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Review

Discriminatory policy among the undergraduate students towards racism and white privilege in America

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This paper addresses racism and white privilege in America. Racism is generally discriminatory policy and behavior aimed at oppressing non whites whereas white privilege is the advantage gained by whites that is not due to ability or merit. It is argued that white privilege is largely invisible and that this allows the current unacceptable status quo to continue. A survey of items is offered as a tool to be used by college teachers to sensitize students of the nature and effects of white privilege.

Key words: Discriminate, racism, racial code words, racism, white privilege.

INTRODUCTION

While racism has received considerable attention in the social sciences in the U.S., white privilege generally has not. The data revealing racist policies in American history are legion. White privilege, on the other hand, has been largely invisible.

The purpose of this paper is to briefly illustrate the concept of white privilege and offer suggestions on how to make undergraduate college students more aware of its effects. White privilege is best conceptualized as the "other side of the racism coin."

That is, while the study of racism focuses on the harmful effects of discriminatory policies designed to oppress nonwhites, white privilege is a term used to show how whites benefit from whiteness, regardless of the effects of racism on nonwhites. It is far easier, for example, to speak out against overt racism (e.g., hate speech, discriminatory policies, racial profiling, etc.) than it is for whites to acknowledge the advantages they receive simply because of their color.

Examples of racism

Before addressing white privilege specifically, it is important to summarize the nature of racism and its effects. While this certainly is not an exhaustive discussion of racism in America, it helps get the reader into the mindset necessary to address white privilege. For a more detailed discussion of racist policies in criminal justice see Walker (2011).

Racism has been pervasive in American society. It has been insidious, harmful and resistant to change as well. Jensen (2012), for example, points out that nonwhites are less likely to enjoy the following characteristics when compared to whites:

1. Attend primary and secondary schools with smaller class sizes;
2. Have access to computer technology in public schools and at home while in school;

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3. Graduate college;
4. Earn larger salaries;
5. Keep a job during recessions;
6. Have access to adequate medical care;
7. Live in favorable housing (less dilapidation, less crime, etc.);
8. Spend a lower percentage of income on housing;
9. Have adequate access to home loans;
10. Own stocks;
11. Have retirement accounts;

Along the same lines, black income is only about three-fifths that of whites and black joblessness is twice as high. Also, black babies are twice as likely as white babies to die in the first month of life (Jensen, 2012; United for a Fair Economy, 2004). Still others have found that black job applicants with no criminal record are less likely than white applicants with a criminal conviction to get called back by prospective employers (Jensen, 2012; Pager, 2003).

The origin of racism against nonwhites in North America goes back to the 1600s, but much of the recent damage is just as salient. For example, during the New Deal (1930s), the Social Security Act intentionally excluded people working on farms and servants from being covered. This effectively denied nonwhites the benefits that were routinely accorded to whites (Jackson, 1985). This support was generally taken for granted by whites and allowed them to pass down more resources to successive generations. It is not surprising that nonwhites typically had less ability to meet financial responsibilities. This white privilege was a strong boost for whites as they sought to: 1) save money, 2) pass down money to their heirs, 3) provide for their children’s education, 4) choose a place to live, etc. Similarly, another New Deal program (e.g., FHA) typically favored whites over nonwhites for home loans. This made it much easier for whites to buy homes and property and to leave them for their children. This type of white privilege gave a huge head start to whites starting out in life (Jackson, 1985).

Also, the U.S. has been loath to enforce fair housing rules on lenders and sellers. As a result, substandard inner-city housing was foisted upon nonwhites with higher rates of crime, pollution, weak and abusive police, etc. As a response, many whites who were averse to living among nonwhites, left for the suburbs and the access to white privileged home loans. This allowed whites to accumulate prime homes and property to be left as inheritances while nonwhites were left in the squalor of the broken inner-city. Eventually, the federal government began urban renewal projects that led to the confiscation of nonwhite’s property for the purpose of office building and highway construction. This resulted in a population decline that led to less political power which in turn led to vulnerability to having prisons, garbage incinerators, and toxic waste dumps being placed in their neighborhoods (Bullard, 1999).

Labor unions during this time also favored whites as well. Unions typically sought to restrict membership to whites while simultaneously seeking lavish benefits for its members (e.g., better working conditions, healthcare, pensions, etc.). This also exacerbated the inequality between whites and nonwhites.

The end result of this vicious and racist cycle of economic violence against nonwhites was that nonwhite neighborhoods were dilapidated, polluted, undervalued, stigmatized, had poor services (and in the case of police, abusive services), were undesirable, politically weak and essentially hopeless. This acted as a major impediment to getting ahead in life while at the same time providing a huge privilege to whites who had the inverse situation in the comfortable suburbs.

Research has shown that of families with incomes of less than $6000 per year, two-thirds are black while only 36% are white. This is yet another indicator that poverty cannot explain the deleterious effects of being black in America by illustrating the privilege of whiteness (Bunyan and Mohai, 1992). Race is significantly more powerful than socioeconomic class at explaining and predicting who is most likely to live near hazardous waste sites (Lee, 1993). In fact, if American blacks had had the same access to nutrition, wealth, healthcare, and protection from environmental pollutants that whites take for granted, 75,000 fewer of them would die every year (Wray, 1992; Lipsitz, 2006).

Another area where it pays to be white concerns the issue of drug use and possession. While the prison population in the U.S. has dramatically increased since the initiation of the latest war on drugs in the early 1980s, the rate of growth has impacted nonwhites more than whites. This is in spite of the fact that a 1990 study by the National Institute on Drug Abuse revealed that 15% of the United States’ 13 million chronic drug abusers were black (compared to 13% black in the population) and 77% were white (compared to 68% white in the population). However, blacks were four times more likely to be arrested for drug violations than were whites (Bertram, et al., 1996). More shocking is the trend toward the persecution of blacks by drug law enforcement. That is, in 1984, blacks accounted for 10% of drug arrests, in 1988 the figure was 40% and in 1990 it reached 42%. Either black Americans suddenly decided to become severely chronic drug law violators or law enforcement became substantially more discriminatory toward them. The available data point to the latter. To make matters worse, blacks also are more likely than whites to receive longer sentences even when committing comparable crimes (Bertram et al., 1996). It is not argued here, however, that police, courts and corrections personnel are all consciously choosing blacks to persecute with anti-drug laws while ignoring similarly-situated white offenders.

Nevertheless, the factors discussed thus far have
produced financial and social catastrophes in black neighborhoods that whites largely have the privilege of avoiding. These economic catastrophes harm blacks (e.g., joblessness, housing discrimination, mortgage bias, police discrimination, etc.) so that selling and using drugs actually begin to "make sense" to some people. The poor opportunities to work, buy and own land, and accumulate wealth derails many blacks as they seek to better themselves. This, combined with the problem of the lack of intergenerational transfers of wealth, makes it nearly impossible for black parents to exercise control over their children. Without the possibility of an inheritance, many black kids begin to respect the wishes of their delinquent peers more than they do their own parents (Lipsitz, 2012).

Even after all of this, the vicious cycle continues. Black communities then become known as the "bad parts of town" whereas the predominately white suburbs are considered respectable. As a result, crime prevention strategies are designed to keep the suburbs protected. To do this, law enforcement vigorously attacks the drug problems in those communities thereby forcing the inevitable and unstoppable drug trade to move into black neighborhoods. The result? Whites drive to black neighborhoods to buy their illegal drugs and then escape back into the white privilege of the suburbs. So long as the suburbs remain pristine, the extreme social and economic stigma of the inner-cities is tolerable. The "dangerous classes" are allowed to sell and use drugs and otherwise victimize each other so long as they stay in their places (Lipsitz, 2012).

This is not to say that urban drug sellers are ignored. In fact, the process of targeting minority communities for drug enforcement is blatant and unapologetic. The police, not wanting to agitate influential members of the white privileged suburbs, cannot direct their arrest activities at the residents in those communities. However, they have arrest quotas that must be met (although most police departments deny this). Therefore, they go to where open market street sales are highly visible and that takes them to inner-city black neighborhoods. These areas are inhabited by politically and economically powerless blacks who have poor job and education prospects and no place to go. Many of them see high risk drug sales as lucrative. The police have an easy time rounding up enough young blacks to meet their arrest and prosecution quotas. As an added benefit to the criminal justice industrial complex is the fact that these are people with few political connections and no money to afford competent defense counsel. They are far less likely to have charges reduced, dropped or ultimately expunged and they are much more likely to plead guilty because they know the system is rigged against them (Lipsitz, 2012).

