important to cope with the changes in technology and with diversity within the organization.

Advantages of Training Provided to Employees at the Workplace

Employee training fosters the initiative and creativity of human capital resources and helps to prevent manpower obsolescence, which may be due to age, and the attitude of employees to adapt to technological changes (Obisi, 2011). McNamara (2013) and Cole (2002) agree that training involves an expert working with participants (students) to transfer certain areas of skills, behavior and knowledge, in order to improve the current job. Moreover, Nga et al. (2010) argue that an important component of any effective training is the capacity of trainees to apply the learning gained to their work practice. Effectiveness involves more than improvement of skills and knowledge. In his study on '*the effects of employee empowerment, teamwork, and employee training on organizational commitment*' Hanaysha (2016) concluded that employee training has a significant positive effect on organizational commitment; hence training is a useful technique that many organizations use in order to enhance the skills and knowledge of their employees (p. 303). From the studies above, one could thus conclude that training at workplace should be considered as an advantage rather than a burden.

Strategies to Facilitate the Transfer of Training

According to Nga, Mien, and Wim (2010), transfer of learning during training is not automatically conveyed; therefore the trainees need to have the intention to transfer these skills, knowledge and behavior in a systematic manner, through transfer strategies. These strategies are cognitive and behavioral in nature and include the requirement to set the goals, to analyze the work situation, prepare to deal with difficulties, identifying and use the necessary support, recognize and monitor opportunities to use acquired knowledge and skills on the job (Nga et al., 2010). To maximize the transfer of training, managers, trainees and trainers should be actively involved before, during and after the formal training intervention (Friesen, Kaye, & Associates [FKA], 2009). The transfer of training that takes place in a continuum of two categories for enhancing learning transfer is now

discussed: pre-training and transfer strategies during training; and post transfer strategies.

Pre- Training and Transfer Strategies during Training

Friesen, Kaye, and Associates [FKA] (2009) state that the manager must involve trainees in the training program planning, brief trainees on why they are going for training, and what they should expect from the training and accomplish after the training. Managers should also understand the training course, review expectations, clearly communicate to the staff members that training is a prime organizational goal and must discuss with the trainee how training initiatives will improve the trainee's performance. Similarly, Taylor (1997) argues that it is important for the trainer to involve both supervisors and trainees in the training program as this can help during the needs assessment and course design process. Through this, a program would be tailor made to suit the needs of the organization. In order for training to be effective, the fundamentals of training design will need to be followed. These include selecting the right trainees, matching performance objectives to organizational outcomes, delivering at the right time and choosing the appropriate methods and delivery modes (Allan, 2003). FKA (2009) claim that supervisors must recognize trainee's participation in the training program, communicate supervisory support for the training program and encourage full participation by ensuring that the trainees job content is covered during the training program. Taylor (1997) emphasizes that application – oriented objectives, consisting of behavioral statements of what the trainees should do once they return to their jobs, should be developed. These objectives will prepare trainees to think beyond the training session. FKA (2009) also argue that supervisors must participate in the transfer of training action plans and get feedback, possibly, during each training day from the trainees to ensure the learning program is pertinent and valuable. The supervisor must also plan how he or she will assess the transfer of new skills to the job and prepare for trainees' return to the job (FKA, 2009).

Post Transfer Strategies

Allan (2003) argues that transferring skills to the workplace at the conclusion of the training program begins with a post – course debriefing which requires the supervisor to review with the trainees the content of the training program and the experience of trainees' experience. Taylor (1997) stresses the importance of giving a positive reinforcement by systematically applying positive consequences to a trainee, depending on the demonstration of a desired behavior. Positive reinforcement can be highly effective for cementing a pattern of desirable work behavior and stimulate repetition. Richman-Hirsh (2001) argues that post training goals that lead to higher performance should be set. These post training goals direct attention, mobilize effort and encourage persistence on a task. Similarly, Foxon (1993) argues that the potential of goal setting as a post –training transfer strategy has only been recognized relatively recently and those trainees are more likely to use the training on the job when they are presented with a skill utilization objective, or when they determine their own goals in consultation with the trainer and supervisor. Post transfer goal setting strategies, according to Foxon (1993), increase the likelihood of transfer because they acknowledge the impact of organizational system factors while at the same time assisting the individual to focus on potential applications and to make plans for using the training.

Some Factors which Influence Transfer of Training

The following factors may influence the success of the transfer of training process:

Employees' attitude and behavior. Mwesigwa (2010) describes an attitude as an internal state of a person that is focused on objects, events, and people and exists in the people's psychological world. Attitude is assessed through one's feelings, thoughts or expressions. Attitude is a perception with a frame of reference. An employee with an attitude that is responsive to training will learn different skills which increase the employee performance and ultimately affect organizational productivity (Khan et al., 2011). An

employee must also be motivated and willing to learn as that could influence the employee's training and performance outcome (Nga et al., 2010).

Motivation to transfer learning and self-efficacy. Motivation to transfer learning can be described as the trainee's desire to apply the new skills, knowledge and behavior on the job. Trainees' motivation to transfer learning is a key variable in determining the level of transfer of training since a trainee must first be committed to using what he or she has learnt (Nga et al., 2010). Therefore, the higher the motivation and eagerness to transfer the more transfer of learning will take place. According to Yan and Ming (2007) participants are more motivated to learn and transfer their skills to a work environment when they are highly involved in their jobs. Moreover, these authors assert that such participants will transfer skills, knowledge and new behavior, if rewards are associated with training. The self-efficacy of an employee is also an important variable which has an impact on individual and organizational performance. Nga et al. (2010) argue that self-efficacy refers to the confidence of an individual to perform a task. Putting effort into a task is dependent on the belief that an individual can do so. Self-efficacy is positively related to the transfer of learning and has a strong association with motivation to learn and motivation to transfer learning (Nga et al., 2010).

Structural expectations. It is a waste of resources to send participants to a course when they are not keen and motivation to attend. Taylor (1997) suggests that the timing of sending participant for training plays an important role in the learning process. Without the perception by the trainee of the need for new behavior, skills or knowledge; there is no motivation to change and, therefore no readiness to learn. It is therefore imperative that training courses be timed correctly and carefully so that trainees are ready when the training program is offered.

Work environment. A supportive working environment is imperative for any organizational productivity to take place. According to the Society for Human Resource Management [SHRM] (2008) when training is strategically linked to organizational goals, employee will be able to see

how their training transfer can improve overall organizational performance. An active and supportive organizational climate has to be created at work to make the transfer of training process effective. Employers should encourage a supportive transfer climate, hold trainees accountable for their learning and involve managers and peers to support training transfer and provide trainees with opportunities to practice the new skills in a work setting ([SHRM, 2008](#)). This encouragement is important because as concluded by Kohlrausch and Rasner ([2014](#)), workplace training has a positive effect on employment outcomes although not all socio-demographic groups might benefit to the same extent.

Commitment of supervisors and staff. According to Hanaysha ([2016](#)) organizational commitment reflects loyalty of an employee toward his or her organization and is characterized by a strong belief in and acceptance of the organization's goals and values; willingness to exert considerable effort on behalf the organization and a strong desire to maintain membership of the organization. Haslinda and Mahyuddin ([2009](#)) argue that management must ensure that trainees have immediate and frequent opportunities to apply what they have learned in training. Management should encourage and reinforce trainee's application of new skills, knowledge and behavior on the job. They must develop an action plan with trainees and show support by reducing job pressures and workloads, arrange practice sessions, announce transfer of learning successes, give promotional preference to employee who have received training. Staff commitment can be described as staying with the organization through good and bad times; attending work regularly and delivering the best of your ability. Hanaysha ([2016](#)) supports this view by arguing that employees who feel committed to their organization reveal higher identification to their values and goals. Favorable behavior outcomes have been associated with employee commitment such as retention, daily attendance, significant achievement, quality of work, and individual sacrifice to help an organization in improving its performance. Redmond ([2013](#)) argues that organizational commitment is the degree of an individual's relations and experiences as a sense of loyalty toward one's organization. It involves an individual's willingness to extend effort in order to further an organization's goal. Hence, there is a psychological link

between an employee and his or her organization that makes it less likely that the employee will voluntarily leave the organization.

Training objectives and human resource policy. Hanaysha (2016) argues that one way to improve the quality of employees is to provide them with beneficial training and development opportunities because the capabilities, knowledge, and skills of the talented employees were proved to be the key determinants of competitive advantage in global marketplaces. Similarly, Algranti (1988) argues that learning alone will not produce the desired employee effectiveness ultimately leading to organizational productivity. The organization should therefore provide training opportunities with end- of course training objectives, on-the-job objectives and end-results objectives that are aligned to the strategic objective of the organization. These objectives are essential to the course design and should not only state what is to be learnt but also how it will be measured. Similarly, Taylor (1997) claims that the best way to influence the transfer of learning is to use it from the learner's point of view and not from the trainer. These objectives enhance the training course and reflect the exact task required by the job. According to Kelana (2010), if a human resource policy is well developed and clearly written, it will enhance communications with employees, clarify expectations, and assist with consistency of application. Haslinda and Mahyuddin (2009) state that a human resources policy should determine a clear link between training opportunities provided and the organization's career development and reward system. Hence, a good human resources policy which is aligned with the strategic objectives of an organization must be implemented at all costs as it will bring greater returns for the organization.

Organizational performance. The effectiveness of training can be evaluated based on some indicators of training. The position of the authors of this paper is that employee performance and organizational performance has a direct relationship. According to Hanaysha (2016) training is associated with the skill that an employee should gain to help him or her by working with others in an attempt to achieve organizational goals and objective. A poorly trained workforce leads to poor performance and costly

mistakes (Wilke, 2006). Khan et al. (2011) point out that employee performance is the important factor and the building block which increases the overall performance of the organization. Similarly, Cooney, Terziovski and Samson (2002) argue that a firm's performance is enhanced by raising the skills, knowledge and behavior of the employees. As employees become more highly motivated and more highly skilled, so does their task performance and organizational effectiveness. Hence, Hanaysha (2016) confirms that training employees can lead to favorable organizational commitment and job satisfaction.

The main study was based on the effectiveness of training transfer and indicators such as whether lesson delivery plans encouraged the development of critical thinking, problem solving, lesson objectives introduced and clarified at the start of the lesson, just to mention, but a few. Therefore, this paper addressed the lecturers' perceptions on the effectiveness of the in-service training programs offered at this particular public sector organization.

Methodology

The study adopted a quantitative research method to investigate the effectiveness of in-service training programs at the selected institution in Namibia. The quantitative method focused on numbers or quantities and its results are based on numeric analysis and statistics (Akpo, 2006). Therefore, the study employed a descriptive design. A total of 32 academic staff formed the population as well as the sample of this study. A self-administered questionnaire was given to all the 32 lecturers. The questionnaire consisted of 23 closed-ended questions of which 6 questions were demographic and 17 quantitative questions. A five Likert scale was used by the participants to indicate the strength of the agreements and disagreements to the items of the questionnaire.

Results

Participants' Biographical Information

From the 32 questionnaires distributed, only 27 participants (11 males and 16 females) ($N=27$) completed the questionnaires. A high response rate was attributed to the constant appeal and telephone calls made prior to the dispatch of the questionnaires.

Table 1

Level of teaching qualifications of the participants (N= 27)

Teaching qualifications	Frequency	Percent
No teaching qualification	21	77.78
Teaching certificate	2	7.41
Basic Education Teachers Diploma	0	0
Higher Education Diploma	3	11.11
B. Degree in Education	1	3.70
Hon Degree in Education	0	0
Masters in Education	0	0
Total	27	100.0

Table 1 above indicates that the majority of lecturers (77.78%) at this College did not have teaching qualifications and therefore are not professional teachers. However, six academic staff have some teaching qualifications including certificates, diplomas and a bachelor degree in education.

Lecturers' Views on their Training Needs

The participants' views on their training needs are presented in Figure 2.

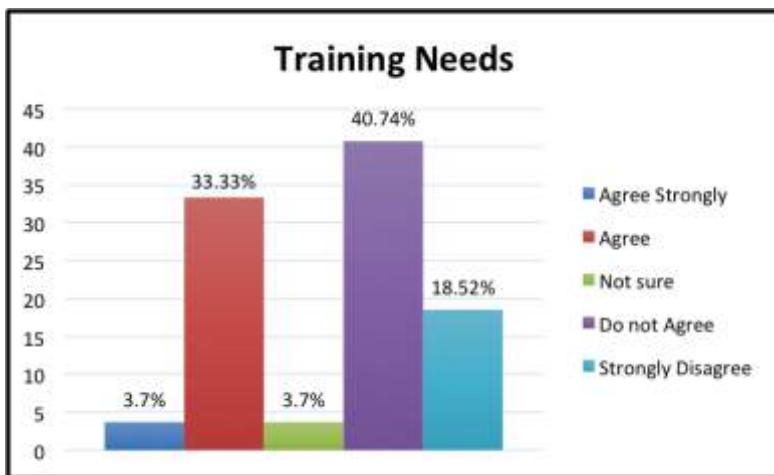


Figure 2. Views on whether the institution conducts training needs analysis

Surprisingly enough, the figure above shows that almost 60% of the lectures disagreed that the institution conducts training needs analysis exercises; while 37.03% agreed that the institution does conduct training needs analysis. It can be assumed that the training needs analysis program of this institution is not fully implemented to all staff members. According to Obisi (2011), training should take place only when the need and objectives for such training has been identified. Such training forms the corner stone of sound management, because it makes staff members more effective and productive. On the contrary, the training program at this institution is designed and tailor made for the selected few. The assumption here is that the sense of loyalty of staff members could be affected and such feelings could ultimately negatively influence the performance of the institution.

Views on the Training Program Objectives

The participants' views on the training program objectives are presented in Figure 3.

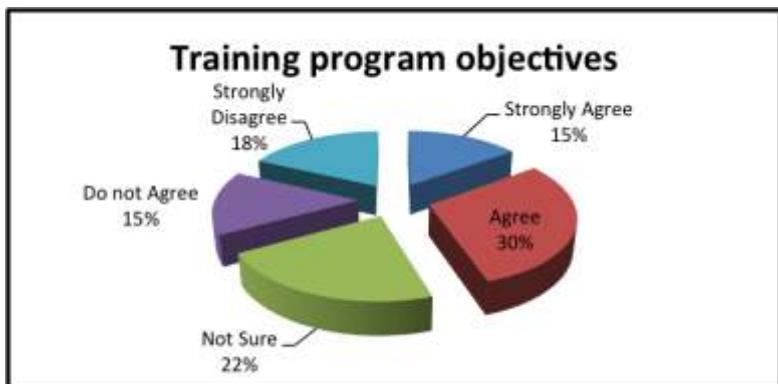


Figure 3. Views on the training program objectives

Figure 3 depicts that 30% of the respondents agreed that the objectives of the training programs they have attended were fully achieved. These sentiments were supported by 15% of the respondents who strongly agreed that the objectives of the training programs that they attended were fully achieved. Nevertheless, 15% of the respondents did not agree that the objectives of the training programs that they attended were fully achieved. Their sentiments were echoed by 18% of the respondents who strongly disagreed that the objectives of the training programs they have attended were fully achieved. Only 22% of the respondents were not sure whether the training programs that they attended were fully achieved. The different views of respondents on the training program objectives indicated that there is a lack of clear guidance of what should be expected at the end of their training program.

Views on the Monitoring of Training Activities Provided to Lecturers

The views on the monitoring of training activities provided to lecturers are depicted in Figure 4.



Figure 4. Views on the monitoring of training activities provided to lecturers

Figure 4 shows that 37% of the respondents agreed that the institution monitors training activities and gathers feedback from participants during training to determine participants' reaction and level of satisfaction. The same sentiments were echoed by 8% of the respondents who strongly agreed that the institution monitors training activities and gathers feedback from participants during training to determine participants' reaction and level of satisfaction. Still, 15% of the respondents did not agree that the institution monitors training activities and gathers feedback from participants during training to determine participants' reaction and level of satisfaction. The remaining 22% strongly disagreed that the institution monitors training activities and gathers feedback from participants during training to determine participants' reaction and level of satisfaction. Only 18% of the respondents were not sure whether training activities are monitored training

to determine the lecturers' reaction and level of satisfaction to the training provided.

Lecturers' Views on the Support Rendered for Training Offered

The lecturers were asked to give their views on the support rendered for training offered as illustrated in Figure 5.



Figure 5. Views expressed on support for training provided to lecturers

Figure 5 shows that 37% of the respondents agreed that training for lecturers receives a high degree of support at all levels at the institution. This was supported by 8% of the respondents who strongly agreed that the institution supports the training activities for lecturers. On the other hand, 18% of the respondents were not sure whether training for lecturers received a high degree of support at all levels of their institution. The results indicate that there is a difference of 7% between the respondents who strongly disagreed and strongly agreed that training received a high degree of support and a further 11% difference exists between the respondents who agreed and

those who disagreed that training receive a high degree of support at the institution. It is thus assumed that minimum supervisory support at the institution is taking place; hence staff members will be better motivated if full support is given to implement new knowledge and skills at the workplace.

Views on the Effectiveness of In-service Training Programs

Figure 6 shows lectures' views on whether the in-service training programs offered at their institution are effective or not.

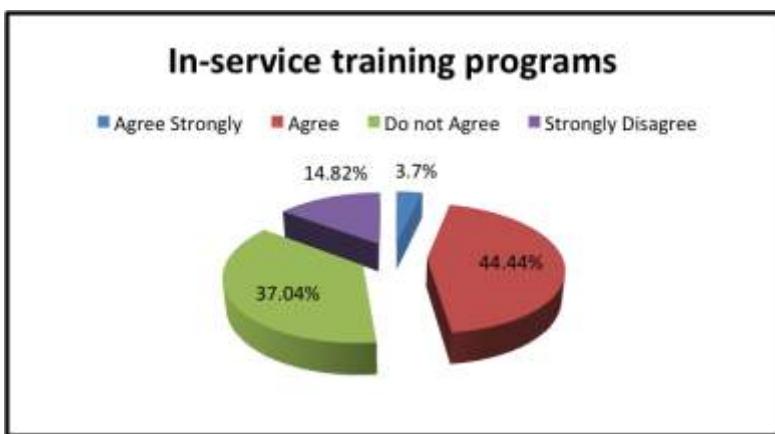


Figure 6. Views on the effectiveness of in-service training programs

On issues of effectiveness of in service training, 44.44% of the respondents agreed that in-service training programs are effective. This is supported by 3.7% of the respondents who also strongly agreed that in-service training is effective. However, 37.04% of the respondents did not agree and they are supported by the remaining 14.82% of the respondents supported who strongly disagreed that the institution's in-service training is effective.