**What is white privilege?**

White privilege is the hidden, almost invisible side of racism. Whereas overt racist actions and policies disadvantage nonwhites, white privilege is the latent benefit of being white. In addition to the copious privileges of whiteness discussed above, there are still other types of advantages that benefit whites that are beyond the reach of nonwhites.

First is the privilege of genealogy. It is clear that whites have the advantage of being descended from people who traditionally made the rules. Whites have the privilege of having largely come to the U.S. voluntarily as compared to blacks, able to secure land and homes, and legally able to own other human beings. This has afforded whites a major privilege, that of being able to define normality or of assuming that their perspectives are defined as the norm. All others, especially nonwhites, are different. White becomes normal and all other groups are "raced."

Cohen (1955) alluded to how white normalcy manifests itself in school settings. In his theory of reaction formation, he argued that middle-class people (i.e. whites who are in control) are able to create middle-class measuring rods that define which behaviors are acceptable and those that are to be proscribed. In the U.S., people are taught to believe that if they do not pursue material gain (e.g., the American Dream) then they are lazy or shiftless. People are defined by how much they can earn, spend, consume and the types of materials they can show off. However, the institutional means (e.g., studying, saving, delaying gratification) of attaining the goal of middle-class status are severely blocked among the poor. Whereas the middle-class white child may have: 1) ample space at home, 2) parents to help with homework, 3) a desk, computer, learning software etc., and 4) a stress-free environment in which to study.

Most importantly, the lower-class black child lacks the cultural capital that is taken for granted in white families. Cultural capital is another form of white privilege. Cultural capital represents social benefits that promote well-being. These include things such as 1) socialization on how to be respectful to white authority figures (e.g., teachers, police, judges, employers), 2) education, 3) intellect, 4) modes of speech (e.g., A sounding white* instead of using Ebonics), 5) modes of dress (e.g., being neat instead of gangstar/disseveled, and 6) being taught how to resolve disputes diplomatically rather than with insults or aggression.

The problems that disadvantaged lower-class blacks will have in middle-class settings such as schools are predictable. The lower-class black youth has been indoctrinated by the materialistic American culture to have the same aspirations as other kids with reference to achieving middle-class status. He also wants a job, house, car, security, retirement account, adequate health care, and vacation time with a family. When he confronts middle-class/white America, however, he experiences extreme cultural shock and disadvantage (Merton, 1938). Even though many inner-city schools are substandard
and located in black neighborhoods, they still largely function according to middle-class rules. This disadvantage illustrates the middle-class measuring rods that white America has imposed on public-school systems. The criteria for success in this atmosphere include: 1) ambition, 2) individual responsibility, 3) manners and courtesy, 4) neatness, 5) delayed gratification, 6) skills and achievement acquisition, 7) rationality and planning, 8) refraining from violence, and 9) respect for authority (Cohen, 1955).

Middle-class white kids are taught and socialized these values from an early age. This gives them a huge head start in life given that they will be evaluated according to the same standards. In the movie, "Don't Be a Menace," (Wayans and Barclay 1996) illustrate this type of white privilege to perfection. In one scene, ALoc Dogg, an inner-city black ghetto youth, wants to apply for a job in a middle-class firm. He approaches the receptionist, a nicely dressed, proper and prim white lady of moderate temperament. As the pleasant music softly plays in the background, Loc Dogg approaches her to ask about the job. He screeches to her loudly, "Hey! I heard y'all niggers is hiring! Whassup?"

Did Loc Dogg approach the receptionist this way because he is mean-spirited? Has hormonal imbalances? Is genetically inferior? Of course not. He did this because he grew up without white privilege and consequently was deprived of the cultural capital and was devoid of the socialization necessary to teach him the proper way to meet the middle-class measuring rods. In short, he does not know how to compete in a middle-class environment following white privilege rules. Whites are the ones who define and decide what proper decorum and etiquette are in this type of interaction.

In another scene, two black teens are innocently shopping in a convenience store owned by an Asian couple. The Asian wife follows the blacks through the store incessantly demanding that they "buy something or get out!" She clearly believes they are untrustworthy and prone to shoplifting. During this time, a professionally dressed white man is stealing items from every aisle but remains undetected by the Asian couple because he simply does not fit the "shoplifter profile." While these two movie scenes are hyperbolic parodies, the point from them is valid. Black males from "the hood" must endure life in middle-class white America without the benefit of white privilege. The constant psychological strain that this causes is enormous and relentless. What is even stranger is that so many whites wonder why they are often angry and rebel by committing crimes at a higher rate.

Given the magnitude of the obstacles placed in the way of lower-class blacks, success in school becomes problematic as well. Middle-class measuring rods created and evaluated by white America are relatively easy for whites to follow. When the rules are made by whites, for whites, it is easy, for example, to believe in individual responsibility while simultaneously eschewing communal responsibility.

Blacks exhibit because they are told that everyone should make it on their own merit and not with the aid of white privilege. This is another reason college students must be made aware of that privilege.

Historically, whiteness also has helped to create the myth of the meritocracy. This is the white delusion that encourages members of society to believe that people have an equal chance at success and will attain it if they follow the Protestant work ethic requiring study, saving, paying one's dues, and following white rules. Part of the meritocratic delusion is the concept of rugged individualism. Here, people are duped into believing that since the early westward expanding pioneers made it without the help of the state then everyone today should do the same.

No matter one's lot in life, people should pick themselves up "by the bootstraps." If, for example, a person looks to government for help then it is because of personal defects such as learned helplessness, laziness, greed, low self-control, or even genetic inferiority. To accept aid from government is seen as a cause of intergenerational dependency that will emasculate people and destroy the enterprising spirit by turning the masses into wards of the state. In America, people of color, being devoid of white privilege, are keenly aware of the ludicrousness of this reasoning. They already know that the system was created specifically with the intent of keeping resources in the hands of the powerful, predominantly white elitists. By promoting the myth of meritocracy, white America can more easily assuage its collective guilt for creating and perpetuating acute inequality between races. If, after all, people get ahead strictly as a result of their own merit, then people of color who fall behind must obviously be defective and unworthy of our concern.

It follows, then, that government social programs for the poor should be both de-emphasized and drastically slashed in order to reduce the surplus population in American society.

To continue to redistribute resources to the surplus population is dysgenic in nature and promotes the devolution of the human species. This forms the basis of
Social Darwinism (McNamee, 2009).

Celebrating diversity

White America has adopted a ruse as a way of ignoring the problems of inequality and systemic racism called the "celebration of diversity." The ostensible goal of celebrating diversity is to give equal opportunity to everyone regardless of race, creed, color, national origin, handicap status, sexual preference, etc. This is only a superficial goal of course because the real goal of celebrating diversity is to create the impression of fairness and equal opportunity while simultaneously ensuring that there is no meaningful redistribution of resources away from the white ruling elite.

The white privilege scam of celebrating diversity goes like this. The horrible manifestations of racism in the areas of housing discrimination, home loans, racial profiling by the police, the imposition of middle-class measuring rods, inequality of income, early death, and environmental racism, are to all be forgiven because whites are willing to hire a couple of highly educated nonwhites in the workplace. Imagine the CEO of a firm going on the loudspeaker at his place of business to address the workers as follows:

Ladies and gentlemen of White Supremacy Incorporated (WSI), I have spectacular news! In an effort to promote equality and to offset the unfairness of past American policies and government action, we have sought out, screened, and now hired two new employees. These are not just any new employees, however. No indeed; we have hired both a highly educated, upper middle-class black guy as well as an Oriental. As an added diversity bonus, the Oriental is female. We hereby proclaim this corporation and America to be post-racial as this is proof of a level playing field. We will have a Celebration of Diversity party on Friday complete with ice cream, cake and party favors. Feel free to wear blue jeans and a Hawaiian shirt on that day.

It is precisely the reasoning behind the celebration of diversity that allows whites to remain oblivious to racial inequality and systemic racism. Whites can pat themselves on the back for hiring a black guy and the Oriental female and they are able to successfully neutralize the guilt that would be manifest if they were truly race conscious. Not only are whites not race conscious, but they actually pride themselves on being "colorblind." It is not uncommon, for example, to hear white undergraduate college students who become distressed while discussing these issues, say things such as, "I am colorblind. I do not see race", "we are all just human beings", "let us focus on how we are similar", "why are nonwhites so sensitive all the time about race", "why do nonwhites focus so much on racial differences; is not that racist too?" Whites clearly have a vested interest in ignoring, or at least obfuscating, any distinctions to be made about race. As long as "we are all just humans," and "people who fail do so because they are defective," whites do not have to confront the systemic racism in America and the extremely hard work that must be done to bring about economic and social justice.

The Bell Curve and Defective Nonwhites

In 1994, Herrnstein and Murray published The Bell Curve: Intelligence and Class Structure in American Life where they essentially argued that blacks who failed to achieve the American Dream do so because they are genetically inferior and inherit deficient IQs from their defective parents. These types of publications give license to whites to justify the continuation of the racist policies discussed above. After all, if blacks are failing as a result of flawed genetics and defective wiring, then it really makes no sense to seek redistributive policies that will help them and the poor in general. As noted above, to do so would simply be promoting dysgenics. In other words, if we increase welfare spending it is not a way of alleviating the harms caused by centuries of racist policies, but, rather, simply a way of propping up inferior people (that is, atavists) and will lead to a severe weakening of the U.S. population by relaxing the effects of natural selection. This terrifies white America because redistributive welfare policies will inevitably lead to a proliferation of the "dangerous classes" that will become so numerous that they will swamp the nation, particularly at the voting booths.

Intergenerational Transmission of White Privilege

White privilege also perpetuates itself through the media, literature, entertainment and language. The raw material to make this happen includes slang terminology (e.g., "he was blacklisted," the Washington Redskins, the Prince of Darkness, etc.), movies, cartoons, ethnic jokes, books, history lessons (e.g., Andrew Jackson as the "Indian fighter") and so forth. Such things help create and reinforce racial hierarchies (Barrett and Roediger, 2012). Whites also are quick to reward nonwhites who have learned how to act white. These "model minorities" are those who have learned and internalized the racial hierarchies and understand that whites are on top of it and so long as they are not as bad as blacks, they too can be deemed acceptable in American society. Asian-Americans currently occupy this role but Hispanics are moving up as well (Carbado and Gulati, 2013).

In 1980, the U.S. Census Bureau created two categories of whites: Hispanic and non-Hispanic. This was the
culmination of decades of struggle by Latinos to be accepted in the "white club." Throughout the 1900s, Mexican-Americans fought in courts, legislatures and throughout society to avoid being considered colored. To be tossed in with blacks as colored would have been catastrophic from a social justice standpoint. American society and the courts granted Mexican-Americans the status of "quasi-white." This meant that while they clearly were not equal to European whites, they at least belonged to something of a parallel universe of whiteness. In essence, white privileged America told Mexican-Americans that so long as they accept white supremacist policies and recognize the inferiority of blacks they at least have a chance to be accepted as quasi-white and can enjoy some of the rewards of that privilege (Foley, 2012).

White Privilege to Divide and Conquer

Being white also gives one the advantage of being able to divide and conquer those who dare upset the white supremacist status quo. For example, the white elite powerbrokers pit union members against average Americans. Americans of all races are warned that victories by organized labor will drive up the cost of products. Unions also are blamed for businesses going bankrupt. The argument is that if unions succeed in improving working conditions, wages and pensions, then businesses will not be able to afford to stay open. Therefore, common folks are to be fearful and oppose unionization when, in reality, unions and nonunion members of middle America would be far better off siding with each other against the elite who cling to obscene amounts of the nation's wealth. Legions of "Reagan Democrats" abandoned progressive policies in the 1980s based upon this type of fear-mongering coming from those who seek to destroy organized labor.

Along the same lines, powerful white classes seek to pit modestly educated whites and people of color against undocumented workers. Terms such as "illegal aliens" are used to scare middle and lower-class whites concerning the brown invaders from south of the border. Anti-immigrant rhetoric blames migrants for importing communicable diseases, gang members, and drugs as well as for Balkanizing communities in the U.S. with their foreign customs and language. Anti-welfare propaganda is used to scare nativist Americans into believing that the social safety net will burst if millions of Mexican and Central American immigrants are allowed to "infest the country." Along the same lines, white culture and media promote images of crime designed to keep the masses divided. Criminals are typically portrayed as street offenders and disproportionately nonwhite. We are taught to be fearful of the aggressive thugs in the streets while simultaneously encouraged to ignore the crimes of the powerful such as white-collar and political crimes. This further guarantees that white supremacist control of wealth is not disturbed. This is what Karl Marx referred to as the "false consciousness" (Tucker, 1978).

Racists All Wear Pointed Hoods, Don't They?

White privilege gives whites the advantage of defining exactly what racism looks like. The goal of whiteness is to create the perception that racism manifests itself in isolated individual acts or the acts of lunatic groups. Whites routinely pride themselves for their "compassionate" and "progressive" opposition to the White Aryan Brotherhood, the Ku Klux Klan, and the Neo-Nazis. By lashing out at these racist villains, whites are "proving" they have identified the enemies and are staunchly seeking to marginalize them. How, after all, can someone accuse whites of being racist if they are so opposed to these white supremacist groups? Excoriating individual members of these fringe racist groups, however, is self-serving to whites. By doing so they are obfuscating the fact that real racism can only survive when there is cultural, social, and legal support for it (Davis, 2012). It also covers up the fact that systemic racism is running rampant and is being unconsciously condoned by otherwise well-intentioned whites. This is another reason why white privilege must be made obvious to the future generation of leaders as well as college students. In one study, 70% of whites thought that blacks have the same opportunities to live a middle-class life as do Caucasians. Similarly, in 1990, more than one-half of whites saw blacks as innately lazy, less intelligent and less patriotic than whites (Landry, 1991). This illustrates the dire need to bring white privilege to the forefront of discussion in the college setting.

Criminal Justice Stigma and White Privilege

Finally, white privilege gives whites the freedom from the constant fear of being targeted by the criminal justice system based upon the color of their skin. When a black male, for example, is driving (particularly if he is in the "wrong" neighborhood), he has to psychologically maintain a state of hyper vigilance. He has to worry about whether each lane change, turn, signal, and speed is within the boundaries of acceptability to white America's hired status quo enforcers (that is, the police) or whether he will be targeted for enforcement. Whereas whites have the freedom to completely avoid black neighborhoods, blacks inevitably face the stressors of constantly being reminded that they live in a country set up to benefit whites. This takes an enormous psychological toll on blacks and it is a stressor not faced by whites. This again gives a competitive edge to whites and they need to be made aware of their advantaged status (Rothenberg, 2012).
Conclusion

In light of the above discussion, the question becomes how can we get future generations of students aware of the impact of systemic racism? The only way to do this is to continually raise these issues in college classes. Students, particularly whites, have to be made aware not only of the harmful effects of overt racism but must also come to see the privileges they have been given that are completely independent of their merits, abilities, intellect or hard work.

One caveat is in order first, however. It is essential to point out that whiteness, while an unearned privilege that is granted in America, is not the only one available. In fact, there are copious categories of privilege available. For example, a person is privileged over others if the person is: 1) heterosexual, 2) male, 3) Christian, 4) upper-class, 5) physically able, 6) mentally healthy, and 7) educated. A white person, for example, who is gay, atheist, female, handicapped, has a mental illness, and is undereducated, is not better off than a wealthy black who is a college graduate.

In sum, we all have times, places, and circumstances where we are the oppressor and at other times we may be the oppressed. Nevertheless, it is indisputable that whiteness confers upon its recipients, advantages, preferences, vital cultural capital and access to resources that simply are not available to those who have not been admitted to the club. This is true even though biologists and geneticists have eschewed the physical existence of races and come to the realization that the concept of race is a social construct created and perpetuated by those with the economic and political power to do so (Painter, 2012).

This “survey” is not meant to be administered in its entirety as this would demoralize and fatigue respondents. These items should be sampled by college teachers and used as tools to initiate meaningful debate with students in class. Many of these items have been excerpted from disparate sources (Wise, 2011; McIntosh, 1990) over a period of several years. Some others were created by the author and students from various criminal justice courses.

Conflict of Interests

The author has not declared any conflict of interests.