Discussion

The analysis of results in this study revealed mixed findings. For example, Figure 2 indicates that the majority (60%) of the participants (compared to 37.03%) disagree that the institution conducts training needs analysis exercises. Based on this disparity, the authors concluded that that the training institution need to conduct training needs analysis in order to identify the training needs of the staff and as such identify the organization's weaknesses and strengths. Specifically, Arthur, Bennett, Edens, and Bell (2003, p. 235) state that "a systematic needs assessment can guide and serve as the basis for the design, development, delivery, and evaluation of the training program". Several researchers (e.g., Katman & Tutkun, 2015; Chimezie & Osigweh, 1986; Winfrey, 1999) are in support of training needs analysis to assess the effectiveness of training programs.

It is therefore imperative to evaluate the effectiveness of training in order to allow the trainee to know exactly how the learning process brings positive results to the organization. It is thus emphasized that staff members be provided with a clear training program's objectives beforehand. In fact, Algranti (1988), states that learning alone will not produce the desired employee effectiveness, which ultimately lead to organizational productivity. According to Algranti (1988) organization must have lesson objectives; end of course objectives, on-the-job objectives and end-results objectives that are aligned to the strategic objective of the organization. Algranti also emphasized that these objectives are essential as what is to be learnt and how it will be measured are both an important part of the course design. Similarly, Taylor (1997) argues that the formulation of learning objectives by the trainer and not by the learner's point of view inhibit the transfer of learning. The objectives set from the point of view of students could enhance the course content that is offered. Based on the results of Figure 3; it thus suggested that the institution should consider providing an enhanced opportunity to the students in the formulation of training objectives and also in its strategic planning, if the organization wants to develop competent staff members.

Monitoring of training programs is also very important in any organization. Figure 4 indicates scattered opinions on whether the

institution's monitoring system is effective or not. The monitoring process needs to indicate whether the results have improved and this is an indicator that the training program was effective. If the monitoring process indicates that results were poor or remained the same, then the program needs to be improved. What is important in this context is the supervisory support, because this is believed to be essential in the application of newly acquired knowledge and skills. Therefore, the supervisor must avail opportunities to the trainees to practice. Such opportunities will ensure that the reinforcement of newly acquired knowledge and skills is effective. Supervisors in organizations, according to Allan (2003), must ensure that opportunities are provided to practice the new skills by assigning trainees to the kind of jobs task that will give an opportunity to apply what they have learnt. Hence, monitoring helps to ensure support and coaching provided during workshop could be oriented to play a critical role in assuring the effectiveness in the developmental of employee activities, concerning both training and the application of newly acquired knowledge and skills at the workplace (Nijman & Gelissen, 2011).

Figure 6 above illustrates mixed responses on the effectiveness of in-service training programs provided to lecturers. This scenario is in contrast to the United States Agency for International Development [USAID] (2011) who argue that in-service training should strive towards greater effectiveness in training outcomes at all levels. It is emphasized that in-service training should lead to efficiency by improving training processes and training modalities, reduce waste and improve cost efficiency. It is therefore of utmost important to ensure that “the effectiveness of the training is determined by the set of goals” (Esposito & Freda, 2015, p. 78) in any training institution.

Conclusions and Recommendations

Based on the study findings, it can be concluded that the majority of lecturers who participated in this study are qualified artists and do not possess professional teacher qualifications. These lecturers would therefore find it difficult to effectively transfer knowledge to the students. The lecturers perceived that in-service training courses provided by the

institution are ineffective and not related to their teaching and methodological skills. In light of the findings reported in this study, it is therefore recommended that the current requirements to become a lecturer at this particular training institution should be amended to include a teaching qualification with at least 3 years teaching experience as a compulsory requirement. The institution should provide in-service training programs that specifically address the improvement of pedagogical skills and should set up a training and performance evaluation committee, which would review the institution's current training and performance evaluation policies and align the policies with the institution's objectives. Consequently, Hanaysha (2016) urges managers and decision makers in higher educational institutions to focus on providing training programs for their employees to ensure that they have enough skills and knowledge to carry out their duties efficiently.

References

- Ahmad, I., & Din, S. (2009). Evaluating training and development. *Gomal Journal of Medical Sciences*, 7(2), 165-166. Retrieved from <http://gjms.com.pk/files/Review Vol-7-2.pdf>
- Akpo, S. (2006). *Research Methodology* [Study guide]. Windhoek: Polytechnic of Namibia, Centre of Lifelong learning.
- Algranti, C. A. (1988). *The effects of training on job performance: a study of factors affecting the learning transfer process*. (Unpublished Master's thesis). McGill University, Quebec, Montreal.
- Allan, L. (2003). *Training transfer strategies*. Retrieved from http://www.businessperform.com/workplace-training/training_transfer.html
- Arthur, W. (Jr.), Bennett, W. (Jr.), Edens, P., & Bell, S. T. (2003). Effectiveness of training in organizations: A meta-analysis of design and evaluation features. *Journal of Applied Psychology*, 88(2), 234-245. doi: [10.1037/0021-9010.88.2.234](https://doi.org/10.1037/0021-9010.88.2.234)
- Brinkerhoff, R. O. (2005). The success case study method: A strategic evaluation approach to increasing value and effect of training. *Advances in Developing Human Resources*, 7(1), 86-101. doi: [10.1177/1523422304272172](https://doi.org/10.1177/1523422304272172)

- Chimezie, A. B., & Osigweh, Yg. (1986). An evaluation model of training outcomes for higher education. *Educational Evaluation and Policy Analysis*, 8(2), 167-178. doi: 10.3102/01623737008002167
- Coetzer, A., J. (2006). Developing human capital in small firms: a conceptual framework for analyzing the effects of managers on employee learning. *Research and Practice in Human Resource Management*, 14(1), 143-179. Retrieved from <http://www.highbeam.com/doc/1G1-153309123.html>
- Cole, G., A. (2002). *Personnel Human Resource Management* (5th Edition). London, UK: Thomson Learning
- Cooney, R., Terziovski, M., & Samson, D. (2002). *Employee training, quality management and performance of Australian and New Zealand manufacturers. Working paper series of Monash University, Caulfield East, Australia.* Retrieved from <https://core.ac.uk/download/pdf/36963919.pdf>
- Esposito, G., & Freda, M. F. (2015). Evaluating training context competence of use: productive and unproductive models of use. *Evaluation and Program Planning*, 50, 77-87. doi: 10.1016/j.evalprogplan.2015.02.003
- Florence, T. M. (2011). *Multi-skilling at a provincial training institution: Post training evaluation.* (Unpublished master’s thesis) Cape Peninsula University, South Africa.
- Foxon, M. (1993). A process approach to the transfer of training. *Australian Journal of Educational Technology*, 9(2), 130-143. doi: 10.14742/ajet.2104
- Friesen, Kaye, & Associates (FKA) (2009). *Training Transfer: A corporate strategy for applying skills and knowledge in the workplace.* Retrieved from <http://www.fka.com/files/TrainingTransfer09.pdf>
- Hanaysha, J. (2016). Examining the effects of employee empowerment, teamwork, and employee training on organizational commitment. *Procedia Social and behavioral Science*, 229, 298-306. doi: 10.1016/j.sbspro.2016.07.140
- Haslinda, A., & Mahyuddin, M. Y. (2009). The effectiveness of training in the Public Service [Electronic version]. *American Journal of Scientific Research*, 6, 39-51. Retrieved from

<http://www.scribd.com/doc/142513685/The-Effectiveness-of-Training-in-Public-Service>

Katman, A. K., & Tutkun, O. F. (2015). Teachers' views related to the effectiveness of in-service training programs in primary schools. *Procedia-Social and behavioral Sciences*, 174, 1878 -1885. doi: [10.1016/j.sbspro.2015.01.851](https://doi.org/10.1016/j.sbspro.2015.01.851)

Kelana, D. (2010). *HR policies and the effectiveness of workers' utilization*. Retrieved from <http://dkelana.wordpress.com/2010/10/26/hr-policies-and-the-effectiveness-of-workers%e2%80%99-utilisation/>

Khan, R. A. G., Khan, A. F., & Khan, M. A. (2011). Impact of training and development on organizational performance. [Electronic version]. *Global Journal of Management and Business Research*, 11 (7), 62-68. Retrieved from http://globaljournals.org/GJMBR_Volume11/8-Impact-of-Training-and-Development-on-Organizational-Performance.pdf

Kohlrausch, B., & Rasner, A. (2014). Workplace training in Germany and its impact on subjective job security: short- or long-term returns? *Journal of European Social Policy*, 24(4), 337-350. doi: [10.1177/0958928714538216](https://doi.org/10.1177/0958928714538216)

McNamara, C. (2013). *Employee Training and development: Reasons and Benefits*. Retrieved from <http://managementhelp.org/training/basics/reasons-for-training.htm>

Mwesigwa, A. (2010). *The impact of training on employee work performance behavior. A case study of government aided secondary schools in Ibanda district, Uganda*. (Unpublished master's thesis). International Institute of Social Studies, Hague, Netherlands.

Nga, T. P. P., Mien, S. R. S., Wim., H. G. (2010). Understanding training transfer effects from motivational perspective: A test of MBA Programmes. *Business Leadership Review*, VII(III), 1-25. Retrieved from <https://www.researchgate.net/publication/224841596>

Nijman D. J., & Gelissen, J. (2011). Direct and indirect effects of supervisor support on transfer of training. In Poell, R.F., & Van Woerkom, M. (Eds.), *Supporting workplace learning: towards evidence-based practice* (pp. 89-106). Tilburg: Springer Netherlands. doi: [10.1007/978-90-481-9109-3_6](https://doi.org/10.1007/978-90-481-9109-3_6)

- Obisi, C. (2011). Employee Training and Development in Nigerian Organizations. *Australian Journal of Business and Management Research*, 1(9), 82-264. Retrieved from http://ajbmr.com/articlepdf/AJBM_16_09i1n9a9.pdf
- Otero, C. (1997). *Training as a development tool* (PN-ACA-630). Washington, DC 20523: Academy for Educational Development. Retrieved from: http://pdf.usaid.gov/pdf_docs/pnaca630.pdf
- Redmond, B. F. (2013). *Work and Organizational commitment*. Pennsylvania State University: The United States of America. Retrieved from [https://wikispaces.psu.edu/display/PSYCH484/12+Work+Organization al+Commitment](https://wikispaces.psu.edu/display/PSYCH484/12+Work+Organizational+al+Commitment)
- Richman-Hirsch, W. L. (2001). Post training interventions to enhance transfer: The moderating effects of work environment. *Human Resource Development Quarterly*, 12(12), 105-120. doi: 10.1002/hrdq.2/abstract
- Society for Human Resource Management (SHRM) (2008). *Transfer of Training*. [Power point slides]. Retrieved from http://www.transferoftraining_final.pdf
- Taylor, M. (1997). *Transfer of learning: Planning workplace education programs*. National Literacy Secretariat. Retrieved from <http://files.eric.ed.gov/fulltext/ED414462.pdf>
- Topno, H. (2012). Evaluation of training and development: an analysis of various models. *Journal of Business and Management (IOSR-JMB)*, 5(2) 16-22. Retrieved from <http://iosrjournals.org/iosr-jbm/papers/Vol5-issue2/B0521622.pdf>
- United States Agency for International Development (USAID) (2011). *USAID policy framework 2011-2015*. Retrieved from <https://www.usaid.gov/sites/default/files/documents/1870/USAID%20Policy%20Framework%202011-2015.PDF>
- Wilke, J. D. (2006). The importance of employee training. *Jacksonville Business Journal*. Retrieved from www.bizjournal.com/jacksonville/stories/2006/07/24smallb2.html
- Winfrey, E.C. (1999). Kirkpatrick's Four Levels of Evaluation. In B. Hoffman (Ed.), *Encyclopedia of Educational Technology*. Retrieved from <http://www.4cleanair.org/Kirkpatrick.pdf>

Yan, L. C., & Ming, L. W. (2007, September). *An Investigation of employee attitudes towards training effectiveness*. International conference on management science and engineering. Retrieved from <http://www.seiofbluemountain.com/upload/product/201001/12645799896xzqyxg.pdf>

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The Difficulties of DESIGN TRAIN-ing

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Date of publication: June 15th, 2017

Edition period: June 2017-October 2017

To cite this article: Kirci, N. (2017). The Difficulties of DESIGN TRAIN-ing. *Multidisciplinary Journal of Educational Research*, 7(2), 184-215. doi: 10.17583/remie.2017.2237

To link this article: <http://dx.doi.org/10.17583/remie.2017.2237>

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The Difficulties of DESIGN TRAIN-ing

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Abstract

First year architecture students have difficulties to adapt to the new language of architectural discourse. This depends on the student's individual capabilities and adequacies as well as the department's methodology of teaching and the tutor-student relationship. In respect of 1st year design education, it has been thought that the opinions of the learners are an important source for feedbacks for the revision and improvement of education planning strategies of the teachers. This study, which has been based on ten departments of architecture in Turkey, has been formed to reveal these difficulties from the students' point of view by means of a survey. This survey consists of interpretative questions that are related to the pre-requisites of vocational education, difficulties in learning, the evaluation of students' comprehension of basic design principles and various difficulties of educational process. The subjects that the students struggle with have been identified at the end of the survey and then the suggestions of the students offering a solution for this issue have been passed on.

Keywords: vocation, first year architectural education, basic design, technical drawing, student proposals

Dificultades de la Formación en Diseño

Nazan Kirci
Gazi University

Resumen

Los estudiantes de primer año de arquitectura tienen dificultades para adaptarse al nuevo lenguaje del discurso arquitectónico. Esto depende de las capacidades y adecuaciones individuales del estudiante, así como de la metodología de enseñanza del departamento y de la relación tutor-alumno. En cuanto a la valoración de la formación del primer año en diseño, se han considerado las opiniones del alumnado como una fuente importante de retroalimentación para la revisión y mejora de las estrategias de planificación educativa del profesorado. Este estudio, que se ha basado en diez departamentos de arquitectura en Turquía, revela, las dificultades observadas desde el punto de vista de los estudiantes a través de una encuesta. Esta encuesta consiste en preguntas interpretativas que se relacionan con los requisitos previos de la formación profesional, las dificultades en el aprendizaje, la evaluación de la comprensión de los estudiantes de los principios básicos del diseño y las diversas dificultades del proceso educativo. Al final de la encuesta se identifican los temas con los que los estudiantes se enfrentan y se transmiten también las sugerencias que los estudiantes ofrecen como solución a este problema.

Palabras clave: vocación, primer año de educación arquitectónica, diseño básico, dibujo técnico, propuestas de estudiantes

The main task of the 1st Year Education is to establish the concept of Design Thinking in the minds of the students. While the students try to adapt themselves to this line of thinking during the process they come across challenging and provocative practices. This study had been undertaken to determine what these challenges are from the point of view of the students.

The term ‘Design Thinking’ has been part of the collective consciousness of design researchers since Rowe (1987) used it as the title of his book. Multiple models of design thinking have emerged since then, based on widely different ways of viewing design situations and using theories and models from design methodology, psychology, education, etc. Together, these streams of research create a rich and varied understanding of a very complex human reality (Dorst, 2011).

Since architecture is a special field within the domain of design, many specific methods have been developed for the establishment and improvement of the idea of architectural design in students’ minds. Such methods have to do with how design is defined first and foremost. For example; design is defined by Quayle (1985) as “the process of developing appropriate physical solution in response to specific needs of people and the environment.” On the other hand, while talking about the design process, Glanville (1999) emphasizes the necessity or importance of creativity and identifies the act of designing as more than just problem solving. Alternatively, Blumrich (1970) defines designing as finding a solution to a previously unsolved problem or doing it in a way that has never been tried.

Creativity as a natural component of design process has often been characterised by the ‘creative leap’ that occurs between problem and solution space. Since the nature of creativity is so complex, there is no single definition that fully encompasses this concept and identifies a solution as creative. So, there can be no guarantee that a creative ‘event’ will occur during a design process (Demirkan & Afacan, 2012).

Architectural product has got many qualities telling it apart from other fields of design. Most valuable aspects of educational expectations of the students in design education come to light as subjects which help them to gain the attributes, skills and knowledge in the field by the help of which they can be creative, innovative, can help them solve problems, help them

design artefacts that respond to human needs. Their expectancies in design process and in the content of courses located in curriculum are also parallel to these subjects. They want more knowledge in methods for developing creativity, courses for creativity (Cartier, 2011).

What is the Specific of the First Year Architectural Education

Cultural background and having a “designer” way of thinking are very important (Cross, 1982). The inadequate preparation resulting from a students’ high school education and their insufficient cultural and technical background are seen to have a negative effect. Empirical studies indicate that the learning styles of designers are systematically different from those of other professional groups (Cross, 1991), and this has obvious relevance to designers’ ways of viewing the world and responding to different environments.

Most students of architecture enter higher education with little experience of this form of learning, and therefore a large part of architectural education is concerned with the development of new abilities, values and conceptions, so that eventually they are able to think and do as architects. For new students in architecture, a move to a system where the answers are uncertain, and the route to that endpoint ambiguous (Lawson, 1997) and not following any set methodology, may prove a frustrating and difficult challenge (Roberts, 2006).

Problem Parameters

The problem parameters, which are the actors of the difficulties that the students face in their first year education, are various. However, they can be summarized as such:

- The characteristics of the students (their learning styles, their personal characteristics)
- The methodology of education
- Tutor - student relationship

During the scrutiny of these aspects, it is going to be apparent that they are in fact interconnected.

The Characteristics of the Student

Design education essentially deals with teaching how to design, moreover, rather ideally, with guiding students to discover their own ways of designing (Ulusoy, 1999).

Whereas academic success is closely related to how the student learns and the student's personal characteristics. However, it is difficult to find the answer that would comply with all different qualifications.