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The relationship between power distance and organizational commitment in primary schools

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The aim of this study is to determine the relationship between organizational commitment and power distance. The study has a correlational survey research model. The population of the study consists of a total of 4838 teachers working in the primary schools in the center of the city of Balıkesir and in the centers of its districts in the 2012-2013 educational year. The sample of the study consists of 1506 teachers that were selected using the purposive sampling method. Data were collected using Power Distance Scale and Organizational Commitment Scale by Hofstede. In data analysis, independent group $t$-test and ANOVA were used. In order to determine the level of the relationship between power distance and organizational commitment, Pearson correlation test and simple linear regression analysis were performed. The study has found that the level of the power distance that the teachers perceive in schools was at the medium level and that their commitment to their institutions was mostly emotional commitment. The correlation between power distance and organizational commitment was found to be negative, at low level and significant. In the sub dimensions of organizational commitment, the correlation between power distance and emotional and normative commitment was found to be negative; and the correlation between power distance and attendance commitment was found to be low and positive.

Key words: Power, Power Distance, Commitment, Organizational Commitment.

INTRODUCTION

Human management is related to a large extent with the shaping of the human behavior in the desired course. In order to achieve this, their behavior should be influenced. Influencing behavior may be possible by using a certain power (Şimşek, 1999). Because schools are organizations that are based on human beings and the relationships among them, the administrators of the schools must know human beings and their traits, administer them and know the assumptions on human beings (Bursalıoğlu, 2012). Individuals’ behaviors in organizations are oriented and shaped by individuals’ perceptions of the power margins of the organizations and their administrators.

Power distance is related to the unequal distribution of the power among the individuals and in the organizations in a society. The distance that the power causes among
the social and organizational status of an individual affects the individual's own behaviors and the behaviors of others toward that individual (Hofstede, 2005).

In organizations with low power distance, the centralization of power is not welcomed and the employees believe that they should also be part of the decision-making process (Rodrigues, 1998). In such organizations, the inequality between the administrators and employees is low and the centralization and hierarchy is at a minimum. The opportunities of the organization are distributed equally among all the members of the organization. The administrators are not inspectors or individuals to be obeyed; rather they are democrats that guide their subordinates. Power distance tends to diminish in parallel with social progress (Spencer-Oatey, 1997; Kasuyai, 2008). The level of power that the employees in organizations perceive of their organization and administrators forms a basis for the status of themselves and others in the organization; for the value of their organization to them; for their level of organizational commitment.

Organizational commitment has been an important issue in organizational studies due to the employees' productivity and due to the fact that it accounts for employees' intention to leave the workplaces. Although most of the studies on the subject have been carried out in North American contexts, over the past thirty years an intercultural literature on organizational commitment has been in the making and accumulating. However, it has been stated that because the effects of culture on organizational commitment are not discussed conceptually, because organizational commitment is measured with different tools, because reliability is not given enough care, and because samples show great diversity, the development and consequences of organizational commitment in different cultural contexts have not been understood adequately (Wasti and Önder, 2009). The most comprehensive meta-analytical evaluation of the studies on organizational commitment that have been made in recent years has shown that proposing the intercultural meaning and differentiation of the concept of organizational commitment is one of the three priorities of the future studies on the subject (Meyer et al., 2002). Organizational commitment broadly means an individual's psychological commitment to the organization including such things as attendance to work, loyalty and belief in organizational values (Çetin, 2004). Organizational commitment is the individual's acceptance of the organizational aims and values, his efforts for the realization of these aims and his desire to maintain his membership to the organization (Durna and Eren, 2005). It has been stated that organizational commitment consists of three dimensions which are emotional commitment, attendance commitment and normative commitment (Allen and Meyer, 1990).
Beyond being an instrumental value, institutional commitment is the employee's implementation of his own role solely for the benefit and advantage of his organization in line with the aims and values of the organization. Committed employees have a strong belief in the values and aims of the organization and accept the orders and expectations willingly. Furthermore, employees exert extraordinary effort for the realization of the aims as expected and are determined to remain as members of the organization. Committed employees are naturally motivated (Balay, 2000). Commitment has three phases as obedience, involvement, and developing identity. At the obedience phase, the individual recognizes the impact of other people in order to introduce himself. With this recognition comes the individual's feeling of pride for being a part of the organization. At the final phase, the individual notices that the values of the organization are praiseworthy and that they are almost the same as his own values (Çetin, 2004). According to Allen and Meyer (1990), organizational commitment consists of three dimensions as emotional commitment, attendance commitment (rational commitment), and normative commitment. Emotional, attendance and normative commitments are distinctively considered as the dimensions of organizational commitment by the employees who experience each of these psychological conditions at different levels (Wasti, 2003).

Emotional commitment means the employee's identification of himself with the organization and his intrinsic feeling that he is part of that organization. The desire to remain within the organization can be defined as 'not being able to run the risk of leaving the organization because of one's labor of long years in the organization, or as the risk of high financial cost in case one leaves the organization, or as not having different alternatives other than remaining within the organization. On the other hand, the obligation of remaining within the organization can be defined as the individual's feeling of responsibility for the institution or organization whose part he once was (Allen and Meyer, 1990). This type of commitment is the best type of commitment of an employee to his organization. Such employees are the ones that all employers dream about and who are really committed to his organization and are loyal employees. Such employees are really willing to take extra responsibilities. They have positive attitudes towards the work and are ready to exert extra effort (Çetin, 2004).

Attendance commitment denotes taking and accepting the risk of financial cost of leaving the organization. According to this, if leaving the organization will cost much more than one earns in the institution, the employee will be committed to the organization. At the same time, this approach examines organizational commitment in terms of award-cost perspective. The factor that is stressed here is that the relationships between the organization and the individual are mutually changeable.

For an employee, a higher level of change relationship means more commitment of him to the system. More clearly, receiving a higher reward in comparison with the cost means more organizational commitment (Allen and Meyer, 1990). This dimension of the organizational commitment is considered as a commitment that is developed as a result of the investments that the employees make to their organizations. According to this, commitment is something that an employee develops as a result of the fear of losing status, money, etc. that he gained during his employment in the organization by expending his labour, time and effort. The essential of attendance commitment is the need to remain in the organization (Yağcı and Iplik, 2005). Normative commitment reflects the employees' feelings of responsibility regarding the concerns for remaining in the organization. Individuals' feelings of commitment to the organization is not because of the fact that they are expected to do so for their personal interests; it is because of their feelings for exhibiting certain behavioral actions because they believe what they do is correct and ethical (Allen and Meyer, 1990).

It is clear that there have been enough studies in the literature under different headings and about different types of relationships regarding power distance and organizational commitment. However, it has been considered that the studies that examine the relationship between power distance and organizational commitment is rather rare, that such studies are needed especially in educational institutions, and that such studies will make important contributions to the field and practitioners.

When one looks at the studies on power distance and organizational commitment, one sees that the perception of power distance is usually medium or high. According to the study Power distance and its effect on communication in Turkish Armed Forces by Akyürek (2001), the power distance values of the personnel in this organization was found to be a little above the medium value. In their study titled Power distance between administrators and teachers, Yaman and İrmak (2010) found that there is a high power distance between administrators and teachers. In addition, Basım (2000) in his study An empirical study on military administrators within the context of the cultural dimensions of avoiding uncertainty and power distance; Turan et al. (2005) in their study Administrative and cultural values adopted by university administrators; Gürbüz and Bingöl (2007) in their study An empirical study on the predispositions that administrators of various organizations adopt towards such cultural dimensions as power distance, avoiding uncertainty, masculinity-femininity, individualism-collectivism; and Aktaş and Can (2012) in their study Cultural values of administrators and followers' behavioral preferences found the power distance at medium or high levels. The studies that have been carried out in schools in Turkey on organizational commitment, it was found that organizational commitment...
is in general medium or high. Similarly, Erdoğmuş (2006), in a study titled “The relationship between personal characteristics and organizational commitment of the administrators working in private and state-run primary education,” Özkan (2008), in a study titled “The level of organizational commitment of the form teachers in primary education according to some variables,” Erdaş (2009) in a study titled “The level of organizational commitment of the teachers in primary education in Denizli city center; Budak (2009) in a study titled “Levels of organizational commitments of permanent and contractual teachers in primary education,” Imamoğlu (2011) in a study titled “The relationship between the levels of organizational commitment and perceptions of organizational justice of the teachers in primary education,” Cevahiroğlu (2012) in a study titled “The relationship between perceived leadership behaviors and organizational commitment of the branch teachers in primary education; and Yumuşak (2013) in a study titled “An investigation into the relationship between exposure to mobbing at work and the organizational commitment of the teachers in primary education found that organizational commitment is usually at medium level or slightly above the mean. Given the fact that organizational commitment can have an effect on organizational productivity, the effect of the perceived power of the organizational structure and the administrator of the organization on the employees seems to be inevitable. The perceived power distance can be an important factor for the attitude and behaviors in the organizational relationships of the employees. The scientific investigation of the relationship between these two factors may yield important data in the reorganization of education and in school management. A literature review has shown that there is no direct study in the literature on the relationship between power distance and organizational commitment in schools in Turkey. Within this context, the relationship between power distance and organizational commitment was determined as the topic of this study, and the problem was stated as “The relationship between power distance and organizational commitment in schools.” For the purpose of identifying the relationships between these two variables, the study sought answers to the following questions:

1. What are the levels of perceptions of the teachers in primary education on power distance and organizational commitment?
2. Do power distance and organizational commitment levels show a significant difference according to gender?
3. Do power distance and organizational commitment levels show a significant difference according to branch?
4. Do power distance and organizational commitment levels show a significant difference according to educational background?
5. Do power distance and organizational commitment levels show a significant difference according to the locality of the school?
6. Is there a significant relationship between power distance and organizational commitment?
7. Is power distance a significant predictor for organizational commitment?

METHOD

This study investigates “the relationship between the perception of power distance and organizational commitment in schools” and therefore adopts a correlational study method. A survey research is defined as that which elicits the views of the participants on a topic or event, or which aims to reveal the interests and skills of the participants and which uses larger samples than other types of research (Büyüköztürk et al., 2012). A correlational research is a type of research method which aims at finding out differences and the magnitude of differences between two or more variables (Karasar, 2010).

Sampling

The population of the study consists of a total of 4838 teachers working in the schools of primary education in the city of Balıkesir in the 2012-2013 educational year. The sample of the study was chosen using the criterion sampling method, which is one of the non-probability sampling methods. The schools which employ 15 or more teachers in the center and districts of the city of Balıkesir were taken as criterion. A total of 68 primary schools in 14 districts and 86 secondary schools in 17 districts met the criterion. 710 questionnaires were sent to the primary schools and 796 to secondary schools making a total of 1506 questionnaires. The return rate of the questionnaires is 78%. A total of 1187 questionnaires were returned and of these 73 were excluded from the study due to the fact that some items were marked incorrectly and some were left empty. The data in the questionnaires that were found to be valid were analyzed. Table 1 shows the descriptive statistics on the sample.

Data collection tools

In order to determine teachers’ level of perception of power distance, the study employed the 5-item scale which was developed by Dorfman and Howell in 1988 and which was translated into Turkish by Akyol (2009). A factor analysis was carried out for these five items and it was found that they were collected under one factor. The variance that this factor accounted for about the scale was found to be 48.54%. The factor loaded values of the items in the scale are between 0.52 and 0.79. The Cronbach alpha (α) value was calculated as 0.73. In order to determine teachers’ levels of perception of organizational commitment, the study employed the 18-item scale which was developed by Allen and Meyer (1990) and which was translated into Turkish by Karagüzel (2012). The reliability values of this study are as follows: For the dimension of emotional commitment α = 0.81; for the dimension of normative commitment α = 0.78; for the dimension of attendance commitment, α = 0.63. The general reliability that was calculated for the organizational commitment scale is α = 0.83.

The intervals that were used to interpret the points obtained by the scales are shown in Table 2.

Procedures

The collected data were analysed and evaluated using the SPSS
Table 1. Descriptive statistics on the sample.

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>601</td>
<td>55</td>
</tr>
<tr>
<td>Male</td>
<td>493</td>
<td>45</td>
</tr>
<tr>
<td>Branch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form Teacher</td>
<td>519</td>
<td>48</td>
</tr>
<tr>
<td>Branch Teacher</td>
<td>575</td>
<td>52</td>
</tr>
<tr>
<td>Educational background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate degree</td>
<td>150</td>
<td>14</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>913</td>
<td>83</td>
</tr>
<tr>
<td>Mater's degree</td>
<td>31</td>
<td>3</td>
</tr>
<tr>
<td>Locality of the school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>City Center</td>
<td>387</td>
<td>35</td>
</tr>
<tr>
<td>District Center</td>
<td>707</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 2. Point evaluation intervals.

<table>
<thead>
<tr>
<th>Power Distance</th>
<th>Organizational Commitment</th>
<th>Sub-dimensions of Organizational Commitment (Emotional-Attendance-Normative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Very low level</td>
<td>5 - 9</td>
<td>6 - 10.8</td>
</tr>
<tr>
<td>2  Low level</td>
<td>9.1 - 13</td>
<td>10.9 - 15.6</td>
</tr>
<tr>
<td>3  Medium level</td>
<td>13.1 - 17</td>
<td>15.7 - 20.4</td>
</tr>
<tr>
<td>4  High level</td>
<td>17.1 - 21</td>
<td>20.5 - 25.2</td>
</tr>
<tr>
<td>5  Very high level</td>
<td>21.1 - 25</td>
<td>25.3 - 30</td>
</tr>
</tbody>
</table>

v17.0. The points showed a normal distribution and therefore parametric tests were used. While testing the significance of the differences between mean scores, independent groups t-test was used in cases where there were two discontinuous variables. In order to find out the differences between the mean scores, one-way analysis of variance (ANOVA) was used in cases where there were more than two discontinuous variables. For the significant findings that the ANOVA test yielded, post-hoc tests were employed to determine which groups the variance was and the direction of the variance. The homogeneity of the variances was determined by looking at the Levene Statistical Values. In cases where there was a homogenous distribution of variances, the LSD test of the post-hoc tests was used, and where there was not a homogenous distribution of variances, the Games-Howell test of the post-hoc tests was used. Pearson correlation coefficient was used to determine the relationship between the perception of power distance and organizational commitment, and simple linear regression analysis was used to test the predictive aspect.

**FINDINGS**

**First research question:** What is teachers’ level of perception of power distance and organizational commitment?

Table 3 shows the arithmetic means and standard deviations of the power distance and organizational commitment points.

As seen in Table 3, the mean point of power distance is found to be medium (13.78), the mean point of organizational commitment to be medium (58.58), the mean point of emotional commitment to be high (22.03), the mean point of attendance commitment to be medium (16.42), and the mean point of normative commitment to be medium (20.13). Broadly, it can be said that there is a balanced distribution between the perception of power distance and the levels of commitment.

**Second research question:** Is there a significant difference between the points of power distance and organizational commitment in terms of gender?

Table 4 presents the t-test results in terms of gender. Table 4 shows that teachers’ power distance points in schools do not show a significant difference in terms of gender. In terms of gender, there is not a significant difference between teachers’ organizational commitment points (t= 1.50; p >.05) and attendance commitment points (t= 1.74; p >.05). However, there is a significant difference between teachers’ emotional commitment points (t= 2.52; p <.05) and normative commitment points (t= 2.52; p <.05) in terms of gender. In both types of
commitment, male teachers feel more emotional commitment to their schools than the female teachers.

Third research question: Is there a significant difference between power distance and organizational commitment points in terms of branch.

Table 5 presents the t-test results according to branch. According to Table 5, teachers’ power distance points in schools do not have a significant difference (t= 0.11; p >.05). Their perceptions of organizational commitment show significant differences according to branch (t= 3.41; p <.05). It was found that form teachers feel more commitment to their schools than branch teachers do. Form teachers also feel more commitment to their schools than branch teachers do in terms of emotional commitment (t= 2.16; p <.05), attendance commitment (t= 2.37; p <.05) and normative commitment (t= 3.26; p <.05). It was found that form teachers feel more commitment to their schools than branch teachers do in all three sub-dimensions of commitment as well.

Fourth research question: Do power distance and organizational commitment points have a significant difference in terms of educational background?

Table 6 presents the one-way ANOVA test results in terms of educational background. A detailed examination of Table 6 shows that in terms of the perception of power distance, there is a significant difference between the points of teachers with associate degrees and the points of teachers with master’s degrees in the direction of teachers with associate degrees. On the other hand, there is a significant difference between the points of teachers with bachelor’s degree and points of teachers with master’s degree in the direction of teachers with bachelor’s degree. That the difference is between teachers with master’s degrees and others may stem from the fact that the school administrators appreciate the teachers with master’s degrees more than other teachers for their expending time and effort for their postgraduate studies. In addition, the number of teachers with master’s degrees is low and they have the right to be expert teachers or school principals without any examination because of their master’s degrees. These may be the reasons why such teachers feel more special and therefore are not affected much from the attitudes and behaviors of school administrators and feel the perception of power distance less.