In the literature, learning styles are considered as a kind of general strategy, for example characterised as surface-level or deep-level processing (Marton & Saljoé, 1976), a holistic vs a serialistic style (Pask, 1976, 1988), deep processing, elaborative processing, fact retention and methodical study (Schmeck, 1983). Learning styles are also described as types of learning like, for example, concrete experience, reflective observation, abstract conceptualization and active experimentation, resulting in four learning styles: divergers, accommodators, convergers and assimilators (Kolb, 1976, 1984), as orientations like achieving, meaning, reproducing and non-academic (Entwistle, 1988), or as approaches to learning like surface, deep and achieving (Busatoa, Prinsb, Elshouta, & Hamakera, 2000). Many of the most important personality dispositions may be considered as collectively comprising the 'Big Five' traits of the Five Factor Model of personality (Farsidesa & Woodfield, 2003). These factors are usually named extraversion, agreeableness (sociability), conscientiousness, neuroticism and openness to experience (intellect or culture) (Busatoa, Prinsb, Elshouta & Hamakera, 2000).

As it has been briefly summarized above, the manners of learning and personal characteristics of people differ a great deal. Accordingly, it is evident that one has to show flexibility and comprehensiveness in the selection of the teaching methods to be applied to the students whose personal characteristics are different from each other.

The Methodology of Education

Much of architectural education is concerned with developing students in order for them to become well rounded, competent and imaginative

designers of buildings and the spaces between them. Since architectural education is studio-based learning process, design work cannot put forward a single correct solution. During this process, the student is invited to make propositions which are often exploratory and speculative. Their responses are likely to be unique and individualistic, and owe more to interpretation and intuition than to a logical or formulaic process (Schön, 1985).

Faculty are divided internally often according to the bipolar distinction of architecture as a technocratic profession or an art-between nuts-and-bolts faculty, who insist that schools should transmit primarily practical/technical skills, and those who argue that the school's primary function is to provide training in different aesthetic ideologies (Crysler, 1995).

Studio-based approaches have been widely adopted as a general educational foundation for design education. From a learning perspective, the studio as a medium for design education has been characterized by certain endemic problems (Oxman, 1999). Thus, in the introductory design education, the objectives, the content and the methods should be set much more carefully (Farivarsadri, 2001)

Tutor - Student Relationship

Students are so indoctrinated to their pre-college system that it is difficult for them to become open to learning, and willing to experiment. The reciprocal learning-teaching relationship is a phenomenon in the design studio.

The relationship between the student-tutor started to gain importance at the Bauhaus. The Bauhaus Teaching Theory brought some innovations to architectural education, unlike the Ecole des Beaux-Art Architectural School Education style, as instead of the imitation of classical architecture to actively create a new project by students, the master was more passive, being a guide to the student in the design process (Danaci, 2015).

The teachers also serve as social models for their students. However, fostering creativity via social modelling has two limitations. The first limitation is that creative tutors are by definition rare to come by. Moreover, by tradition, teaching aims at convergence more than divergence. Tutors are to ensure that students learn what is prescribed by

the curriculum so as to fulfill the cultural transmission or recreation function of education.

The second limitation is that there may be a lack of emotionalties between tutors and students. Ideally, a positive social-motional relation prevails in the classroom, but the reality is that not all tutors are admired by their students (Soh, 2017).

Let alone the students, even the teacher may not be sufficiently prepared for this interesting process. As Glasser (2000) has put it plainly; most tutors, found themselves in beginning teaching situations, without mentors or clear direction, obliged to transmit knowledge and skills as best they could. As is the case for many entering teachers, without having had the opportunity to test and evaluate these basic assumptions in the field.

It is possible to classify knowledge as explicit and tacit. Explicit knowledge is sometimes referred to as know-what. Tacit knowledge was originally defined by Polanyi in 1966. He claimed that we had envisaged tacit knowing in the first place as a way to know more than we can tell (Polanyi, 2009, p. 18). This knowledge unexpectedly can reflect our work. Through Schön's (1985), "reflection-in-action" the "designerly" (Cross, 1982) ways of thinking and acting can be "known" by the students. Schön (1985) has pointed out that there are several levels of learning in the process of reciprocal reflection-in-action: "The student learns both about designing and about learning to design...Further, the student learns about design in the same process by which she learns about designing". In other words, the subject (design) and the ways to grasp the subject (designing/learning) are both gained together by the student. Although tutor-student are involved in the same process (studio guiding), the reciprocal reflection-in-action focuses on design as their mutual goal. So, the interaction between student and master in the design studio may enhance the student's learning and the master's teaching on design (Chen, Heylighen & Neuckermans, 2006).

Empirical studies often emphasize the cognitive style of communication between the tutor and the student (Oxman, 2004). A tutor, has many ways of "telling" (Schön, 1989, p.102). Domain knowledge becomes explicit as the significant component to be taught and transferred in education. Through modeling, conceptual knowledge is acquired as well as cognitive

processes in design. The student functions as a design researcher while learning *about design*, in addition to *how to design* (Oxman, 2004).

Case Study

In order to define the problem by means of determining the difficulties that students face within departments of architecture, a survey has been carried out among architecture department students of 10 universities in Turkey: Çukurova University, Erciyes University, Mersin University, Yıldız Technical University, Selçuk University, Mimar Sinan University, Gazi University, İzmir Institute of Technology, Kocaeli University, and İstanbul Technical University. The urban planning department of İzmir Institute of Technology and the urban planning and interior design department of İstanbul Technical University have also been included within the survey, since those students take the same courses in their first year of education. In this survey, in order for students to objectively evaluate both themselves and the method carried out in their universities, they were not asked to give their identification information.

Data Categories

The survey consists of four parts. Within the framework of the survey, the below mentioned subjects are considered nationally within Turkey:

- 1- The factors that affect the choice of the specific vocation,
- 2- The level of the students' interest for the vocation,
- 3- The subjects with which students have difficulties,
- 4- The suggestions of the students to their own problems.

The calculated Cronbach Alpha co-efficient for the trustworthiness of the survey is $\alpha = 0.834$. According to this, the questions are highly trustworthy.

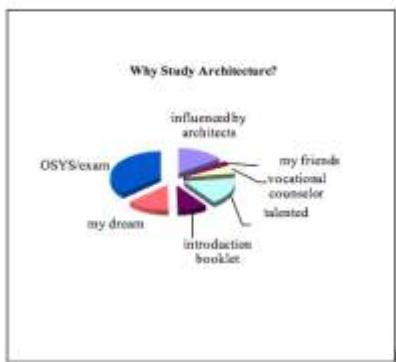
Table 1.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.834	0.750	48

Data Evaluations

1. The factors that affect the choice of vocation. This part of the survey consists of questions related to the entrance to the vocation. The willingness of the students to the vocation, the reason for their choice of architecture, former knowledge about architectural education and design, and the compatibility of this knowledge with what they have learned during their education process are all topics that were asked.



* Student Selection and Placement Examination

Figure 1. The factors that affect the choice of students.

In Turkey, students are accepted to both state and private universities according to the results of a multiple-choice national exam in mathematics, science and reading comprehension. Just like students of engineering departments, entrance to architecture departments is determined from their scores. As a result, students' desire for different departments, in other words their "eagerness," is determined according to their success in the national exam. In such circumstances, eagerness to architectural education will appear to be in below ranks and students will participate to architecture education without any "eagerness". Consequentially, students were requested to answer whether or not they eagerly wanted to study architecture. Among the 450 surveyed participants, 147 said that they

eagerly chose architecture, and 38 stated that they did not want to come to an architecture department eagerly. In order to clarify the reasons that made students choose to study architecture, students were requested to mark one or more choices below. The choices and the number of students that marked each choice are given below according to rank.

The determinant role of the Turkish University Entrance Examination (YGS) on students' choice of architecture departments can be clearly seen in the survey results, since 174 students answered that the amount of points scored on the exam determined their choice. Conversely, the guidance of vocational counselors and introductory booklets can also be seen as not as effective as other influences (See Figure 1).

2. Level of interest in the vocation/architecture. As a result of the survey, it can be clearly seen that although 321 participants stated they had previous knowledge about architecture and/or architectural education, 129 stated that they had no idea about what architecture or architectural education was (See Figure 2). Although the amount of students that had previous knowledge about architecture is not low, when compared with countries that put emphasis on the role of interest and adequacy of students in their choice of vocation, the amount can be seen as remarkably inadequate.

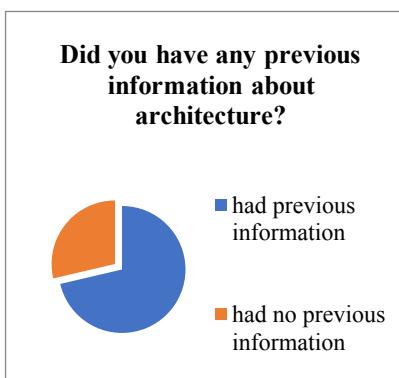


Figure 2. Previous knowledge about architecture.

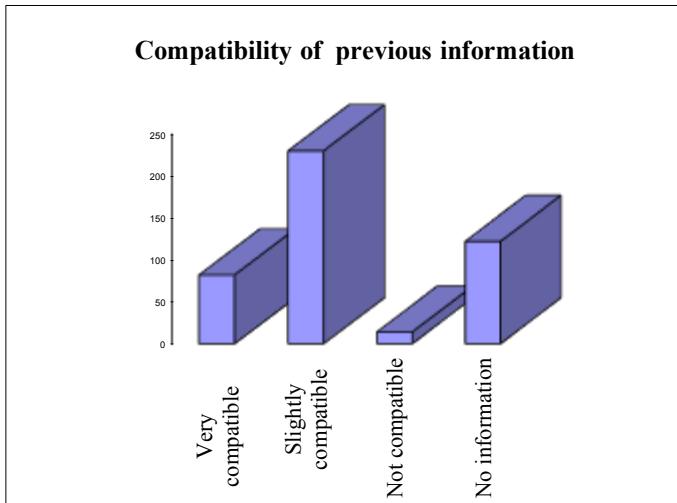


Figure 3. Compatibility of previous information with initial experiences in architecture

Students were also requested to reply whether or not the information they acquired before their entrance to architectural departments was compatible with the experience acquired after admission to their department. From those who had previous knowledge about architecture, 82 stated that knowledge was very compatible with what they acquired during their architectural education; 230 stated that their previous information about architecture was slightly compatible with their experiences at architecture departments, and 14 stated that there was no compatibility (See Figure 3). As a result of the survey it can be seen that the majority of the students had neither adequate nor accurate previous knowledge about architecture.

In universities that accept architecture students via a skills test (rather than the national university entrance exam), the interest of the students about the vocation is evaluated with reference to their knowledge of famous figures in architectural history and their well-known buildings. In order to evaluate such an interest, the students were asked to answer the question

“Did any building in your surrounding or in films and periodicals take your attention before you entered to your architecture department?” While 9 of the students answered “never,” 270 replied “sometimes” and 170 said that buildings “attracted their attention very much” (See Figure 4).

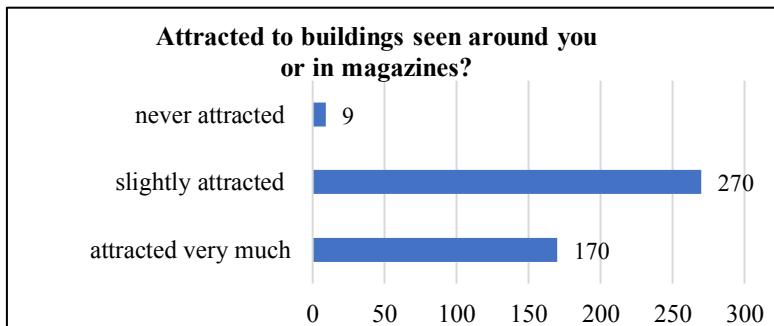


Figure 4. Attraction to the surrounding buildings.

In order to weigh up this interest, the students were then asked the question “Did you know any famous architect or building before you entered your department of architecture?” While 242 replied “yes,” 206 said “no” to this question (See Figure 5). In answer to this question, Architect Sinan was the most known national architect, and Frank Lloyd Wright, Mies van der Rohe, Zaha Hadid, Frank Gehry and Santiago Calatrava were all equally observed to be the most known international architects.

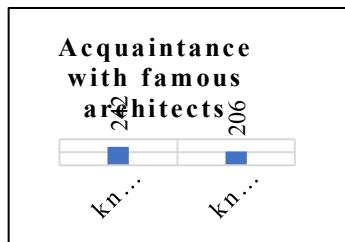


Figure 5. Acquaintance with famous architects.

When compared with the students' familiarity of representational techniques as the communicatory tool of architecture, the amount of "yes" answers to this question about famous architects was observed to be higher, most likely the result of the non-supportive role of the Turkish high school education. The question "Did you know technical drawing before you entered your department of architecture?" was answered affirmatively by only 20 of students. On the other hand, 74 answered the question as "I knew a little" and 355 said that they did not have any knowledge about the representational techniques of architectural practice. As a result of this question, it can be said that the technical language of architectural practice is a little known subject among architecture students prior to studying architecture (See Figure 6).

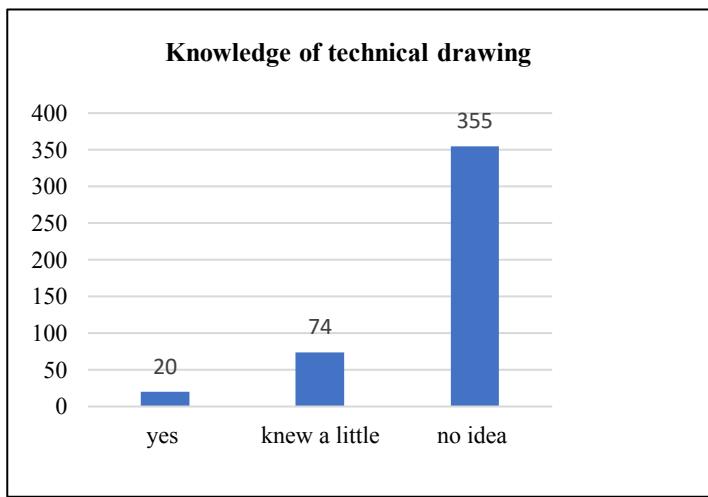


Figure 6. Knowledge of Technical Drawing

3. The most difficult subjects to comprehend during the educational process. For the first year of architectural education, which is an introduction to architectural design, architectural representation techniques

– technical drawing – are taught with the support of the basic design studio education. For this period, which consists of three stages, an elaborate study has been made to reveal the problems that students face during this early learning process.

a. ***Technical drawing and social issues.*** By means of a Likert scale students were asked to express their ideas on the subjects below.

Questions (A-5), (A-6), (B-1) and (B-3) are seen to be the most difficult subjects to understand (See Table 2 in Annex A). The most easily understood questions seem to be (A-2) and (B-2). In Turkey, students are accepted to universities according to their scores on national evaluation exams called YGS. With this in mind, to see if there is a direct relationship between students who claim the results of the national university exam as an essential factor for their choice of department and those students who do not, a comparative study has been made on the range of difficulties in understanding the subjects provided in Table 9. For this reason, by means of a One-Sample Kolmogorov-Smirnov Test, an inquiry has been made to check these factors. In the final tables, since $p=0.00 < \alpha = 0.05$, all the data fits well to the normal distribution. Therefore, a non-parametric test was made and the validity of the two hypotheses was analyzed by means of a Mann-Whitney test.

H_0 : Both examples have the same median distribution. (There is no difference between examples.)

H_1 : The examples do not have the same median distribution. (There is a difference between the two examples.) These two hypotheses are structured as same for the other questionnaires.

If the “p” value in Asymp. Sig. (2-tailed) is compared with $\alpha = 0.05$, a comparison of the answers to questions (A-1-8) and (B-1-3) (See Table 3 in Annex A).

Question A-1 (perceiving the depth of objects and reflecting that in drawing) $p=0.027 < \alpha = 0.05$ H_0 is ignored. That is to say, there appears to be a meaningful statistical difference between the effectiveness of the national exam or not. Similarly, question A-8 (drawing the section of an

object from its perspective and dimensions) $p=0.026 < \alpha = 0.05$ H_0 is also ignored. Among the other analyzed subjects, there is no meaningful statistical difference between effectiveness of the national exam or not.

The data was also tested to see if there was a difference between students who thought that they had drawing ability before entering university and those who thought they understood the subjects of technical drawing. When the “p” value which is in Asymp. Sig. (2-tailed) is compared with $\alpha = 0.05$ the following results are achieved.

For question A-2 (changing scales and working with measurements), since as $p=0.956 > \alpha = 0.05$, H_0 is not ignored. That is, for changing scales, it is seen that there is no statistical difference between believing in the ability to draw or not. Similarly, for question A-6 (drawing the section of an object from its plan and elevation), since $p=0.056 > \alpha = 0.05$ H_0 is not ignored. In this respect, it is seen that there is no statistical difference between students who believe in their drawing ability and those students who do not. For the questions in the table other than these two, since the p value $< \alpha = 0.05$ it is seen that the students who believe in their drawing abilities do not have any difficulty, have easily understood the mentioned subjects and do not have difficulties in coping with them (See Table 3 in Annex A).

Similar to these questions, by means of a Mann-Whitney Test, those students who previously thought of architecture as vocation were compared with those students who did not, in terms of their state of understanding the subjects on B. Abstract and Social Issues.

According to the comparison between “p” value and $\alpha = 0.05$ in Asymp. Sig. (2-tailed), the results are as follows: for question B-1 (studying with abstract concepts), because $p=0.010 < \alpha = 0.05$, H_0 is ignored. That is, it is seen that on the subject of studying with abstract concepts there is a meaningful difference in statistical results between students who imagined architecture as their vocation since his/her childhood and those did not. For questions B-2 (coping with human requirements and easily managing them) and B-3 (struggling with more than one subject in the design process), since the “p” value is $> \alpha = 0.05$, H_0 is not ignored. In brief, there is no

meaningful statistical difference between students who have imagined architecture as their future vocation and those who did not (See Table 4 in Annex A).

For question A-2 (to change scales), since $p=0.122 > \alpha = 0.05$, H_0 is not ignored. That is, for the subjects on “changing scales” or “studying with measurements,” there is no meaningful statistical difference between students who had prior knowledge about technical drawing and those who did not. This is also same for question A-3 (making a model of a design) since $p=0.055 > \alpha = 0.05$, H_0 is not ignored (See Table 5 in Annex A).

b. Basic design comprehension. In this part of the study, students were asked to evaluate their “understanding” of basic design principles using (1-2 very difficult), (3-4 a little bit difficult), (5-6 not so difficult), (7-8 easy), (9-10 very easy) (See Table 2 in Annex A). Students who did not mark any answers are not included in the evaluation. In this way, the total amount of the students participating in the study decreased from 400 to 352.