When we look at the findings from the organizational commitment perspective, there is no significant difference between organizational commitment and emotional and attendance commitment sub-dimensions in terms of educational background. In the normative commitment points, it was found that there is a significant difference between the points of teachers with associate degrees
Table 5. The t-test results according to branch.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Branch</th>
<th>N</th>
<th>$\bar{x}$</th>
<th>SS</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power distance</td>
<td>Form Teacher</td>
<td>519</td>
<td>13.77</td>
<td>4.08</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>Branch Teacher</td>
<td>575</td>
<td>13.80</td>
<td>3.64</td>
<td></td>
</tr>
<tr>
<td>Organizational Commitment</td>
<td>Form Teacher</td>
<td>519</td>
<td>59.72</td>
<td>10.71</td>
<td>3.41</td>
</tr>
<tr>
<td></td>
<td>Branch Teacher</td>
<td>575</td>
<td>57.55</td>
<td>10.34</td>
<td></td>
</tr>
<tr>
<td>Emotional Commitment</td>
<td>Form Teacher</td>
<td>519</td>
<td>22.36</td>
<td>5.05</td>
<td>2.16</td>
</tr>
<tr>
<td></td>
<td>Branch Teacher</td>
<td>575</td>
<td>21.72</td>
<td>4.72</td>
<td></td>
</tr>
<tr>
<td>Attendance Commitment</td>
<td>Form Teacher</td>
<td>519</td>
<td>16.73</td>
<td>4.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Branch Teacher</td>
<td>575</td>
<td>16.13</td>
<td>3.99</td>
<td>2.37</td>
</tr>
<tr>
<td>Normative Commitment</td>
<td>Form Teacher</td>
<td>519</td>
<td>20.62</td>
<td>4.83</td>
<td>3.26</td>
</tr>
<tr>
<td></td>
<td>Branch Teacher</td>
<td>575</td>
<td>19.69</td>
<td>4.62</td>
<td></td>
</tr>
</tbody>
</table>

$^1 t > 1.96; \ p < .05.$

Table 6. The one-way ANOVA test results in terms of educational background.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Branch</th>
<th>n</th>
<th>$\bar{x}$</th>
<th>SS</th>
<th>Sd</th>
<th>F</th>
<th>Difference (Post-Hoc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Distance</td>
<td>1. Associate</td>
<td>150</td>
<td>14.16</td>
<td>4.43</td>
<td></td>
<td></td>
<td>1 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>2. Bachelor's</td>
<td>913</td>
<td>13.78</td>
<td>3.76</td>
<td>1091</td>
<td>3.72</td>
<td>2 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>3. Master's</td>
<td>31</td>
<td>12.09</td>
<td>3.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Commitment</td>
<td>1. Associate</td>
<td>150</td>
<td>59.77</td>
<td>10.56</td>
<td></td>
<td></td>
<td>1 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>2. Bachelor's</td>
<td>913</td>
<td>58.46</td>
<td>10.49</td>
<td></td>
<td></td>
<td>2 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>3. Master's</td>
<td>31</td>
<td>56.35</td>
<td>12.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Commitment</td>
<td>1. Associate</td>
<td>150</td>
<td>22.50</td>
<td>4.91</td>
<td></td>
<td></td>
<td>2 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>2. Bachelor's</td>
<td>913</td>
<td>21.96</td>
<td>4.89</td>
<td></td>
<td></td>
<td>1 &gt; 2</td>
</tr>
<tr>
<td></td>
<td>3. Master's</td>
<td>31</td>
<td>21.74</td>
<td>4.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendance Commitment</td>
<td>1. Associate</td>
<td>150</td>
<td>16.26</td>
<td>4.88</td>
<td></td>
<td></td>
<td>1 &gt; 2</td>
</tr>
<tr>
<td></td>
<td>2. Bachelor's</td>
<td>913</td>
<td>16.47</td>
<td>4.05</td>
<td></td>
<td></td>
<td>2 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>3. Master's</td>
<td>31</td>
<td>15.74</td>
<td>4.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normative Commitment</td>
<td>1. Associate</td>
<td>150</td>
<td>21.00</td>
<td>4.90</td>
<td></td>
<td></td>
<td>1 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>2. Bachelor's</td>
<td>913</td>
<td>20.03</td>
<td>4.66</td>
<td></td>
<td></td>
<td>2 &gt; 3</td>
</tr>
<tr>
<td></td>
<td>3. Master's</td>
<td>31</td>
<td>18.87</td>
<td>5.80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^1 \ p < .05.$

and teachers with bachelor’s degrees in the direction of teachers with associate degrees. It was found that there is a significant difference between the points of teachers with associate degrees and teachers with master’s degrees in the direction of teachers with associate degrees. In terms of personal rights and retirement, there is no difference between the teachers with associate degrees and teachers with bachelor’s and master’s degrees. That teachers with associate degrees feel inferior may stem from their need for a higher commitment to the organization. Consequently, this may be considered as the cause for their high levels of
According to Table 7, there is a significant difference in terms of the locality of schools (t = 2.65; p < .05). The findings show that teachers working in schools in city centers have higher levels of power distance perceptions than the teachers working in schools in district centers. Teachers' organizational commitment points do not show a significant difference in terms of the locality of schools (t = 0.28; p > .05). Nor is there a significant difference in the sub-dimensions of emotional commitment (t = 0.61; p > .05), attendance commitment (t = 1.95; p > .05) and normative commitment (t = 0.47; p > .05) in terms of the locality of schools.

Fifth question: Is there a significant difference between power distance and organizational commitment points in terms of the locality of schools?

Table 7 shows the t-test results in terms of the locality of the school.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Locality of the school</th>
<th>n</th>
<th></th>
<th>SS</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power distance</td>
<td>City Center</td>
<td>387</td>
<td>14.20</td>
<td>3.91</td>
<td>2.65*</td>
</tr>
<tr>
<td></td>
<td>District Center</td>
<td>707</td>
<td>13.56</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>City Center</td>
<td>387</td>
<td>58.70</td>
<td>10.88</td>
<td></td>
</tr>
<tr>
<td>Organizational</td>
<td>District Center</td>
<td>707</td>
<td>58.51</td>
<td>10.40</td>
<td>.28</td>
</tr>
<tr>
<td>Commitment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Commitment</td>
<td>City Center</td>
<td>387</td>
<td>21.90</td>
<td>4.95</td>
<td>.61</td>
</tr>
<tr>
<td></td>
<td>District Center</td>
<td>707</td>
<td>22.09</td>
<td>4.85</td>
<td></td>
</tr>
<tr>
<td>Attendance Commitment</td>
<td>City Center</td>
<td>387</td>
<td>16.75</td>
<td>4.23</td>
<td>1.95</td>
</tr>
<tr>
<td></td>
<td>District Center</td>
<td>707</td>
<td>16.23</td>
<td>4.16</td>
<td></td>
</tr>
<tr>
<td>Normative Commitment</td>
<td>City Center</td>
<td>387</td>
<td>20.04</td>
<td>4.84</td>
<td>.47</td>
</tr>
<tr>
<td></td>
<td>District Center</td>
<td>707</td>
<td>20.18</td>
<td>4.68</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

According to Table 8, there is a low and negative significant correlation (r = -0.14; p < 0.01) between teachers’ perceptions of power distance in schools and organizational commitment. Table 8 also shows that there is a low, negative and significant correlation between power distance and emotional commitment (r = -0.29; p < .01); a low, negative and significant correlation between power distance and normative commitment; and a low, positive and significant correlation between power distance and attendance commitment (r = .15; p < .01). As the perception of power distance in schools increases, the organizational, emotional and normative commitments decrease but attendance commitment increases.

Seventh research question: Is power distance a good predictor for organizational commitment?

Table 9 presents the regression analysis results regarding the prediction of emotional commitment.