As a result of this part of the study, symmetry/asymmetry and repetition-rhythm are the most easily understood subjects, while the concept of hierarchy is seen to be the least comprehended concept. The comparison of understanding of basic design principles by those students who believe in their drawing ability and those who do not is again made with a Mann-Whitney Test (See Table 6 in Annex A).

As a result of this study, it can be seen that there appeared no meaningful statistical difference between students who believe in their drawing ability and those who did not according to their evaluation of basic design concepts of Measure/Ratio/Proportion, Harmony, Contrast, Dominance, Texture, Hierarchy, Repetition-Rhythm, Symmetry/Asymmetry Figure-Ground relationship, and Solid-Void relationship. For the subject of Unity ($p=0.026 < \alpha = 0.05$) and the subject of Light-Shadow relationship ($p=0.002 < \alpha = 0.05$), H_0 is ignored. For these two subjects, a meaningful statistical difference between students who believe in their drawing ability and those who did not can be seen: those who believed in their drawing ability asserted that these two subjects were easy (See Table 7 in Annex A).

The comprehension of basic design principles was also analyzed in terms of the students' former knowledge about architecture.

Since $p=0.017 < \alpha = 0.05$, H_0 is ignored. That is, in terms of hierarchy, a meaningful statistical difference between students who had previous knowledge about architecture and those who did not can be seen. Those students with previous knowledge declared that the concept of hierarchy was easy for them. For the other basic design principles, there appeared to be no meaningful statistical difference (See Table 8 in Annex A).

c. Difficulties in the education process. This part of the questionnaire consists of seven questions concerning the difficulties of the architectural educational process.

- (C-1) Not knowing the way my design is going to be evaluated hardened my perception regarding the method I should choose.
- (C-2) The fact that there is no single “correct” answer makes it difficult for me to understand whether my work will succeed or not.
- (C-3) The fact that there are not many resource books I can use as reference makes it difficult for me to proceed with my work.
- (C-4) The fact that the resource books I use are not directly related to my area of search makes it difficult for me to proceed with my work
- (C-5) The studio tutors should not make use of examples too frequently
- (C-6) I find it hard to use group instructions while working on my own.
- (C-7) I am quite shy while interacting with the studio tutor personally and therefore cannot ask everything I should.

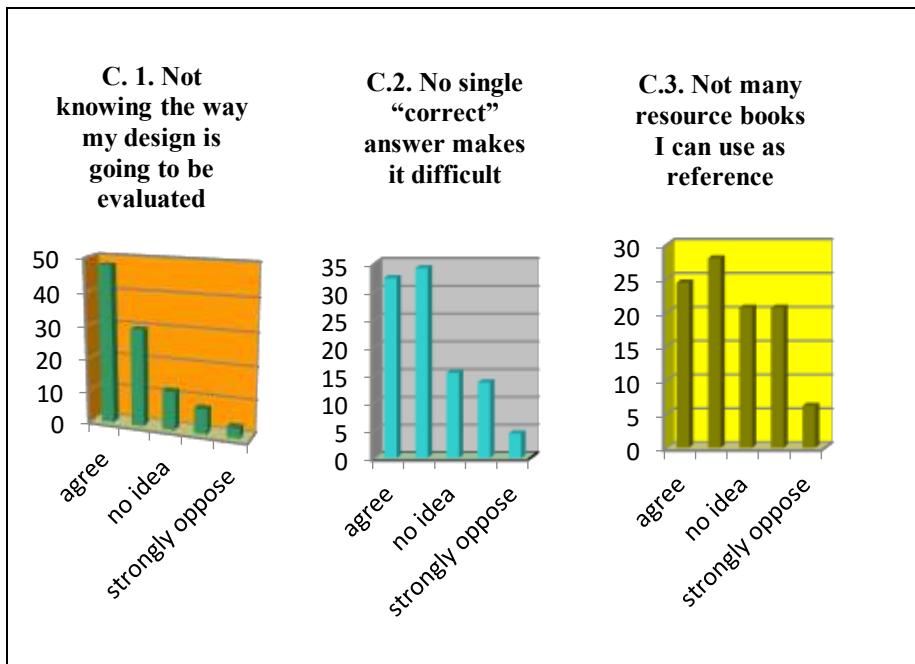
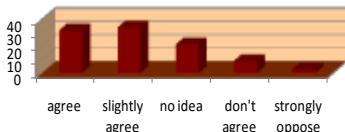


Figure 7. Evaluation of C.1, C.2, and C.3.

It is seen that most of the students accepted comments (C-2) and (C-3). For the interpretational question (C-3), the first year students specifically expressed their difficulties on the small amount of convenient resource books available to them (See Figure 7).

With regards to question (C-4), the students expressed that the existing books' methodology (not providing the answer in the shortest way as they are used to) as a difficulty.

C.4. The resource books I shall use are not directly related to my area of search



C.5. Instructors should not teach the lessons by making use of examples too frequently

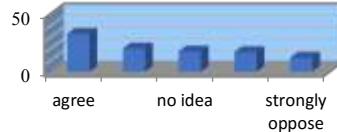
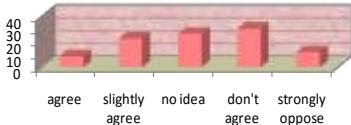


Figure 8. C.4 and C.5 evaluation.

For question (C-5), which contains a negative connotation, the amount of “I agree” answers are seen to be more than the “I don’t agree” and “strongly oppose” answers in comparison with previous questions, which reveals that perhaps the students are not carefully reading and understanding all the questions (See Figure 8).

C.6.Hard to use the instructions made for the group while working on my own



C.7. While interacting with the studio instructor personally cannot ask everything I should

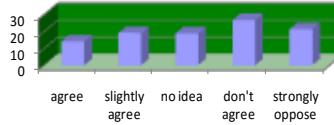


Figure 9. C.6 and C.7 evaluation.

Because the statistical density of non-committals weighs towards the “I don’t agree” answer for question (C-6), it is inferred that the students can make use of group instructions. As a result of question (C-7), it is seen that

although there are non-committal students, most students do not face such kind of a difficulty (See Figure 9).

3. Students' own solutions to their difficulties. To the question “do you think that with another methodology the subject could become more easily understandable?” 79 students answered “yes” and 205 said “maybe”. Among all the students, although 41 of them answered that the current methodology was “useless” and 7 said “worthless,” 118 students answered that they were non-committal about the subject. If the non-committed answered are ignored, it can be asserted that the majority of students (284) are in hope of a new method other than an existent educational methodology.

Although on the one hand 358 students did not propose a new methodology, on the other hand 92 did propose a different method or working methodology. The majority of these 92 proposals emphasized the necessity of the introduction of digital technologies to the modern way of education. They claimed that with the aid of digital technologies, the teaching of most subjects would be better. They also stated that the process of architectural production would be easier if 3D modeling tools are taught better or more effectively. They also mentioned the importance of animations and video presentations. Additionally, the students also emphasized the essentiality of model making or teaching with models to better understand three-dimensional design. The importance of learning architecture through national and international travel was also indicated by the students. They recalled the importance of the tutors’ behavior specifically for the first year education on their development and future plans. Moreover, they focused on the necessity of human psychology and physiology lessons, teaching with exemplary models and the importance of model laboratories in architecture departments.

Results

In Turkey, it can be asserted that the major criterion for entering architectural education is the national university exam: the YGS (Student Selection and Placement Centre).

The students' tendency to choose the subject and their attraction from architects that they know are some other factors that follow their exam results. Other than the exam results, the students' tendency to select the subject might be because of their proximity to and admiration for an architect that they know. On the contrary, it has been observed that career consultation services and vocational introductory booklets are not so effective in students' choices to study architecture. Only 18% of the students expressed that what they knew about architecture matched their experiences while studying in the first year. This reveals the fact that the current presentation of the vocation is not adequate for students to gain prior knowledge about the study of architecture.

Despite the majority of students claiming an interest in architecture culture, it has been seen that the amount of the students who had acquaintance with an architect or his/her work was much less. Additionally, it has been observed that their knowledge and interest of the subject was not so deep. For example, the amount of students who did not know technical drawing was 79%.

According to the arithmetic average of the survey, it has been seen that the subjects of structural systems, perspectival drawing of objects whose dimensions are known, and sectional drawing of objects whose dimensions and perspective is known are difficult to understand. The students stated that they have difficulties in abstract thinking and coping with complex problems. Among the concepts related with basic design, the students declared that "hierarchy" was the least successful subject.

The survey questions on the difficulties of learning and comprehending basic design principles were tested in order to observe the effects of some chosen criteria. For instance, in the comparison between students who stated that the student selection and placement exam was a determinative role in their choice to study architecture and those for whom it was not, it has been seen that difference occurs in "conceiving the depth of objects" and "drawing the section of an object when the dimensions and perspective are known." In the comparison between those who believe that they have drawing ability and those who believe they do not, the evaluation of "to change scale and to work with measurements" and "to draw the section of an object from its plan and elevation" were observed to be different.

Students who knew technical drawing seem to have more easily overcome the subjects of architectural representation techniques; however, this knowledge did not provide them any advantage for the topics “to form the design into a model...”

The question “was it difficult for you to design with abstract concepts?” in the survey was answered as “yes, it was hard” by a majority of the students. However, the students who claim it was their dream to study architecture, had easily got to grips with the situation. So it was concluded that a prior interest in and a motivation for architecture has positive effects on learning the subject.

The comparison of basic design principles between students who had previous drawing ability and those who stated that they had previous knowledge about architecture resulted in different evaluations on the subjects of unity, light-shadow and hierarchy, but there was no determinative statistical difference observed among the other basic design principles.

In their answers to the interpretation questions, the students stated that they had difficulties because they did not know the method and form of evaluation, that there was no one “correct” accepted answer and that there were no reference sources which directly formulized the taught subjects. 63% of the students thought that some other pedagogical methods different than the ones carried out would be more satisfactory. However, only 20% of these students were able to come up with alternative proposals. They asserted that computer modeling would ease the learning process and video shows and animations should also be integrated into the teaching program. They also stated that teaching the subjects from models would be effective in order to understand the third dimension and they also emphasized the importance of international trips. Moreover, the students also proposed model laboratories, the study of ergonomics and environmental psychology, and a supportive rather than antagonistic pedagogic approach of the tutors.

Discussion and Conclusion

The students’ interest in the vocation of architecture, being rightly informed about the vocation and having the necessary basic knowledge, are some

important factors that will increase the success of the students during and after education. According to the survey, it can be asserted that for students who are relatively close to architecture culture (the ones who have previous knowledge of the subject or the ones who have a relative who is an architect), the beginning of architectural education is easier. It has been understood that such knowledge provides them with the designerly way of knowing as described by Cross (1982).

The challenges related with the first year education could be eased by way of updating the content and method of teaching. Since the subject of abstract conceptualism is expressed as a general challenge, overcoming this could relieve the weight of the system. And for this to be done, the students are offered computer aided-, model- and animation-based education to better understand the study of three dimensions. It has been observed that any change to the content and method would provide both the students and the tutors a better and comfortable process of education. Students require supportive activities to be creative in multi-input problems and to get used to multi-dimensional, flexible thinking. This could be organized as extra- or in-curricular activities to introduce them into architecture culture. To provide these facilities before university education would prevent some of the problems before they occur. The revision of pre-university education to support the academician architects tries to decrease difficulties with respect to their knowledge and interest areas. Specifying what the problem is from the student's point of view will be an important supportive source to enhance the productivity of these studies.

Acknowledgments

The author would like to thank Çukurova, Erciyes, Mersin, Yıldız Technical, Selçuk, Mimar Sinan, Izmir Technology, Kocaeli- and İstanbul Technical Universities for their contribution to the study. Additionally, the author would like to thank Sibel Açık Alemdaroğlu, Betül Koç, Ozlem Sağıroğlu and Meltem Sarman for their contribution in survey and evaluation of it. Lastly, the author would like to thank Christopher Wilson for his careful proofreading of the English text.

References

- Blumrich J. F. (1970). Design. *Science*, 168 (3939), 1551-1554. doi: [10.1126/science.168.3939.1551](https://doi.org/10.1126/science.168.3939.1551)
- Busatoa, V. V., Prinsb, F. J., Elshouta, J. J., & Hamakera, C. (2000). Intellectual ability, learning style, personality, achievement motivation and academic success of psychology students in higher education. *Personality and Individual Differences*, 29, 1057-1068. doi: [10.1016/S0031-9166\(99\)00253-6](https://doi.org/10.1016/S0031-9166(99)00253-6)
- Cartier, P. (2011). Most valuable aspects of educational expectations of the students in design education. *Procedia-Social and Behavioral Sciences*, 15, 2187-2191. doi: [10.1016/j.sbspro.2011.04.077](https://doi.org/10.1016/j.sbspro.2011.04.077)
- Chen J. D., Heylighen A., & Neuckermans H. (2006). Learning Design Teaching. In Al-Qawasmi, J., & de Velasco, G. P. V. (Eds.), *Changing Trends in Architectural Design Education* (pp. 577-588). Rabat, Morocco: CSAAR.
- Cross N. (1982). Designerly ways of knowing. *Design Studies*, 3(4), 221-227. doi: [10.1016/0142-694X\(82\)90040-0](https://doi.org/10.1016/0142-694X(82)90040-0)
- Cross N. (1991). Research in design thinking. *Design Studies*, 12, 3–10. doi: [10.1162/074793601750357196](https://doi.org/10.1162/074793601750357196)
- Crysler, C. G. (1995). Critical Pedagogy and Architectural Education. *Journal of Architectural Education*, 48(4), 208-217. doi: [10.1080/10464883.1995.10734644](https://doi.org/10.1080/10464883.1995.10734644)
- Danaci, H. M. (2015). Creativity and knowledge in architectural education. *Procedia - Social and Behavioral Sciences*, 174, 1309-1312. doi: [10.1016/j.sbspro.2015.01.752](https://doi.org/10.1016/j.sbspro.2015.01.752)
- Demirkhan, H., & Afacan, Y. (2012). Assessing creativity in design education: analysis of creativity factors in the first-year design studio. *Design Studies*, 33, 262-278. doi: [10.1016/j.destud.2011.11.005](https://doi.org/10.1016/j.destud.2011.11.005)
- Dorst, K. (2011). The core of ‘design thinking’ and its application. *Design Studies*, 32, 521-532. doi: [10.1016/j.destud.2011.07.006](https://doi.org/10.1016/j.destud.2011.07.006)
- Entwistle, N. J. (1988). Motivational factors in students' approaches to learning. In R. R. Schmeck, (Ed), *Learning Strategies and Learning Styles* (pp. 21-51). Edinburgh: Scottish Academic Press.

- Farivarsadri, G. (2001, setember). *Critical view on pedagogical dimension of introductory design in architectural education*. Paper presented at the meeting of Architectural Education Exchange (AEE), Cardiff University, England. Retrieved from <http://cebe.cf.ac.uk/aee/pdfs/farivarsadrig1.pdf>
- Farsidesa, T. & Woodfield, R. (2003). Individual differences and undergraduate academic success: the roles of personality, intelligence, and application. *Personality and Individual Differences*, 34, 1225–1243. Retrieved from <https://pdfs.semanticscholar.org/ee61/7cf9791bf54a9afb1f4e2ae5fc83e706dfffa.pdf>
- Glanville, R. (1999). Researching design and designing research. *Design Issues*, 15(2), 80-91. doi: [10.2307/1511844](https://doi.org/10.2307/1511844)
- Glasser, D. E. (2000). Reflections on architectural education. *Journal of Architectural Education*, 53(4), 250-252. doi: [10.1162/104648800564662](https://doi.org/10.1162/104648800564662)
- Kolb, D. A. (1976). *The Learning Style Inventory: Technical Manual*, Boston, Ma.: McBer.
- Kolb, D. A. (1984). *Experiential Learning*, Englewood Cliffs, NJ.: Prentice Hall.
- Lawson, B (1997). *How designers think: the design process demystified*. Oxford: Architectural Press.
- Marton, F., & Saljo, R. (1976). On qualitative differences in learning. I. Outcome and process. *British Journal of Educational Psychology*, 46, 4-11. doi: [10.1111/j.2044-8279.1976.tb02980.x](https://doi.org/10.1111/j.2044-8279.1976.tb02980.x)
- Oxman, R. (1999). Educating the designerly thinker. *Design Studies*, 20(2) 105–122. doi: [10.1016/S0142-694X\(98\)00029-5](https://doi.org/10.1016/S0142-694X(98)00029-5)
- Oxman, R. (2004). Think-maps: teaching design thinking in design education. *Design Studies*, 25(1), 63–91. doi: [10.1016/S0142-694X\(03\)00033-4](https://doi.org/10.1016/S0142-694X(03)00033-4)
- Pask, G. (1976). Styles and Strategies of Learning. *British Journal of Educational Psychology*, 46, 128-48.
- Pask, G. (1988). Learning strategies, teaching strategies and conceptual or learning style. In R. R. Schmeck (Ed.), *Learning strategies and learning styles*. New York: Plenum Press.
- Polanyi, M. (2009). *The tacit dimension*. Chicago: University of Chicago Press.