Table 9 shows that power distance is a significant predictor for emotional commitment (F = 101.46; p = .00). This predictive aspect accounts for 9% of the variance in teachers' levels of emotional commitment. The standardized regression coefficient took the value of β = -0.29. According to the t-test for the significance of regression coefficients, the t value was found to be t=51.64 and p < .05. According to this, the power distance in schools is a good predictor of teachers’ emotional commitment.
According to Table 9, it can be said that a 1-unit increase in power distance will reduce the level of teachers' emotional commitment to 0.370 unit.

**DISCUSSION AND CONCLUSION**

The study has found that teachers’ perceptions of power distance in schools is at a medium level. According to the findings of a study by Hofstede (2001), Turkey is among the countries which are examples of a culture with high power distance. When we examine the findings of the studies that were carried out on power distance in recent years in Turkey, we see that in some studies power distance was found to be at medium levels (Akyürek, 2001; Basım, 2000; Turan, Durceylan and Şişman, 2005; Gürbüz and Bingöl, 2007, Aktaş and Can, 2012; Sarıgül, 2010), and in some at high levels (Yaman and İrmak, 2010). It can be said that power distance in schools increases if the school administrators move away from democratic way of thinking when using their powers. Teachers’ belief that school administrators discipline the teachers by keeping themselves at a distance from teachers may have resulted in the discernibly high perceptions of power distance. Given the time that elapsed after Hofstede’s study (2001), it can be said that power distance has been in a tendency to decrease.

Organizational commitment was found to be at a medium level as a whole; at a high level in emotional commitment sub-dimension, at a medium level in attendance commitment sub-dimension, and at a medium level in normative commitment sub-dimension. In some studies carried out in schools in Turkey, organizational commitment was found to be at a medium level (Erdoğmuş, 2006; Özkan, 2008; Erdaş, 2009; Budak, 2009; İmamoğlu, 2011; Cevahiroğlu, 2012 and Yumuşak, 2013). In the dimension of emotional commitment, which means internalizing the values of the institution, identifying oneself with the institution, considering the institutional problems as one’s own problems, and one’s loyalty to the institution, the perception was found to be higher compared to other dimensions.

The power distance that teachers perceive in schools is at a medium level and differs according to gender. In some studies (Akyol, 2009; Terzi, 2004; Turan, Durceylan and Şişman, 2005; Macit, 2010; and Jahangirov, 2012), it was found that teachers’ perception of power distance does not differ according to gender. This confirms the findings of the present study. Teachers’ level of organizational commitment in general does not differ significantly in terms of gender. However, it significantly differs in the emotional and normative sub-dimensions of commitment. Male teachers feel a bit more emotional and normative commitment to their institutions than female teachers. It can be said that this difference between males and females in Turkey is the result of the general acceptance in the public that social roles that have been cast on females come before the work life. Teachers’ attendance commitment does not differ significantly according to gender. However, some studies found significant differences in the organizational commitment points in terms of gender. In their studies, Cevahiroğlu (2012), Erdaş (2009), Budak (2009), İmamoğlu (2011) and Yumuşak (2013) found that male teachers perceive organizational commitment at higher levels than female teachers. According to the results of the studies made by Erdoğmuş (2006), Özkan (2008), Kılıçoğlu (2010) and Gülle (2013), the perception of organizational commitment does not differ significantly in terms of gender.

Teachers’ perception of power distance in schools does not differ significantly in terms of branch. In a study with students in different branches, Macit (2010) found that students’ perception of power distance do not differ. Studies made by Erdoğmuş (2006), Erdaş (2009) and Budak (2009) found that branch does not affect the perception of organizational commitment.

The present study has found that teachers’ perception of organizational commitment significantly differs in terms of branch. It was found that form teachers feel more committed to their schools than branch teachers do. A significant difference was found also in the emotional, attendance and normative commitment sub-dimensions in terms of branch. In all sub-dimensions, form teachers feel more committed to their schools than branch teachers do. The high levels of commitment of form teachers in all sub-dimensions of organizational commitment may be the result of the fact that they teach the same classes for a long time.

Teachers’ perception of power distance in schools shows significant difference in terms of the locality of schools. The task of inspection in primary education institutions is a function of local educational inspectors. The offices of local educational inspectors are in

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>R</th>
<th>R²</th>
<th>β</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>27.127</td>
<td></td>
<td></td>
<td>-</td>
<td>51.64</td>
</tr>
<tr>
<td>Power distance in school</td>
<td>-.370</td>
<td>-.29</td>
<td>.09</td>
<td>-.29</td>
<td>-10.01</td>
</tr>
</tbody>
</table>

N = 1094; F = 101.46; **p < .01.
Provincial Directorates for National Education. Educational inspectors, provincial directors of national education, deputy provincial directors of national education or departmental directors are near the schools in city centers, which makes the inspection of such institutions possible at any time. This makes it necessary for the school administrators to keep their schools ready all the time for inspection. It is possible that this pressure on school administrators may affect their attitudes and behaviors negatively. It can be said that this negative effect on school administrators may increase the power distance in schools. However, a study by Macit (2010) showed that students’ perception of power distance does not differ in terms of the locality of the schools.

Teachers’ organizational commitment points, together with its sub-dimensions, do not show a significant difference in terms of the locality of the school. Because all schools are easily accessible and because teachers working in primary education institutions in villages and living in city centers have the necessary transport facilities, it can be said that the locality of the school does not affect the levels of organizational commitment. In a study, Özkan (2008) reached similar findings and concluded that the levels of organizational commitment do not differ significantly in terms of the locality of schools. According to Yumuşak (2013), there is no difference between emotional commitment points; however, he found that the levels of normative and attendance commitments of teachers living in city centers are higher than those of teachers living in small towns.

There is a low, negative and significant correlation (14%) between teachers’ perception of power distance in schools and their organizational commitment. As the perception of power distance in schools increases, teachers’ organizational commitment decreases.

A low, negative and significant correlations (29%) was found between power distance and emotional commitment. As the perception of power distance in schools increases, teachers’ emotional commitment decreases.

There is a low, positive and significant correlation (15%) between teachers’ perception of power distance in schools and their attendance commitment. As the perception of power distance in schools increases, there does teachers’ attendance commitment. Though it would be desirable to have low power distance in all organizations, maintaining a certain level of power distance for teachers may contribute positively to the attendance of teachers to schools.

There is a low (13%), negative and significant correlation between teachers’ perceptions of power distance in schools and their normative commitment to schools. As the perception of power distance in schools increases, teachers’ normative commitment decreases. When we examine the studies made in Turkey, we see that some correlations regarding power distance or organizational commitment have been identified. For example, İmamoğlu (2011) found low (38%), positive and significant correlations between identification sub-dimension of organizational commitment and the perception of procedural justice. Kılıçoğlu (2010) identified a low (21%), positive and significant correlation between organizational climate and organizational commitment. In a study, Yücel and Koparan (2010) found a medium (41%), positive and significant correlation between power distance and genderual harassment behavior. Akyol (2009) found a medium, positive and significant correlation between power distance and work-oriented leadership style.

The present study concluded that the power distance that teachers perceive in schools is a good predictor of their emotional commitment. This predictive aspect accounts for 9% of the variation of teachers’ level of organizational commitment ($r^2 = .085$). This means that teachers’ perception of 1-unit power distance in schools results in a .374-unit decrease in their perceptions of organizational commitment.

By training first the school administrators and then all the administrators within the whole body of the Ministry of National Education about “power distance”, it may be possible to reduce the power distance boosting factors in their attitudes and behaviors.

Creating a power distance profile by extending such studies into private schools, new insights can be introduced into the area. Furthermore, by carrying out this study in the universities it may help develop new paradigms about the concept of power distance in higher education. This study is based on ‘power distance’ which is one of the cultural dimensions defined by Hofstede and can be replicated with its other cultural dimensions.

**Conflict of Interests**

The authors have not declared any conflict of interests.

**REFERENCES**


Examining the role of college student's approach to Math

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Many educators posed in class why students lack interest in learning mathematics. Regularly this lack of interest in learning is accompanied with difficulties and is perceived by teachers, in general, from the basic stage until the adult stage process. The study seeks to explain the strength of association or correlation between social psychology, and analyse the interrelationship between attitude toward mathematics and academic performance of college students from Panama and Mexico. We evaluated 1076 students from both countries, under the three attitude components: cognitive, affective and behavioural. The results of the study revealed that there are significant correlations between attitudes toward mathematics and academic performance by college students. This study sensitizes us to the fact that having a positive attitude towards mathematics is a demonstration in which they participate directly or indirectly such as teachers and everyone else involved in the teaching-learning process. However, we recognize a more intimate involvement in teaching, and rightful address issues traditionally ignored by all. Moreover, affective and emotional wellbeing issues are addressed, even with the limitations and loopholes that the years leave in the student. Better result could be achieved if the student sets goals with a degree of difficulty, that he or she perceive his or her own progress.