- Roberts, A. (2006). Cognitive styles and student progression in architectural design education. *Design Studies*, 27(2), 167-181. doi: [10.1016/j.destud.2005.07.001](https://doi.org/10.1016/j.destud.2005.07.001)
- Rowe, P.G. (1987). *Design Thinking*. Cambridge, MA: MIT Press.
- Schön, D (1985). *The design studio: an exploration of its traditions and potentials*. London: RIBA Publications.
- Schön, D. (1989). *Educating the reflective practitioner*. San Francisco: Jossey-Bass publishers.
- Schmeck, R. R. (1983). Learning Styles of college students. In R. F. Dillon & R. R. Schmeck (Eds.), *Individual differences in cognition* (pp. 233-279). New York: Academic Press.
- Quayle M. (1985). *Idea book for teaching design*. Mesa, AZ: PDA Publisher Corporation.
- Soh, K. (2017). Fostering student creativity through tutor behaviors. *Thinking Skills and Creativity*, 23, 58–66. doi: [10.1016/j.tsc.2016.11.002](https://doi.org/10.1016/j.tsc.2016.11.002)
- Ulusoy, Z. (1999). To design versus to understand design: the role of graphic representations and verbal expressions. *Design Studies*, 20(2), 123–130. doi.org/10.1016/S0142-694X(98)00030-1

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ANNEX A

Table 2
The evaluation and the effect of factors

Table 3

Ranks Grouping Variable: OSYS

Test Statistics(a)

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)
Mann-Whitney U	21169.000	23297.000	21741.500	23067.000	22125.000	22280.000
Wilcoxon W	36394.000	61523.000	36966.500	38292.000	37350.000	37505.000
Z	-2.214	-0.574	-1.760	-.737	-1.453	-1.355
Asymp. Sig. (2-tailed)	0.027	0.566	0.078	0.461	0.146	0.176
	(A-7)	(A-8)	(B-1)	(B-2)	(B-3)	
Wilcoxon W	21559.500	21102.500	22938.500	22619.500	23913.000	
Z	36784.500	36327.500	38163.500	60845.500	39138.000	
Asymp. Sig. (2-tailed)	-1.875	-2.233	-0.823	-1.089	-0.077	
Mann-Whitney U	0.061	0.026	0.411	0.276	0.939	

Table 4

Ranks Test Grouping Variable: talented at drawing

Statistics (a)

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)	(A-7)	(A-8)
Mann-Whitney U	14523.00	20830.00	17585.00	17600.00	18254.50	18614.50	16745.00	16995.50
Wilcoxon W	65563.00	71870.00	68625.00	68640.00	69294.50	69654.50	67785.00	68035.50
Z	-5.320	-0.056	-2.751	-2.754	-2.179	-1.912	-3.401	-3.208
Asymp. Sig. (2-tailed)	0.000	0.956	0.006	0.006	0.029	0.056	0.001	0.001

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Table 5
Ranks Grouping Variable: dream

Test Statistics (a)

	(B-1) abstract concept	(B-2) user needs	(B-3) complicated issues
Mann-Whitney U	14959.000	17063.500	16826.500
Wilcoxon W	75337.000	22419.500	77204.500
Z	-2.586	-.732	-.937
Asymp. Sig. (2-tailed)	.010	.464	.349

Table 6
Ranks Grouping Variable: single line 2

Test Statistics (a)

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)	(A-7)	(A-8)
Mann-Whitney U	11767.00	15122.50	14667.50	11564.00	13876.50	12187.00	12129.00	12973.00
Wilcoxon W	75313.00	78668.50	78213.50	75110.00	77422.50	75733.00	75675.00	76519.00
Z	-4.633	-1.548	-1.917	-4.828	-2.633	-4.259	-4.216	-3.456
Asymp. Sig. (2-tailed)	0.000	0.122	0.055	0.000	0.008	0.000	0.000	0.001

Table 7.
Evaluation of the difficulty of basic design principles

basic design principles	very difficult (1-2)	(3-4)	(5-6)	(7-8)	very easy (9-10)	Talent for drawing	Having information about architecture
Measure/Ratio/Proportion	7	14	76	151	104	0	0
Harmony	5	32	98	140	77	0	0
Contrast	12	46	101	121	72	0	0
Dominance	16	38	92	113	93	0	0
Texture	12	38	93	128	81	0	0
Hierarchy	18	47	99	112	76	0	↙
Repetition-Rhythm	7	14	56	105	170	0	0
Symmetry-Asymmetry	5	7	43	97	200	0	0
Unity	13	36	107	131	65	↙	0
Figure-Ground relationship	10	40	112	132	58	0	0
Light-Shadow relationship	13	39	102	103	95	↙	0
Solid-Void relationship	6	26	78	133	109	0	0

Table 8
Ranks Grouping Variable: drawing talent

Test Statistics (a)

Basic Design Principles	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Measure/Ratio/ Proportion	11874.00	16627.00	-0.615	0.539
Harmony	12203.00	44843.00	-0.203	0.839
Contrast	12187.50	44827.50	-0.219	0.826
Dominance	11947.50	16700.50	-0.511	0.610
Texture	11337.50	43977.50	-1.259	0.208
Hierarchy	12239.50	16992.50	-0.155	0.877
Repetition- Rhythm	12157.00	16910.00	-0.267	0.790
Symmetry- Asymmetry	11809.000	44449.000	-0.735	0.462
Unity	10552.000	43192.000	-2.228	0.026
Figure-Ground relationship	11197.500	43837.500	-1.439	0.150
Light-Shadow relationship	9808.500	42448.500	-3.112	0.002
Solid and void relationship	11445.500	44085.500	-1.136	0.256

Table 9.

Ranks grouping variable: previous information

Test Statistics (a) Mann-Whitney Test

Basic Design Principles	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Measure/Ratio/ Proportion	10453.50	14731.50	-1.909	.056
Harmony	11726.50	16004.50	-.293	.770
Contrast	10655.50	14933.50	-1.617	.106
Dominance	11283.00	15561.000	-.837	.402
Texture	10979.50	15257.50	-1.219	.223
Hierarchy	10017.50	14295.50	-2.397	.017
Repetition- Rhythm	11926.00	16204.00	-.044	.965
Symmetry- Asymmetry	10780.000	15058.000	-1.579	0.114
Unity	11230.00	15508.00	-0.911	0.362
Figure-Ground relationship	10952.000	15230.000	-1.260	0.208
Light-Shadow relationship	11824.000	16102.000	-0.168	0.866
Solid and void relationship	10787.500	15065.500	-1.469	0.142

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Análisis de la Elección de Itinerarios Educativos en los Universitarios Españoles. El Caso del Campus de Palencia de la Universidad de Valladolid

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Date of publication: June 15th, 2017

Edition period: June 2017-October 2017

To cite this article: Valero-Matas, J.A., Callejo, J., Valero-Oteo, I., Romay, J. (2017). Análisis de la Elección de Itinerarios Educativos en los Universitarios Españoles. El caso del Campus de Palencia de la Universidad de Valladolid. *Multidisciplinary Journal of Educational Research*, 7(2), 216-248. doi: 10.17583/remie.2017.2718

To link this article: <http://dx.doi.org/10.17583/remie.2017.2718>

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Análisis de la Elección de Itinerarios Educativos en los Universitarios Españoles. El Caso del Campus de Palencia de la Universidad de Valladolid

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Abstract

Este texto analiza la enseñanza de la ciencia en la educación a través de un estudio longitudinal realizado en la Universidad de Valladolid. Con ello se trata de conocer las razones que llevan a los estudiantes a seleccionar itinerarios de ciencias experimentales o ciencias sociales. El objetivo de esta investigación es analizar las valoraciones de los estudiantes sobre la ciencia en la educación universitaria para posteriormente articular los instrumentos educativos que ayuden a mejorar dicha formación

Keywords: educación universitaria, ciencia, alfabetización científica, CTS

Analysis of the Choice of Educational Pathways in the Spanish University. The Case of Palencia Campus at University of Valladolid

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Resumen

This paper analyzes the perception that high school students have about of the teaching of science. It is a longitudinal study is carried on at the University of Valladolid. The inquiry wants to know the reasons because the students choose degrees of experimental sciences or social sciences. This research attempts to analyze the student's assessments on science in undergraduate education. So then, we can design the tools and skills that we help to improve their training.

Palabras clave: graduate education, science, scientific literacy, STS

El valor de la ciencia y la tecnología que brilló en los años 50 y 60 de la pasada centuria en todo el mundo y supone el alistamiento de miles de jóvenes a las titulaciones de ciencias, y que se mantuvo en España hasta bien entrados los años 90 del siglo pasado, está sufriendo un descenso vertiginoso en los denominados países desarrollados. La visión positiva de la ciencia y la tecnología en todos los ámbitos de la vida cotidiana ha tenido una profunda mutación, pasando de una visión indispensable, a una desconfianza, y como diría Beck (2009) a que la ciencia y la tecnología sean tomadas como fuentes de riesgo. Esta percepción de riesgo de la ciencia y la tecnología está bastante arraigada entre los jóvenes de las sociedades denominadas desarrolladas, Japón, USA, Alemania, España, Francia, Austria o los países escandinavos (Sjøberg & Schreiner, 2010). Desde hace varias décadas se viene hablando de este problema, pues a finales de los años ochenta Fensham (1988) escribía que el desencanto con la ciencia y la tecnología era la principal razón del abandono de los estudiantes en las aulas de ciencias. Sobre este asunto existe un amplio elenco de estudios (Rossi y Barajas M, 2015; Vazquez y Manassero 2008, Coll & Eanes 2008, Lindahl 2008; Sjøberg 2004) que intentar dar una explicación a dicho fenómeno.

En España desde hace décadas se viene invirtiendo en alfabetizar a la sociedad en la ciencia, comunicación científica y en acercar la ciencia al ciudadano (FECYT, 2015). El informe ENCIENDE (2011), pone de relieve o mejor dicho advierte de la necesidad de promulgar una verdadera educación científica desde los 3 años. Etapa considerada por muchos expertos como el ideal para la socialización y el aprendizaje inicial a modo de generar una educación científica a lo largo del desarrollo educativo (Spektor et al. 2013). A juicio de García-Carmona et al. (2014) la alfabetización científica en España es insuficiente con las exigencias de la sociedad actual.

En estos momentos, la ciencia, tecnología, ingeniería y matemáticas (STEM) serán las responsables de cultivar los científicos del siglo XXI para ser analíticos y creativos en el desarrollo de soluciones prácticas a los problemas de la sociedad actual y futura. Cada vez más desafíos complejos y diversos requieren el conocimiento de conceptos dentro de las disciplinas que tradicionalmente no se presentan en la educación científica de

pregrado, incluidos los valores humanos, las actitudes y el comportamiento y las interrelaciones sociales, políticas, ambientales y económicas (Geppert 1995; Splitt 2002).

Lo que aquí se presenta es un estudio de los estudiantes universitarios en un campus concreto¹, y que trata de desvelar las principales razones que han llevado a los estudiantes a seleccionar estudios de ciencias sociales, jurídicas y humanidades o estudios de ciencias y tecnología. Para posteriormente reflexionar sobre la educación científica escolar y terminar con conclusiones a modo de ayudar a edificar una educación científica ajustada a las necesidades actuales.

Discusión Preliminar

La construcción social de la ciencia (Barnes, 1988) y por consiguiente la ciencia educativa se ha limitado en muchos escolares en la educación científica, relegando casi al olvido la esencia de la ciencia. La ciencia no crece sólo con la vida de los niños, experiencias o incluso con el mundo real, la ciencia es mucho más que eso, y si no se muestra realmente lo que es la esencia de la ciencia, estamos alienando, desinteresando e incapacitando a los infantes a acceder a la ciencia.

Esta alienación se entiende porque se encuentra fuertemente interiorizada en los profesores de primaria (Coll & Eaner, 2008; Fleer, 2013; Rebelo et al., 2011). Jones y Edmunds en un estudio, observaron que los estudiantes habían encontrado tremendas dificultades para comprender los conceptos científicos que se presentaban. Sin embargo, habían aprendido la jerga científica y satisfecho los requerimientos necesarios para aprobar la asignatura. No obstante, la mayoría de las veces no comprendían esas cosas que eran consideradas como importantes. Los estudiantes manifestaban que realmente disfrutaban de la ciencia cuando trabajaban con las manos y entendían su significado. Entonces es cuando encontraron el itinerario de su aprendizaje de los hechos científicos, especialmente de aquellos que percibían irrelevantes y sin sentido (2013, p. 119).

En esta misma línea están las investigaciones de Fleer (2013) donde los estudiantes de grado en educación primaria, ponían de relieve que los profesores se centraban principalmente en temas que no habíamos

estudiado y que prácticamente desconocían (Física, Química, etc.,) en lugar de abordar cuestiones de materias conocidas (Biología, Geología, etc.). Otro estudiante declaraba, siempre me interesaron las ciencias, pues resolvían diversas cuestiones relacionadas con la vida cotidiana, muchas de las preguntas que planteaban eran significativas e incluso comprensibles. En cambio, otras, muchas eran bastante cuestionadas, y alguna resultaban muy extrañas en la naturaleza, lo cual me dejaban perplejo incluso antes de intentar buscar la respuesta (2013, pp. 75-84).

La motivación, una pedagogía inadecuada, escasa alfabetización científico-tecnológica, exigua proyección hacia la ciencia son factores de sobra conocidos que afectan negativamente a la elección de estudios de ciencias. No obstante, existen otros factores importantes a tener presentes, como un cambio en el proceso de aprendizaje de la ciencia donde los estudiantes aprendan activamente a través de la observación y la interacción, en lugar de la instrucción directa (Chinn & Malhotra 2002; Mastropieri, et. al 2001). Es decir, cambiar la enseñanza de las ciencias, y abandonar el esquema clásico de lecciones magistrales, que sigue siendo lo dominante. La ciencia moderna, la interacción científica y la demanda científico tecnológica, requiere de otras formas de aprendizaje, donde los estudiantes utilicen y desarrollen una serie de habilidades complejas, necesarias para la comprensión de la ciencia, y su posterior aplicación, léase, proponer afirmaciones, observación, recopilar información, analizar datos, extraer conclusiones y presentación de resultados. Como expresan McNeill y Krajcik (2007) en el aprendizaje del proceso de investigación los estudiantes para generar sus explicaciones necesitan conectar sus observaciones llevadas a cabo durante la investigación con sus experimentaciones de manera que, las afirmaciones se realicen sobre una base sólida de la significación de lo observado.

Si el proceso educativo es complejo, se complica más cuando se pretende enseñar ciencia. Existen muchos obstáculos que los docentes deben solventar; la poca motivación, la comprensión de la ciencia (Rose & Meyer 2006), la utilización de herramientas que ayuden a solventar las barreras en el aprendizaje de la ciencia y una metodología adaptada a los cambios socio-educativos. Estas y otras herramientas pueden ayudar a los docentes a resolver situaciones complejas, así como a fomentar las

habilidades, destrezas y comportamientos de los estudiantes para que sean más productivos en el aprendizaje de las ciencias (Rappolt-Schlichtmann et al. 2013).

Es necesario entender la ciencia como una de las cumbres de la capacidad humana de pensar la educación científica como un laboratorio para el desarrollo de habilidades de resolución de problemas, y la educación científica como un medio para preparar a los estudiantes para una ciudadanía democrática que demanda una sociedad bien informada capaz de tomar decisiones personales y comunitarias sobre cuestiones científicas (NRC, 2007).

Metodología

Distribución de la Muestra

El “universo” objeto de estudio han sido los estudiantes de primer curso de grado en el Campus de Palencia de la Universidad de Valladolid, de las titulaciones de Ingeniería agraria, Ingeniería forestal, Enología, Ciencias del Trabajo, Educación (Primaria, Infantil y Educación social). Se seleccionaron aleatoriamente diferentes aulas de los grados. La muestra final fue de 9 aulas de los diferentes grados, con un saldo de 313 estudiantes que respondieron válidamente el cuestionario tras depurar y eliminar algunos casos.

Segmentación de la Muestra

En referencia a la segmentación por edad, los estudiantes de la muestra están comprendidos entre los 17 y 47 años y proceden del bachiller, módulos formativos superiores o ambos. La mayoría de los estudiantes se localizan en la franja de edad de los 18 a los 23 años, el 85,6% de la muestra ($n=268$). Y el resto corresponde a discentes de edades más avanzadas, acceso para mayores de 25 años, repetidores o personas que se han incorporado en una edad más tardía a los estudios universitarios.

Según sexo, el 61,5% de la muestra está compuesta por mujeres, frente al 38,5% de varones. El peso de las mujeres en la muestra es mucho más

elevado en los grados de Educación donde su porcentaje se eleva al 83,8% y en Ciencias del Trabajo al 79,1%, mientras en los grados de Ingenierías Agrarias, Ing. Forestal y Enología el porcentaje mayoritario corresponde a los varones, con un 74,4% de la muestra. Mención especial dentro de estos últimos merece el caso de la Ingenierías Agrarias, itinerario de Industrias agroalimentarias donde el porcentaje de mujeres asciende a prácticamente el 30%, por el 21,7% del resto de estas titulaciones técnicas.

La última variable de segmentación utilizada para analizar el comportamiento en la elección de las titulaciones de grado ha sido los estudios cursados anteriores por los estudiantes, en los que aparecen principalmente los estudios de Ciencias Sociales, cursados por el 34,3% de la muestra y las Ciencias de la Salud/Ciencias de la Tierra, cursados por el 27,3%. Inicialmente parece obvio que un estudiante del itinerario de bachiller de ciencias debería seleccionar un grado relacionado con las ciencias o las Ingenierías, pero se comprueba que bastantes estudiantes, tras haber estudiado un itinerario de ciencias optan por titulaciones de ciencias sociales o humanidades.

Instrumento

El instrumento de la investigación es un cuestionario cerrado elaborado para este análisis por los miembros del equipo de investigación. El estudio es de carácter longitudinal con una duración de 5 años. Es decir, se empezó en el curso 2015/2016, y aquí se presentan dichos resultados. Cada año se aplicará a los estudiantes de primer grado, con los mismos ítems, y tan sólo se ampliará algún ítem, si se detectan nuevas necesidades que puedan aportar mayor información a dicho estudio.

El contenido del cuestionario se centra en diversos aspectos de la ciencia educativa, concretamente, las actitudes de los alumnos sobre la enseñanza de las ciencias en el aula, las actitudes generales sobre la ciencia y la tecnología, la percepción de los valores de la ciencia, los elementos que hacen despertar el interés hacia el estudio de las mismas y las expectativas de futuro tras el estudio de estas. Tratando rasgos generales de la ciencia, sin referencia expresa a asignaturas específicas, de modo que el constructo que valora se ha denominado ciencia escolar.

Procedimiento

La investigación pretende averiguar las razones principales que llevan a los estudiantes a elegir estudios de ciencias experimentales y tecnología o ciencias sociales o humanidades. Muchas de las cuestiones explicadas en la introducción y discusión inicial no están claramente determinadas. En ocasiones se dan por hechas muchas cuestiones, pero luego las investigaciones extraen otras cuestiones, que inicialmente no se habían valorado en los términos requeridos. A partir de aquí se han analizado los diferentes ítems, inicialmente desde un punto de vista descriptivo, estableciéndose después diferenciaciones entre los segmentos mediante análisis estadísticos bivariantes y multivariantes, extrayendo las diferencias (criterio de significación $p < .05$).

Dadas las características de la muestra, no es posible asumir la normalidad de las variables, a la vista de la prueba de Kolmogorov-Smirnov, por ello se han utilizado análisis no paramétricos como la H de Kruskal-Wallis o la prueba de Wilcoxon.

Tabla 1

Resumen metodológico

Universo	Estudiantes de primer curso de Grado en el Campus de Palencia
Tipo de encuesta	Encuesta presencial en el Aula
Ámbito de la investigación	Universidad de Valladolid. Campus de Palencia
Cuestionario	Preguntas cerradas, principalmente de escala Likert que permiten un correcto tratamiento estadístico de las actitudes. Se incluyen variables de segmentación como el sexo, edad, centro y estudios anteriores. En la encuesta se incluyen un pequeño número de preguntas abiertas para su posterior tratamiento cualitativo que no han sido tomadas en cuenta para el análisis cuantitativo.
Tipo de muestreo	Muestreo aleatorio
Tamaño de la muestra	313 encuestas
Error muestral	Error muestral general sobre el Campus de Palencia: 5,1% para un nivel de confianza del 95% Error muestral de cada una de las Facultades analizadas: Facultad de Educación, 6,9% para un nivel de confianza del 95% Facultad de CC del Trabajo, 13,4% para un nivel de confianza del 95% Escuela Técnica Superior de Ingenierías Agrarias, 7,7% para un nivel de confianza del 95%
Plazos temporales	Primera oleada de encuestación, 2º Cuatrimestre del Curso 2014-2015

Resultados

Relación de la Elección de Itinerarios por Sexo y Posterior Elección de Carreras Universitarias

El estudio se ha estructurado en bloques donde se ha analizado la enseñanza de las ciencias en el aula, las actitudes hacia la ciencia y la tecnología, los valores de la ciencia o los factores que despiertan el interés en los alumnos y alumnas por la ciencia y la tecnología.

Los análisis iniciales han tratado de establecer las relaciones entre los itinerarios seguidos por los estudiantes y el género, como viene confirmándose en diferentes estudios, tanto nacionales Rossi y Barajas (2015) como internacionales, Mann and Dipetre (2013) de la brecha género en los estudios universitarios. En esta misma línea están los estudios de Dickson (2010) donde además de la brecha de género está la brecha de la raza, Y el análisis de Goyette y Mullen (2006) expone que una de las razones de la falla de género en la elección de grados de una u otra rama reside en la motivación y los ingresos. Los varones eligen ramas de ciencia y tecnología porque los ingresos son mayores, frente a las mujeres que eligen áreas de educación y participación social por identificación. En el caso español las mujeres matriculadas en la universidad son mayoría (53,7%) (datos y cifras del SUE 2014-2015). Empero en grados de ciencia y tecnología el porcentaje es bajo un 49,1% y 29,5% respectivamente y tan sólo en ciencias de la salud son mayoritarias las mujeres con un 68,7%. En el caso de humanidades y ciencias sociales las mujeres dominan los asientos universitarios, 61,0% y 56,7%. Con esto de fondo, parece claro, que la fase de elección viene determinada por un proceso de socialización temprano en la segregación de estudios para mujeres y estudios para varones. Como apuntan Sáinz y Eccles (2012) en la enseñanza escolar cabe más esperar de los chicos que de las chicas en los saberes tradicionales, considerados para los varones, como son los estudios de ciencias experimentales.

Los resultados en este sentido, tras la realización de las tablas de contingencia y las pruebas de chi-cuadrado han sido los esperados, según lo antedicho, en lo referente a la brecha de género, estableciéndose una

priorización en la elección de los itinerarios de ciencias y los de ingeniería entre los varones de la muestra, y de las humanidades y las ciencias sociales entre las mujeres. En esta misma línea seguimos las afirmaciones de otros estudios, como Navarro y Casero (2012) donde los estudios de técnicas están dominados por los varones, mientras que las titulaciones de ayuda o educación lo hacen las mujeres. El 38,8% de los varones habían elegido itinerarios de ciencia y tecnología mientras que el porcentaje bajaba en el caso de las mujeres hasta el 9,3%. El caso contrario se observa al analizar las diferencias en humanidades, elegido por solo el 3,3% de los hombres, mientras que en el caso de las mujeres el porcentaje sube al 19,2%, y en las ciencias sociales, itinerario elegido por el 14,9% de los varones y el 46,1% de las mujeres. Menos significativo, atendiendo a los p-valores, es el caso de las ciencias de la tierra y ciencias de la salud, itinerario de entrada a la carrera de ciencias agrarias estudiada en la muestra donde el porcentaje de hombres que lo eligen es del 36,4% y el de mujeres del 21,8%.

Por último, en los itinerarios de artes y en los estudiantes que han accedido a la universidad tras realizar estudios de modulo, no existen diferencias significativas por sexo. Sin embargo, aparecen diferencias significativas por sexo en las diferentes carreras dependiendo si estas son de ciencia y tecnología o de ciencias sociales y humanidades. Aproximadamente el 84% de los estudiantes analizados en la encuesta en Educación son mujeres y el 79% en Relaciones Laborales, mientras que el 74,4% de los estudiantes analizados en la Escuela de Ingenierías Agrarias son varones.

Se observa que los itinerarios son los que van a marcar la elección, no obstante, no todos los estudiantes que eligen itinerarios en bachiller o módulos de ciencias se decantan por estudios de ciencias, sino que optan posteriormente a grados de ciencias sociales o humanidades, exactamente el 15,4% y tan solo el 1,9% de los estudiantes de itinerarios de ciencias sociales realizan el trasvase a ciencias experimentales o tecnología.

La Enseñanza de las Ciencias en el Aula

La enseñanza de las ciencias en el aula es uno de los elementos básicos para la familiarización y posterior proyección de los estudiantes hacia una

titulación de ciencias y tecnología. Una buena disposición de los docentes en la enseñanza de la ciencia, así como una actitud positiva de los docentes hacia las ciencias, conlleva una buena disposición de los estudiantes hacia la ciencia, pues descubren y abren su pensamiento hacia las grandes dudas que el mundo plantea y que la ciencia bien puede resolver o de lo contrario dejar abierta para su explicación.



Figura 1. La enseñanza de las ciencias en el aula.

Elementos como la dificultad o la excesiva formulación son las variables que ofrecen puntuaciones más altas entre los alumnos, empero, aparecen otras cuestiones importantes como los escasos recursos en las aulas y ausencia de laboratorios. Por otro lado, cuestiones relacionadas con el profesorado no presentan tasas altas como ocurre con otros estudios, (Coll & Earnes, 2008; Vazquez & Manassero, 2008) ni tan bajos como cabría de esperar, sino que se sitúa en valoraciones medias. De modo que, el profesorado tendrá un grado de responsabilidad en la elección de los itinerarios de los estudiantes.

Fijándose en las diferencias en cuanto a la elección final de una titulación de Ciencias y tecnología y analizando los estadísticos, parece que los profesores influyen en la falta de motivación hacia el estudio de Ciencias experimentales, aunque en muchos casos sin que se lleguen a dar diferencias significativas al nivel de confianza planteado. Las dos variables que muestran significación estadística clara son, el alto contenido teórico de las asignaturas y el escaso interés del profesorado en la enseñanza de las asignaturas de ciencia y tecnología como vemos en la siguiente tabla 2:

Tabla 2

Clases demasiado teóricas y docentes con poco interés

	Tipo de carrera elegida	Media	Rango promedio	U de Mann-Whitney	Sig. Asintot Bilateral
Las clases son demasiado teóricas y me aburre	Ciencias sociales y humanidades	3.34	164.07	9107,5	.008
	Ciencia y Tecnología	3.05	137.20		
El profesorado no muestra interés en enseñar Ciencias y Tecnología	Ciencias sociales y humanidades	2.73	164	8834,5	.003
	Ciencia y Tecnología	2.43	134,82		

Como se observa en la Tabla 2, los estudiantes que perciben en menor medida que las clases son demasiado teóricas y piensan que el profesorado

ha mostrado más interés en la enseñanza de las ciencias y tecnología eligen en mayor medida carreras de ciencias y al contrario. En ambos itinerarios se manifiesta que existe poca práctica en el aula en relación a las ciencias. Esto hace que para aquellos estudiantes dubitativos en seleccionar un itinerario u otro desestimen las ciencias, al percibirlo como aburrido. Por otro lado, resulta difícil atraer a un estudiante a las ciencias si realmente no interactúa con ellas.

En el resto de los casos se establecen diferencias por los gustos de los estudiantes, como es normal. Los estudiantes de Ciencias experimentales encuentran una mayor satisfacción en el estudio de estas ciencias, mientras los estudiantes de CSyH lo perciben en los campos de su área, al encontrarlos más dinámicos socialmente.

Tabla 3

Satisfacción en las ciencias experimentales satisfacción y aplicabilidad social de las CSyH

	Tipo de carrera elegida	Media	Rango promedio	U de Mann-Whitney	Sig. Asintot. Bilateral
El estudio de las ciencias experimentales me produce satisfacción	Ciencias Sociales y Humanidades	2.55	129.15	6331.5	.000
	Ciencia y Tecnología	3.42	194.92		
Las ciencias sociales y humanas tienen más aplicación en la vida social	Ciencias Sociales y Humanidades	3.74	187.35	4828.5	.000
	Ciencia y Tecnología	2.38	100.13		

En la batería de preguntas (Figura 1) la diferencia entre itinerarios es sustancial, puesto que ahonda en el corazón de la enseñanza de las ciencias. Es obvio que a los estudiantes de ciencias no los resulta “desagradable estudiar las asignaturas de Ciencias Experimentales” (CS y H 2.87 y CyT 2,09) de lo contrario no estarían estudiándolas. Por otro lado, en el ítem

“Busco un título y en Ciencias Experimentales resulta más difícil”, también presenta diferencias significativas, puesto que los índices entre estudiantes de un itinerario y otro son importantes. En cierto modo es una proyección de la cultura española de la “titulitis”. En consecuencia, que los jóvenes busquen un título, y para ello lo hagan donde se requiera menos esfuerzo.

Algo similar acontece en el ítem, “Los compañeros ejercen influencia en el rechazo de las Ciencias Experimentales”, aquí de nuevo aparecen diferencias entre los itinerarios, si bien, los índices en el itinerario de quienes optaron por CSyH, son mayores a los estudiantes de Ciencias Experimentales.

Otro aspecto que marca un punto de partida interesante está en que los estudiantes no perciben que la ciencia tenga una aplicación social. Todo lo contrario, el ítem “Falta de relación entre la enseñanza de la Ciencia y la vida real” (Tabla 3) es un acto de confirmación del anterior ítem. Los estudiantes de ciencias CSyH, al no percibir en la ciencia un activo social, no lo consideran a la hora de elegir dichos itinerarios. Por ende, se decantan por estudios de ciencias sociales.

Tras el análisis clúster del caso específico de la Facultad de Ciencias del Trabajo, reconocemos en la misma, tres grupos diferenciados de estudiantes que nos pueden dar claves para conocer las razones por las que determinados alumnos no eligen itinerarios científicos en sus estudios universitarios.

Un primer grupo bien diferenciado muestra un elevado desagrado por las asignaturas o los contenidos de ciencia y tecnología. En estos casos se revela como un problema personal, que no tiene especialmente que ver con los recursos del aula, el contenido teórico o práctico de las clases o el profesorado. Rechazan la ciencia tanto en su parte teórica como en su parte práctica, les resultan asignaturas de elevada dificultad y les desagrada su estudio.

En un segundo grupo encontramos con discípulos que reconocen una facilidad para el estudio de las ciencias. No les resulta difícil la parte teórica, aunque si aburrida y se sienten cómodos en la parte práctica de laboratorio (la cual creen que es escasa) y en los temas relacionados con formulación y análisis matemático. A pesar de esta facilidad consideran

desagradable el estudio de las ciencias, especialmente por la excesiva carga teórica de las materias.

Un tercer grupo de estudiantes estaría compuesto por los entrevistados que encuentran satisfacción en el estudio de las ciencias experimentales pero perciben grandes problemas en esos itinerarios en temas relacionados principalmente con la docencia del profesorado y achacan a estos la no elección de los itinerarios científicos tecnológicos.

En todos los casos, los discentes incluidos en los diferentes clusters reflejan la poca relación que ven entre la ciencia escolar y la vida real y tienen una percepción de escasa utilidad en la vida diaria de los contenidos estudiados, lo que se puede relacionar con el bajo número de prácticas y la escasez de recursos científicos en las aulas. A partir de esta visión ven una aplicación en la vida social mucho mayor de los itinerarios de Ciencias Sociales y Humanas.

Las Actitudes hacia la Ciencia y la Tecnología

Como en el caso anterior veamos primero como se valoran las actitudes hacia las ciencias en la muestra de estudiantes:

La Figura 2 muestra que los estudiantes están muy de acuerdo con la idea de la utilidad de la ciencia para la sociedad por ejemplo en términos de desarrollo, oportunidades para las generaciones futuras o para la hacer la vida más saludable, fácil y cómoda, y, por otra parte, lo ven desde una perspectiva general pues cuando se traspasa al ámbito personal y práctico, dejan de percibir esa importancia. La ciencia escolar no ofrece respuestas a su propia vida cotidiana ni a su manera de vivir ni tampoco los aporta mucho en aspectos personales como el desarrollo del pensamiento crítico o aumentar su curiosidad sobre cuestiones desconocidas.

En este apartado, se observa que existe una gran diferencia de actitud en los diferentes itinerarios, ciencias y tecnología y ciencias sociales y humanidades. Entre los consultados que eligen estudiar itinerarios de ciencias sociales no existe una percepción de las posibilidades de la ciencia como en los de itinerarios de Ciencias Experimentales. La formación científica evidentemente pone al estudiante en una posición más nítida hacia los objetivos, planteamientos y definiciones de la ciencia en la vida

social. En todos los ítems de esta pregunta aparecen diferencias significativas entre los estudiantes de cada uno de los itinerarios, lo que permite establecer una relación directa entre el itinerario que se estudia y la percepción de la importancia de la Ciencia y Tecnología en todos los aspectos sociales. Es obvio para los estudiantes de ciencia, que ésta presenta unos valores indispensables para la sociedad y por ello, entre otros aspectos, eligen estudiar estas titulaciones. Sin embargo, para los estudiantes de ciencias sociales, aunque también reconocen la importancia de la ciencia en la vida social. No la consideran tan necesaria como para seleccionarla como titulación universitaria. En el fondo es continuar con la tendencia humanística que marca a España desde tiempos pretéritos “la ciencia no es para mí”, se sigue manteniendo el aforismo de Unamuno, ¡qué inventen ellos!

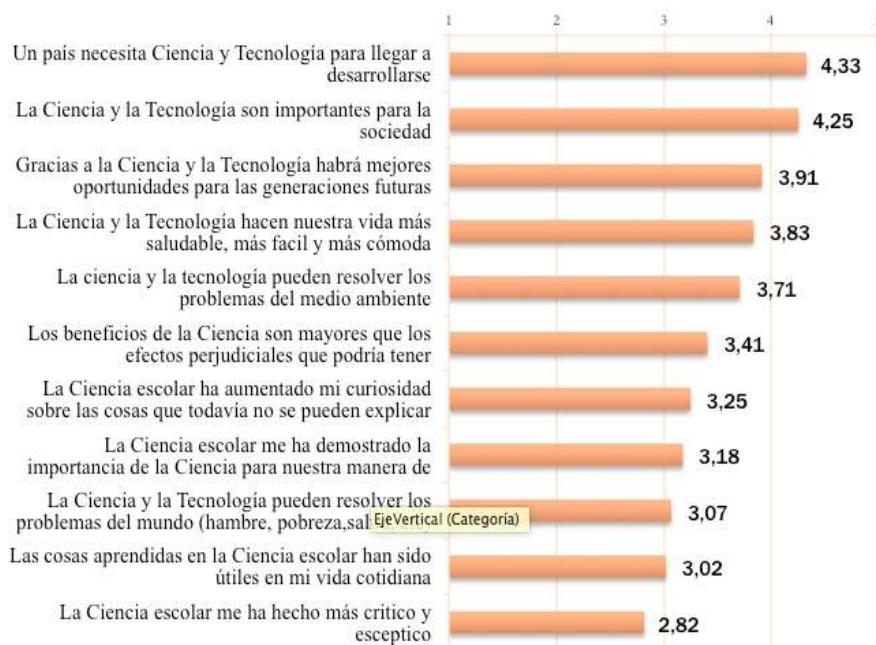


Figura 2. Actitudes hacia la ciencia y la tecnología

Un punto a destacar es que entre los estudiantes de ciencias sociales y humanidades se mejora la percepción social de la ciencia, en cuanto que, los beneficios de la ciencia son mayores que los perjuicios que puede causar, así se observa en los datos con una media de 3,20 para CSyH y 3,75 para CyT en dicho ítem.

Por otro lado, y como aparece en los datos del ítem “La Ciencia escolar me ha hecho más crítico y escéptico” (CyT, 3,07, CSyH, 2,66) se pone de relieve que la ciencia es un instrumento necesario para ser crítico, según los estudiantes de ciencias, a pesar de ello no tienen la misma opinión los matriculados en CSyH. La pregunta “La Ciencia escolar me ha demostrado la importancia de la Ciencia para nuestra manera de vivir” no muestra un valor diferencial tan elevado entre los itinerarios como el resto de variables (aunque entra en nuestros rangos de significación), pues para ambos la ciencia ha condicionado significativamente su modo de vivir. Esto es incuestionable puesto que la ciencia ha repercutido, lo sigue haciendo de manera directa en la sociedad, ya sea por las comunicaciones, el transporte, la tecnología y un sinfín de cuestiones.

Otro punto a tener presente y donde no aparecen diferencias significativas entre los estudiantes reside en “Las cosas aprendidas en la Ciencia escolar han sido útiles en mi vida cotidiana”, esto puede parecer normal, pero lo representativo está en los valores muy bajos en todos los estudiantes. Poniendo de relieve la existencia de algún problema en la gestión educativa de la ciencia en la enseñanza no universitaria. Hecho que aparece en otros estudios ([Carnevale & Cheach, 2013](#); [Coll & Earnes, 2008](#); [Enciende, 2011](#); [Vázquez & Manassero, 2008](#)).

En todos los demás ítems, se dan diferencias significativas claras entre los estudiantes de uno u otro itinerario. En “La Ciencia escolar ha aumentado mi curiosidad sobre las cosas que todavía no se pueden explicar”, “La Ciencia y la Tecnología hacen nuestra vida más saludable, más fácil y más cómoda” y “la Tecnología pueden resolver los problemas del mundo (hambre, pobreza, salud, etc.)”.

Es cierto que la ciencia escolar, a tenor de lo que viene sucediendo a lo largo de las últimas décadas, no muestra la aplicabilidad en la vida cotidiana de los estudiantes, así como tampoco hace que se aumente su

curiosidad. Esto puede ser una de las consecuencias de lo antedicho, que los docentes no muestran un interés por enseñar la ciencia.

Valores de las Ciencias

En el apartado Valores de las ciencias (ver Figura 3) la mayoría de los ítems presentan puntuaciones muy altas, lo que puede entenderse como un aspecto importante para la sociedad. Cuestiones como el método científico o la capacidad de razonar que ofrece la ciencia son ampliamente respaldadas por los discentes.

Empero realizando un análisis más pormenorizado aparecen diferencias significativas en las variables, que viene siendo la tónica general entre los estudiantes de Ciencias Sociales y Humanidades y de Ciencia y Tecnología. Extrayendo de manera general, la percepción de los valores de la ciencia es mayor entre los estudiantes de itinerarios experimentales frente a quienes eligieron otros itinerarios.



Figura 3. Valores de las ciencias

Por ejemplo, en el ítem Ciencia abre la curiosidad (Tabla 4), aparece una gran diferencia entre estudiantes de ciencias experimentales y de otros itinerarios. Para los matriculados en CSyH la ciencia abre “un poco” la

curiosidad, pero no en los términos de los encuestados de CyT, para quienes la ciencia es un factor determinante en la curiosidad por las cosas.

Tabla 4.

La ciencia abre la curiosidad

	Tipo de carrera elegida	Media	Rango promedio	U de Mann-Whitney	Sig. Asintot. Bilateral
La ciencia abre la curiosidad	Ciencias Sociales y Humanidades	3.83	139.28	8213.5	.000
	Ciencia y Tecnología	4.24	177.45		

Lo interesante en este caso es que las puntuaciones en este ítem, al contrario que en las preguntas del bloque anterior, son bastante altas, es decir, los discentes entienden que la ciencia estimula la curiosidad. Por otro lado, tomando el ítem del grupo anterior, “la ciencia escolar me ha...” y relacionándolo con este ítem, se concluye que, en los estudiantes de ciencias sociales y humanidades, la ciencia escolar ni abre ni estimula la curiosidad, mientras que la ciencia en sí misma sí. Para los estudiantes de ciencias experimentales, no sólo activa la curiosidad, sino también, ayuda a tener una cosmovisión del mundo. De modo que, a juicio estudiantes de CSyH la ciencia escolar está mal planteada o bien, los docentes no se implican en acercar la ciencia. Para los estudiantes de ciencias experimentales, la ciencia implica responsabilidad, porque dependiendo de cómo se utilice, las consecuencias pueden ser positivas o negativas. A los científicos se los exige una responsabilidad que está más allá del interés particular (Valero-Matas, 2006). En cambio, en los otros itinerarios no implica eso, puesto que la ciencia no es responsable, pues ha provocado múltiples problemas y desastres, cuestionando su interés por el bien general, rechazando el valor responsabilidad. Por ejemplo, la bomba atómica, el cambio climático o los transgénicos.

Tan sólo en un ítem no existen diferencias entre ambos itinerarios, “Ciencia que sigue un método”. Dichos grupos de estudiantes consideran que la ciencia es metódica y estructurada. Esto tiene sentido porque

cualquiera de los itinerarios considera sistemáticos y científicos sus estudios.

Factores que Despiertan el Interés por la Ciencia en los Alumnos

El factor más importante para todos los estudiantes es el de los laboratorios (ver Figura 4). Como se muestra a lo largo del estudio, el contenido práctico de la enseñanza en las ciencias es donde los discentes encuentran más carencias y la ciencia escolar debería poner más énfasis en ello para despertar el interés en los estudiantes. A criterio de estos, el modo más fácil de lograrlo es realizando prácticas en laboratorio.



Figura 4. Elementos que despiertan en el alumno el interés por las ciencias

Respecto a la comparación entre los alumnos de Ciencias y Tecnología y los de Ciencias Sociales y Humanidades, como cabía de esperar, en este bloque, las diferencias más significativas aparecen en los ítems que se corresponden con cuestiones relacionadas con las Ciencias experimentales, “Química”, “Física”, “Biología”, lo cual es relativamente normal. El único ítem en el que no existen diferencias, es en el caso de los laboratorios, donde los estudiantes de ambos itinerarios expresan de la misma manera la necesidad de estos para generar interés por las ciencias, recibiendo las puntuaciones más altas para los dos tipos de estudiantes.

Respecto a la percepción sobre la importancia de la utilización en el aula de la “Historia y vida de los científicos/as” es un asunto sorprendente, pues

en ambos itinerarios no se consideran importantes a la hora de despertar interés por la ciencia. En el caso de las “Visitas a museos científicos” las puntuaciones, aunque relativamente mayores con respecto a otros ítems, no son muy elevadas. Generalmente tener un contacto directo a través de las representaciones de los museos o las historias de los científicos implica despertar un vínculo hacia la ciencia, léase ver el museo de la Evolución de Burgos (donde muestra la evolución de la sociedad y el modo de trabajar de los científicos), la historia y vida de Madame Curie, la evolución de las comunicaciones aéreas, etc.

Expectativas de los Estudios de Ciencia y Tecnología

En referencia a las expectativas sobre las ciencias (ver Figura 5), se observa la gran importancia que los estudiantes dan a las ventajas para la sociedad que supone la investigación científica, aspecto que no se visualiza en los mismos términos en los beneficios concedidos a la actividad empresarial o a la generación de sociedades más científicas y tecnológicas.

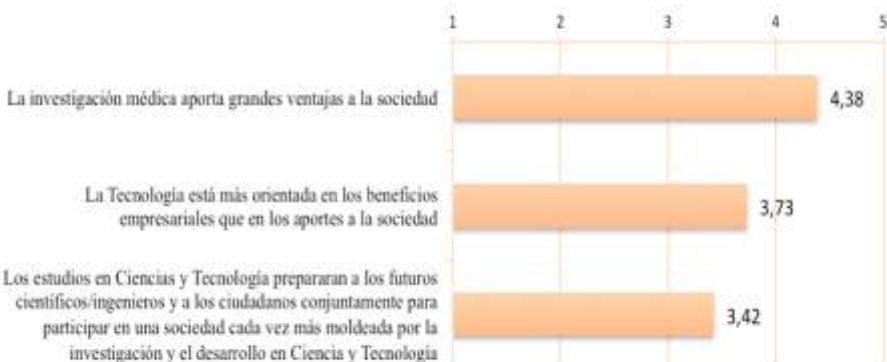


Figura 5. Expectativas sobre los estudios de ciencia y tecnología

Analizando según tipología de estudios, los estudiantes presentan comportamientos diferentes en sus valoraciones hacia las expectativas de los estudios de Ciencia y Tecnología. En estas dos últimas variables,

aunque no son muy elevadas y la significación estadística de esta diferencia está muy cercana a los límites asumidos por el estudio. En el ítem “la investigación médica como ciencia que aporta grandes ventajas a la sociedad” no se observa ninguna diferencia de valoración en la tipología de estudiantes. Su actitud hacia estas cuestiones, se encuentra en sintonía con la percepción mayoritaria de la sociedad hacia la ciencia y la tecnología.

El discurso referido a los ítems, “La Tecnología está más orientada en los beneficios empresariales que en los aportes a la sociedad” y “los estudios en Ciencias y Tecnología preparan a los futuros científicos/ingenieros y a los ciudadanos conjuntamente” tienen una estimación claramente diferente a los de la ciencia médica. La sociedad española considera que los científicos y tecnólogos benefician más a las empresas que a la sociedad y su actividad está marcada por el mercado y los beneficios económicos. Si bien, los estudiantes de itinerarios de ciencias experimentales no lo entienden de la misma manera y presentan mayor grado en desacuerdo con esa afirmación. Creen que la ciencia y la tecnología están proyectadas hacia la sociedad, y por lo tanto, aportan grandes beneficios sociales y no sólo económicos.

Por último, el ítem “los estudios en Ciencias y Tecnología preparan a los futuros científicos/ingenieros y a los ciudadanos conjuntamente” aparecen de nuevo diferencias entre ambos itinerarios. Los estudiantes de itinerarios de CSyH no perciben que los estudios de CyT preparen a los individuos para el futuro y los formen como individuos mejores y adaptados a la sociedad. Los cambios sociales y la marcha de la sociedad la adquieren los individuos con el devenir, y no porque estudien ciencia y tecnología.

Discusión

La docencia ha sido el modo predominante de todos y cada uno de los niveles de enseñanza educativa. En las últimas décadas, las lecciones magistrales como venían haciéndose desde tiempos pretéritos se están cuestionando, en favor de otras formas de aprendizaje, como la construcción a manos del estudiante de la propia comprensión, que desafían los fundamentos teóricos tradicionales. Al respecto, como indican Freeman

et al. (2014) debe tenerse presente que no existen estudios cuantitativos que evidencien la mejora del rendimiento de los estudiantes mediante métodos constructivistas frente a la exposición docente, en las disciplinas de ciencia, tecnología, ingeniería y matemáticas (STEM). Abordar esta cuestión es esencial para aquellos científicos comprometidos con la enseñanza basada en la evidencia en lugar de la tradición. Además, también podría ser parte de la solución al *problema principal* que algunos países están experimentando en la educación STEM. Es decir, poca formación en dichas materias y bajos porcentajes de estudiantes adscritos a estas titulaciones, lo que provoca una escasa proyección hacia el futuro y al desarrollo tecnológico e industrial de los países no adaptados a estas materias educativas. No conviene olvidar que desde finales del siglo XIX el crecimiento de la renta de los EEUU se debe a la innovación tecnológica, y en las próximas décadas el empleo se deberá al STEM. Nuestra sociedad no debe perder esta oportunidad.

La brecha de género es un factor importante a tener en consideración, no sólo por la necesidad de alcanzar la igualdad, sino que se pierde mucho capital femenino capacitado para las ciencias. La orientación en los niveles previos de educación, se va focalizando la enseñanza o los valores de género, para la ciencias experimentales o humanidades o ciencias sociales, entonces la fractura se hace mayor. Además, con las tendencias actuales del mercado de trabajo, donde los estudios de la NCR americana, donde para el año 2020 se necesitarán más de 2 millones de personas formadas en STEM, o la EU más de 1 millón en esta misma formación, más que nunca se hace necesario orientar a los jóvenes hacia estos estudios. Por otra parte, la OECD pone de relieve en su informe de 2015 que el 69% de los varones graduados en ciencia e ingeniería trabajan en áreas relacionadas con dichos estudios, mientras que un 42% de las mujeres con dichos grados, trabajan en áreas relacionadas con ello. La fractura no sólo está en los estudios, sino que también se proyecta más allá, es decir, al mercado laboral. Aun cuando tienen estudios en ciencias o ingeniería optan o se ven obligadas a desempeñar trabajos no relacionados con sus grados.

Los estudiantes tampoco perciben la ciencia como una actividad de conocimiento e investigadora que pueda preordenar y orientar sus proyectos educativos y profesionales. Sus enseñanzas se estructuran entorno a una

misión de adquirir un conocimiento que posteriormente en la práctica profesional deberán desplegar, sin que previamente hayan tenido una experiencia profesional durante su formación pre-univeristaria y universitaria. Por lo tanto, se demanda la necesidad de un ejercicio práctico profesional durante todo el proceso formativo.

Se ha enarbolado la bandera de la alfabetización científica como una necesidad básica para la sociedad, puesto que esta se orienta en dos sentidos, por un lado, la comprensión profunda de las características y leyes básicas del mundo en el que vivimos, y en segundo término, el modo de hacer de la ciencia, es decir, un pensamiento crítico, la elaboración de métodos explicativos, su argumentación, contratación y debate. ¿Es necesario incorporar la alfabetización científica a la cultura general? Autores como Fensham (2002) cuestionan que la mayoría de los ciudadanos adquieran una formación científica realmente útil. No está de acuerdo con una educación científica para toda la ciudadanía, puesto que ninguna de las teorías que defienden la alfabetización científica están bien argumentadas. Según este autor, la teoría democrática ignora la complejidad de los conocimientos científicos, y la teoría pragmática, los usuarios no necesitan saber principios científicos para la utilización de los instrumentos tecnológicos, pues la mayoría de estos productos tecnológicos están concebidos para que los usuarios no tengan ninguna necesidad de conocer los principios científicos en los que se basan para poder utilizarlos. Por lo tanto, la toma de decisiones científicas requiere de profundización, y esta debe dejarse para los especialistas. Autores como Gil y Vilches creen que tras la idea de alfabetización científica no debe verse, como una “desviación” o “rebaja” para hacer asequible la ciencia a la generalidad de los ciudadanos, sino una reorientación de la enseñanza absolutamente necesaria también para los futuros científicos; necesaria para modificar la imagen deformada de la ciencia hoy socialmente aceptada y luchar contra los movimientos anti-ciencia que se derivan. (Gil & Vilches 2006, p. 45).

A nuestro juicio, debe llevarse a efecto una alfabetización científica, pero diferenciando entre alfabetización de ciencia popular y ciencia experta. Los ciudadanos necesitan tener un conocimiento de la ciencia para poder desenvolverse en la sociedad, y esta, los ayudará a participar en los debates sociales de manera activa y crítica. Sin embargo, los argumentos que

requieran de un conocimiento más profundo y exhaustivo deberán dejarse al conocimiento experto.

En los estudios universitarios de ciencias sociales, la educación científica debe ser un objetivo prioritario en los primeros años del grado, y por lo tanto, adjuntar programas de enseñanza científica básica. En los estudios universitarios de ciencias incluir programas de aplicación y significación social de la ciencia.

La identidad docente es una parte importante en la educación. En el proceso cabe destacar dos características de la identidad de la ciencia y de los docentes, su naturaleza y la formación dinámica a través de la interacción social (Jackson & Seiler 2013; Luehmann 2007; Varela et al. 2005). El pensamiento contemporáneo incorpora la idea que la identidad profesional docente se define en gran medida en términos de relaciones de unos a otros, incluyendo las afiliaciones personales, culturales, y sociales (Beijaard et al 2004; Chace 2014; Duncan 2015;). Por lo tanto, para participar en las estrategias de enseñanza de la ciencia, un docente principiante debería demostrar que pertenece al grupo de profesores de esa materia. Sin embargo, otros como Wenger (1998) y Pearson (2009) prefieren una educación inicial generalista, y manifiestan que la identidad no puede influir en la toma de decisiones ni tampoco en la elaboración de programas educativos. Abogan por que se tenga tan sólo una identidad científica en la enseñanza específica, pero dentro de los contextos educativos. En la Universidad de Toronto desde 2015 debaten si formar en los grados de educación: especialista o generalista.

El hecho que los docentes con compañeros de ideas afines, indudablemente conlleva a una mejora de la enseñanza y del aprendizaje, especialmente en entornos informales. Wallace y Brooks (2015) defienden que aprender a enseñar ciencias en contextos de ciencias informales tiene un fuerte potencial para influir en el disfrute de los docentes de educación primaria de enseñar ciencia y comprender cómo las estrategias basadas en investigaciones desarrollan el conocimiento conceptual.

Harlow (2012) analizó los efectos y las valoraciones sobre ciencia, tras haber sometido a un grupo de estudiantes a una noche de reflexión, comentarios y exposiciones de enseñanza de la ciencia. Mayoritariamente, aprendieron como la enseñanza de ciencias puede ser divertida, y tuvieron

la oportunidad de escuchar ideas y explicaciones científicas de los niños. Esto los permitió tener conocimiento sobre el pensamiento de los niños.

Conclusiones

Existen dos elementos claves en el crecimiento de la ciencia educativa y su posterior proyección sobre las vocaciones de los jóvenes en estudios científicos: por un lado, la cultura científica, que requiere una transmisión de la importancia de la ciencia y la tecnología en nuestras vidas, sino también como la ciencia y la tecnología son un instrumento necesario para el desarrollo y crecimiento de la sociedad. Es decir, porque la luz, el agua, los electrodomésticos, la investigación médica, y un sin fin de elementos que intervienen en nuestra vida y que son claves para nuestro desarrollo social, cultural y económico. Y un segundo factor, un buen aprendizaje basado en hechos, realidades y experiencias, pues al visualizar y “tocar” la ciencia mejorar las actitudes de los estudiantes hacia ella. Aprender ciencia o ser científico implica aprender la subcultura de la ciencia y llegar a ser un miembro de la comunidad científica. Por ello se hace necesario separar la ciencia popular de la ciencia educativa. Además, el conocimiento da libertad al individuo. Para muchos jóvenes los científicos y la ciencia son como individuos alejados del mundo, y que responden a un club ajeno a la vida social.

Es necesario modificar o implementar nuevas formas de aprendizaje de la ciencia, es decir, variar los estándares de educación científica por otros nuevos adaptados a las nuevas necesidades sociales ([Lloyd 2009](#)). Lo que se debe buscar es una mayor participación de los estudiantes, y aplicaciones reales a la vida social. Parece que el aprendizaje activo es una adecuada metodología para la enseñanza de las ciencias. Freeman et al ([2014](#)) observó en un estudio que la utilización de intervenciones de aprendizaje activo, hizo que variara ampliamente en intensidad y ejecución, la marcha de la clase, y el rendimiento de los estudiantes fueron mejores. Se evaluados utilizando dos variables de resultado: (a) las puntuaciones en los exámenes idénticos o formalmente equivalentes, inventarios concepto, u otras evaluaciones; o (b) las tasas de fracaso, por lo general miden como el porcentaje de estudiantes que reciben una calificación de D o F o retirada

del curso en cuestión. Atendiendo a esto, en la enseñanza se puede utilizar como metodología, los proyectos de investigación para promover un aprendizaje más profundo. Ejercicios de aprendizaje en grupos pequeños, como el estudio de caso, o un aprendizaje colaborativo en pequeños grupos, mediante un proceso estructurado a través del cual los participantes deben resolver problemas, negociar metas y plazos para el cumplimiento de los objetivos a modo de que todos los miembros desarrollen el procedimiento y la construcción de conocimiento que produce el propio proceso. Los estudiantes alfabetizados deben ser conscientes de que la ciencia tiene tanto fortalezas y limitaciones, y estos deben ser capaces de utilizar científicamente maneras de pensar y de conocimiento para propósito individual y social, así como competente en la comunicación y trabajo en equipo.

En lo relacionado a la brecha de género en materia de ciencias e ingeniería y humanidades y ciencias sociales, se necesita cambiar los modelos de orientación, así como de formación. No se pueden mantener los esquemas del pasado de mostrar la existencia de grados para mujeres y grados para varones, y que las mujeres perciban que como mujeres ellas deben orientar su profesión hacia estudios implicados en la ayuda, colaboración o educación, porque sus capacidades están adecuadas para eso, y no para la ciencia y la ingeniería, que son cosas de varones ([OECD, 2015](#)). Los programas educativos tendrán que tener una extensión de proyección identitaria neutra, donde todos y cada uno de los estudiantes (varones y mujeres) jueguen en el mismo equipo formativo. Un ejemplo puede ser el trabajo en equipo científico basado en grupos de trabajo de género y mixtos, que irán rotando en cantidad de miembros de diferente género, así como los líderes de los grupos, unas veces chicas y en otras, chicos. Los programas educativos y orientación en las primeras etapas de la educación tendrán que tener un carácter neutro e igualitario en identificación científica.

Otro punto importante para aumentar la inquietud por la ciencia es la educación científica informal. Jugar con la ciencia en entornos donde no requieran una evaluación o calificación de méritos genera espacios y momentos más distendidos donde los jóvenes se identifican con las tareas científicas. Al respecto existen estudios y análisis donde se percibe un

incremento hacia el valor de la ciencia como proyección de futuro. Johnson (2012) encontró que "hablar de ciencia" en los futuros profesores de primaria en entornos informales aumentaba la transferencia de interés y conocimiento a los estudiantes. Wallace y Eick (2012) también descubrieron que aumentaba significativamente el interés por aprender a enseñar ciencias en contextos informales, como campamento de verano dedicados a promover la enseñanza, la diversión, la comprensión de la investigación, y acompañar las actividades prácticas con la discusión. Por último, una de las grandes olvidadas en la enseñanza de la ciencia experimental, y que es un potencial para la motivación de la enseñanza y aprendizaje de cualquier ciencia: la biblioteca. Esta proporciona una exitosa oportunidad de aprendizaje para los estudiantes porque (a) porque están interactuando con "personas y hechos diferentes al docente"; (b) el personal es de apoyo y responda a las necesidades de los estudiantes; y (c) la biblioteca proporciona una estructura muy real desde la cual fundamentar a elaboración de su pensamiento científico.

Por último, la educación básica, media y superior debe tener una proyección más específica hacia el STEM, pues sobre esto pivota el futuro de la sociedad, y como tal, si se desea mantener un estatus competencial en el mundo industrial y empresarial, la educación debe entre otras cuestiones, cubrir las necesidades productivo-competitivas de la sociedad. Pero para lograr una sociedad con un alto nivel formativo en STEM se necesita una base teórica sólida pero también unos estudiantes familiarizados e interactuantes con todos y cada uno de las curiosidades, maravillas y prácticas de la ciencia. Los estudiantes como han declarado en nuestra investigación y los estudios de Mann y Dipetre (2013) o Dickson (2010) se necesita una mayor familiaridad con la ciencia, es decir, más prácticas más manejo manual del conocimiento científico y tecnológico. A esto se debe añadir, una fuerte implicación de los docentes en la materia, un apasionamiento por mostrar las entrañas de la ciencia y sus posibilidades.

Notas

¹ Proyecto PIP- 18IPIK, "Estudio de los factores determinantes en la elección de los estudios de ciencias, humanidades y ciencias sociales en los Universitarios españoles", financiado por la UVa y dirigido por el prof. Jesús A. Valero-Matas.

Referencias

- Barnes, B. (1988) *The nature of power*. Cambridge: Polity.
- Beck, U. (2009). *World at risk*. Cambridge: Polity.
- Beijaard, D., Meijier, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 20, 107–128. doi: 10.1016/j.tate.2003.07.001
- Carnevale, A. P., & Cheah, B. (2013). *Hard times. Colleges majors, unemployment and earnings*. Washington DC: Georgetown Public Policy Institute.
- Chace, J. (2014). Collaborative projects increase student learning outcome performance in nonmajors environmental science course. *Journal of College Science Teaching*, 43(6), 58-63. Retrieved from <http://www.jstor.org.sire.ub.edu/stable/43631761>
- Chinn, C. A., & Malhotra, B. A. (2002). Epistemologically authentic inquiry in schools: A theoretical framework for evaluating inquiry tasks. *Science Education*, 86(2), 175-218. doi: 10.1002/sce.10001
- Coll, R. K., & Earnes, C. (2008). Developing and understanding of higher education science and engineering learning communities. *Research in Science and Technological education*, 26(3), 245-257. doi: 10.1080/02635140802276413
- Dickson, L. (2010). Race and gender differences in college major choice. *The ANNALS of the American Academy of Political and Social Science* 627, 108-124. doi: 10.1177/0002716209348747
- Duncan, L., Duncan, B., Burkhardt, B., Benneyworth, L., & Tasich, C. (2015). Getting the Most Out of Dual-Listed Courses: Involving Undergraduate Students in Discussion Through Active Learning Techniques. *Journal of College Science Teaching*, 45(1), 24-31. Retrieved from <http://www.jstor.org/stable/43631881>
- ENCIENDE. (2011). *Informe: enseñanza de las ciencias en la didáctica escolar para edades tempranas en España*. Madrid: COSCE.
- FECYT. (2015). *Estudio de las ciencias de la computación en España*. Fundación Española para la ciencia y la tecnología, Madrid.
- Fensham, P. J. (1988). *Development and dilemmas in science education*. London: Folder Press.

- Fensham, P. J. (2002). Time to change drivers for scientific literacy. *Canadian Journal of Science, Mathematics and Technology Education*, 2(1), 9-24. doi: 10.1080/14926150209556494
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *PNAS*, 111, 8410-8415. doi: 10.1073/pnas.1319030111
- Fleer, M. (2013). Affective imagination in science education: determining the emotional nature of scientific and technological learning of young children. *Research in Science Education*, 43(5), 2085-2106. doi: 10.1007/s11165-012-9344-8
- García-Carmona, A., Criado, A. M., & Cañal, P. (2014). ¿Qué educación científica se promueve para la etapa de Primaria en España? Un análisis de las prescripciones sociales del currículo vigente. *Enseñanza de las Ciencias*, 32(1), 139-157. doi: 10.5565/rev/ensciencias.778
- Geppert, L. (1995). Educating the renaissance engineer. *IEEE Spectrum*, 32(9), 39–43. doi: 10.1109/6.406462
- Gil, D., & Vilches, A. (2006). Educación ciudadana y alfabetización científica: mitos y realidades. *Revista iberoamericana de educación*, 42, 31-53. Retrieved from <http://roderic.uv.es/bitstream/handle/10550/45418/2259852.pdf?sequence=1&isAllowed=y>
- Goyette, K. A., & Mullen, A. (2006). Who studies the arts and sciences? Social background and the choice and consequences of undergraduate field of study. *The Journal of Higher Education*, 77(3), 497-538. doi: 10.1016/j.ssrresearch.2013.07.002
- Harlow, D. B. (2012). The excitement and wonder of teaching science: what preservice teachers learn from facilitating family science night centers. *Journal of Science Teacher Education*, 23(2), 199–220. doi: 10.1007/s10972-012-9264-5
- Jackson, P., & Seiler, G. (2013). Science identity trajectories of latecomers to science in college. *Journal of Research in Science Teaching*, 50(7), 826–857. doi: 10.1002/tea.21088

- Johnson Cartright, T. (2012). Science talk: preservice teachers facilitating science learning in diverse after school environments. *School Science and Mathematics*, 112(6), 384–391. doi: [10.1111/j.1949-8594.2012.00147.x](https://doi.org/10.1111/j.1949-8594.2012.00147.x)
- Jones, M.G., & Edmonds, J. (2013). Models of elementary science. Instructions role of science specialist teachers. In K. Appleton (Ed.) *Elementary science teacher education: International perspectives on contemporary issues and practice*. New York: Routledge.
- Lindahl, R. (2008). Shared leadership: can it work in schools? *The Educational Forum*, 72(4), 298-307. doi: [10.1080/00131720802361894](https://doi.org/10.1080/00131720802361894)
- Luehmann, A. L. (2007). Identity development as a lens to science teacher preparation. *Science Education*, 91, 822 – 839. doi: [10.1080/00131720802361894](https://doi.org/10.1080/00131720802361894)
- Lloyd, G. M. (2009). School mathematics curriculum materials for teachers' learning: future elementary teachers' interactions with curriculum materials in a mathematics course in the United States. *Mathematics Education*, 41, 763–775. doi: [10.1007/s11858-009-0206-4](https://doi.org/10.1007/s11858-009-0206-4)
- Mann, A., & DiPetre, Th.A. (2013) Trends in gender segregation in the choice of science and engineering majors. *Social Science Research*, 42(6), 1519-1541. doi: [10.1016/j.ssresearch.2013.07.002](https://doi.org/10.1016/j.ssresearch.2013.07.002)
- Mastropieri, M.A., Scruggs, T. E., Boon, R., & Carter, K. B., (2001). Correlates of inquiry learning in science: constructing concepts of density and buoyancy. *Remedial and Special Education*, 22, 130–138. doi: [10.1177/074193250102200301](https://doi.org/10.1177/074193250102200301)
- McNeill, K. L., & Krajcik, J. (2007). Middle school students' use of appropriate and inappropriate evidence in writing scientific explanations. In M. Lovett, & P. Shah (Eds.), *Thinking with data*. New York: Taylor & Francis.
- OCDE (2015). The ABC of gender equality in education: attitude, behaviour and confidence, PISA, OCDE Publishing.
- Pearson, Ch. (2009). *Writing games. Cultural case studies of academic literary practices in high education*. New Jersey: Taylor & Francis.
- Rappolt-Schlichtmann, G., Daley, S. G., Scott, S., Robinson, K. H., & Johnson, M. (2013). Universal design for learning and elementary

- school science: Exploring the efficacy, use, and perceptions of a web-based science notebook. *Journal of Educational Psychology*, 105, 1210-1225. doi: 10.1037/a0033217
- Rebelo, D., Marques, L., & Costa, N. (2011). Actividades en ambientes exteriores al aula en la educación en ciencias: contribuciones para su operatividad. *Enseñanza de las Ciencias de la Tierra*, 19(1), 15-25. Retrieved from <http://www.raco.cat/index.php/ect/article/viewFile/244375/331347>
- Rose, D. H., & Meyer, A. (2006). *A practical reader in universal design for learning*. Cambridge, MA: Harvard Education Press.
- Rossi, A., & Barajas, M. (2015). Elección de estudios CTIM y desequilibrios de género. *Enseñanza de las ciencias*, 33(3), 59-76. doi: 10.5565/rev/ensciencias.1481
- Sáinz, M., & Eccles, J. (2012). Self-concept of computer and math ability: gender implications across time and within ICT. *Journal of Vocational Behavior*, 80(2), 486-499. doi: 10.1016/j.jvb.2011.08.005
- Sjøberg, S. (2004, April). Science Education: The voice of the learners. In *Conference on Increasing Human Resources for Science and Technology in Europe*. Bruselas: Unión Europea.
- Sjøberg, S., & Schreiner, C. (2010). *The ROSE Project. An overview and key findings*. Retrieved from <http://roseproject.no/network/countries/norway/eng/nor-Sjoberg-Schreiner-overview-2010.pdf>
- Spektor-L.O., Kesner Baruch, Y., & Mevarech, Z. (2013). Science and Scientific Curiosity in Pre-School. The Teacher's point of view. *International Journal of Science Education*, 35(13), 2226-2253. doi: 10.1080/09500693.2011.631608
- Splitt, F.G. (2002). Environmentally smart engineering education: a brief on a paradigm in progress. *Journal of Engineering Education*, 91(4), 447-450. doi: 10.1002/j.2168-9830.2002.tb00731.x
- Valero-Matas, J.A. (2006). Responsabilidad social de la actividad científica. *Revista Internacional de Sociología*, 64(43), 219-242. Retrieved from <http://revintsociologia.revistas.csic.es/index.php/revintsociologia/article/viewFile/47/47>

- Varela, M., House, R., & Wenzel. S. (2005). Beginning teachers immersed into science: Scientist and science teacher identities. *Science Education*, 89(3), 492–516. doi: 10.1002/sce.20047
- Vázquez-Alonso, Á., & Manassero-Mas, M. A. (2008). El declive de las actitudes hacia la ciencia de los estudiantes: un indicador inquietante para la educación científica. *Revista Eureka sobre Enseñanza y Divulgación de las Ciencias*, 5(3), 274-292. Retrieved from <http://www.redalyc.org/articulo.oa?id=92050303>
- Wallace, C., & Brooks, L. (2015). Learning to teach elementary science in an experiential, informal context: culture, learning and identity. *Science Education*, 99(1), 174–198. doi: 10.1002/sce.21138
- Wallace, C. S., & Eick, C. (2012). *Preservice elementary teachers in service learning settings: developing ideas about teaching, learning and science identity*. Paper presented at the Annual meeting of the National Association for Research in Science Teaching, Indianapolis: IN.
- Wenger, E. (1998). *Communities of Practice: learning, meaning and identity*. Cambridge: Cambridge University Press.

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Patrones de Movilización Cognitiva: Pautas para una Interacción Dialógica en el Aula.

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Date of publication: June 15th, 2017

Edition period: June 2017 - October 2017

To cite this article: Molina, S. (2017). Patrones de Movilización Cognitiva: Pautas para una Interacción Dialógica en el Aula [Review of the book]. *REMIE- Multidisciplinary Journal of Educational Research*, 7(2), 249-251.
doi:10.17583/remie.2017.2758

To link this article: <http://dx.doi.org/doi:10.17583/remie.2017.2758>

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Review

Mora, J., & Aguilera, A. (2016). *Patrones de Movilización cognitiva: Pautas para una interacción dialógica en el aula*. Sevilla: Editorial de la Universidad de Sevilla. ISBN: 978-84-472-1842-4.

Las teorías e investigaciones que mejor explican actualmente cómo se da el aprendizaje en las aulas –y fuera de ellas– tienen como componentes esenciales la interacción y el diálogo entre múltiples agentes (Aubert, Flecha, García, Flecha & Racionero, 2008; Mercer & Littleton, 2007; Wells, 2001). Si aprendemos a través de la interacción y el diálogo, cuantas más sean las interacciones dialógicas, y cuantas más personas y más diversas participen de esas interacciones, mayores serán las oportunidades de aprendizaje. Esta realidad conforma lo que se ha llamado el “giro dialógico del aprendizaje” (Racionero & Padrós, 2010) y es esencial tenerla en cuenta en cualquier planteamiento que pretenda mejorar el aprendizaje del alumnado.

Mora y Aguilera parten de esta premisa, y con su obra *Patrones de Movilización cognitiva: Pautas para una interacción dialógica en el aula* hacen una aportación para mejorar las condiciones en que esas interacciones tienen lugar. El monográfico parte de los resultados de investigaciones previas en relación a un programa de enriquecimiento cognitivo denominado “Comprender y Transformar”, dirigido a alumnado con dificultades de aprendizaje. Según explican los autores, los resultados de sus investigaciones mostraban que los patrones de interacción eran el componente con un peso más importante en el programa. Estos patrones de interacción son lo que en el libro se presentan como “patrones de movilización cognitiva”, formas de interacción que diferenciaban las aulas más eficientes de las menos eficientes.

Aunque los autores sitúan el origen del libro en una investigación empírica enmarcada teóricamente, el libro *Patrones de Movilización cognitiva: Pautas para una interacción dialógica en el aula* tiene una intención eminentemente práctica. Sus destinatarios principales son el profesorado que quiere mejorar las interacciones de aprendizaje en sus aulas –tanto entre profesorado y alumnado como entre el alumnado–. El objetivo es ayudarles a comprender en qué consisten estos patrones de movilización cognitiva y a ayudarles a aplicarlos. De hecho, el libro supone la publicación de un programa de entrenamiento compuesto por lo que los propios autores denominan “guías de trabajo”, destinadas a formar al profesorado en la aplicación de estos patrones de movilización cognitiva.

La estructura del libro la forma, en primer lugar, una introducción, que explica el origen del libro, su finalidad y cómo está pensado para ser usado, y a continuación, 21 capítulos, cada uno de ellos dedicado a uno de los patrones de movilización cognitiva. Estos 21 capítulos siguen la misma estructura para facilitar su uso por parte de las personas lectoras: en primer lugar, una definición y breve descripción del patrón de movilización cognitiva; en segundo lugar, una justificación de la importancia de ese patrón; en tercer lugar, algunas sugerencias para su aplicación; y, en cuarto lugar, algunos aspectos complementarios. Estas diferentes secciones finalizan con propuestas de actividades en grupo pensadas para que el profesorado en proceso de formación consolide su aprendizaje sobre lo expuesto.

En síntesis, *Patrones de Movilización cognitiva: Pautas para una interacción dialógica en el aula* supone una obra relevante en el contexto educativo actual, y es especialmente importante por su orientación transformadora. Partiendo de la importancia crucial de las interacciones en el aprendizaje y del papel esencial que tiene el profesorado en promover las interacciones que contribuyan de manera más efectiva al aprendizaje, Mora y Aguilera ofrecen con este libro una herramienta destinada a capacitar al profesorado para incorporar en su labor docente formas efectivas de interacción que promuevan el aprendizaje del alumnado, no sólo de aquéllos con más dificultades de aprendizaje, sino de todo el alumnado en conjunto.

References

- Aubert, A., Flecha, A., García, C., Flecha, R., & Racionero, S. (2008). *Aprendizaje dialógico en la sociedad de la información*. Barcelona: Hipatia.
- Mercer, N., & Littleton, K. (2007). *Dialogue and the Development of Children's Thinking: a sociocultural approach*. London: Routledge.
- Racionero, S., & Padrós, M. (2010). The Dialogic Turn in Educational Psychology. *Revista de Psicodidáctica*, 15 (2), 143–162. Retrieved from <http://www.ehu.eus/ojs/index.php/psicodidactica/article/view/808/680>
- Wells, G. (2001). *Indagación dialógica: hacia una teoría y una práctica socioculturales de la educación*. Barcelona: Paidós.

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