Key words: Academic achievement, college students, freshmen, indecision.

INTRODUCTION

Mathematics has been viewed as complex and difficult, which has led to negative attitude among students towards the subject. For students to analyze a mathematical problem is not easy, hence the huge effort by teachers and educational institutions attempting to change this attitude towards this science subject. It is clear that there is a great problem in the learning of mathematics since each year a growing number of students’ failures (in mathematics) are reflected in any part of the world. Similarly, we notice that most of the upper level students lack basic numeracy skills, and observe that students, who graduate from public
institutions and to a lesser extent private school, have insufficient knowledge in the field of mathematical reasoning.

If math is discussed, it seems strange; ordinary people are not able to understand it. It is as if a few human beings were endowed with a kind of chip in their brains, allowing them to process these expertise. Nevertheless, what about others, who think that they will never use mathematical knowledge in their social environment. This problem gets worse when they have a negative attitude due to their poor academic performance in mathematics (Morales, 2009); revealing that majority of these students (who have negative attitude) do not see a utility of mathematics in their lives.

The Secretariat of Public Education of Mexico (SEP) and the Panama Ministry of Education (MEDUCA) face a great challenge specifically in relation to math. The situations are:

1. Improve learning processes to reduce the difficulties that students have in understanding concepts,
2. Problem solving,
3. Transfer the contents to everyday situations and, in general,
4. Improve processes and mathematical thinking strategies that allow them to continue learning this science so that it hits the culture and society.

Failure and dropout rates are alarming, among evolving students in their education. As it is advanced in educational levels, from elementary level to high school, failure and dropout rates grow significantly, decreasing terminal efficiency significantly, as shown below, in the case of higher education. The reported data vary according to the institution and the entity, so there is not a consensus. Table 1 shows conservative data about the rate of desertion and failure, according to indicators of the SNIIEE - SEP of Mexico, MEDUCA of Panama and the DIGEPLEU of University of Panama (UP).

All of the above leads to the point that we are trying to show the importance of the development of an individual in the society who is able to criticize logical arguments mathematical misconceptions or poorly prepared processes. This allows the evolution of the knowledge of science. These mathematical logical arguments can only be acquired through the development of a well-structured mathematical thinking. International education policy (NTCM Standards) points to the need that an individual should be able to guess how to build examples where the goodness of an information is displayed, i.e., that he may judge or evaluate their limitations as strengths. Nevertheless, this indicates the importance of building a mathematical thought, which can only be achieved if the subject in question imitates a mathematician.

A mathematical thought is a scientific and critical thinking that is constructed of processes such as mathematical concepts in a useful manner for an individual within a society (García and Morales, 2012). This thinking is not easy to build in a school environment, if we do not use didactic activities; that allow interacting mathematical information necessary for the construction of the mathematical knowledge in the students. In that sense, it is noteworthy to observe the low performance obtained by Panama and Mexico in the PISA tests (program that measures the skills necessary at an international level math and reasoning). It will be that the Panamanian and Mexican school system made little effort; it is necessary that educational policies change with a primary goal: develop comprehensive individuals able to make suitable trials to build a society that solve their own problems. Complementing the above we can point the following: are there thoughts ingrained in students that do not let them travel from a naive thinking towards a mathematical thought? Sometimes these naive thoughts represent a concern in the educational environment and the teacher often characterizes it as a negative aspect in the learning process, as in his stance, a mistake of the students in his mathematical work is a failure. Some authors have called it obstacle (Brousseau, 2006) in the sense that prevents other expertise new ideas to emerge.

A part of the problem of education lies not only in the ability or inability of students to understand certain topics, but in their attitude toward the school, teacher and the subject. Authors propose that the success of a student in math class is related to the positive attitude towards the activity to carry out this matter and that includes personality traits that involve the intellectual and emotional spheres. This leads to the observation that

Table 1. Indicators of dropout and failure.

<table>
<thead>
<tr>
<th></th>
<th>Dropout rates Panama*</th>
<th>Reprobation rate Panama*</th>
<th>Dropout rates Mexico**</th>
<th>Reprobation rate Hidalgo</th>
<th>Reprobation rate Mexico**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory</td>
<td>9.21</td>
<td>12.82</td>
<td>14.00</td>
<td>15.9</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>20.9***</td>
<td>-</td>
<td>38**</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

attitudes in basic education depend on beliefs that are received from childhood being asserted by the verbal impact and the behavior of the family, in school and community life. Various studies (Guerrero and Blanco, 2002; Akey, 2006) reported that attitudes show a significant positive correlation with motivation, discipline, learning and behavior in general. It is therefore of utmost importance to delve into their training. Among people we found different perceptions or ideas about mathematics leading to show certain attitudes towards it; and "various investigations have since revealed that the success and failure in mathematics depends on more than just knowledge of certain mathematical content requirements. Properly knowing facts, algorithms and procedures is not enough to ensure success"(Gómez-Chacón, 2009).

"Is there a relationship between the affective and cognitive?" To find an answer to the question is the main motive that has led us to the present investigation. The authors of this paper believe that insofar as they investigate aspects of psychological nature in the education process, in this case the attitude, you will get information, which will make proposals to improve the teaching-learning process. Thus, the objective of the study is analyze and compare the relationship between attitudes towards mathematics and school performance in college students of Panama and Mexico.

METHODOLOGY

Due to the characteristics of the sample and of the research problem, it is a descriptive study - in which attitudes and correlation - used to measure the degree of relationship that exists among the variables of the study. (Hernández et al., 2010). Its temporal scope corresponds to a cross-sectional study, as it is observed in a single point in time. Its scope, according to Bravo (2008), is micro sociological, since the phenomenon was investigated in small groups, without claim to generalize the results.

The study was conducted in two phases for the survey: in the first, we designed an instrument of scale of attitudes and applied it to the students of the Autonomous University of the State of Hidalgo (UAH) and of the University of Panama (UP). From the review of literature sources related to the object of study and analysis of items of other questionnaires (Azumendi, 1992, Gómez-Chacón, 2000); were selected verbatim some of them, while other items were created, and modified for the construction of a scale to measure attitudes toward mathematics by these students. Then we proceeded to the organization and structure of the component items looking at their correspondence with the three components of attitudes: cognitive, affective and behavioral.

The type and amount of questions is then determined. Closed questions given the ease to interpret and evaluate the answers you need are considered. The scale was developed in a Likert-type format (Hernández et al., 1991) with five response options (strongly agree (TA) -according (DA) - Undecided (I) - Disagree (ED) - totally disagree (TD)), depending on the degree of compliance with each of the aspects mentioned in the items. That is, a 5-point scale.

We proceeded to administer the questionnaire to a small sample of students in order to validate and evaluate its reliability (n = 247 students from Panama and Mexico). It was found that five indicators were not measured properly. The indicators were mathematical competence, assessment of school mathematics, trust, belief and motivation. Therefore, it was necessary to restructure some items (statements). For this research, a reliability index of 0.928 instrument used was obtained, and so the survey is valid and reliable.

Later, the questionnaire was given to judges who were active math teachers, to validate the content of the instrument. Based on feedback from the judges some adjustments were made to the scale.

This cohort was a total of 247 students for validation, 120 are from the Faculty of Exact Natural Sciences and Technology (UP) and 127 of the Institute of Basic Sciences and Engineering (UAH). In the second phase, the same instrument for the correlational study of variables was applied to first year students of the same universities in 2012. The total sample was 1076 students, 530 from Panama and 546 from Mexico.

Figure 1 shows the whole structure linked to the concept of attitude that is related to their cognitive, affective and behavioral components discussed in this research.

The first phase of the study has an exploratory character, since it tried to get closer to the attitudes of the surveyed students (Bravo, 2008), and after that, validate (I) an instrument of the research, without taking into account the semester they were in. Meanwhile, the second phase groups were the total number of freshmen from which the population of students who had previously failed in the subject (mathematics) were removed; since these groups may represent a bias in information, affecting the variables studied.

The selection of the second phase was determined by a stratified sampling, which is used when the population is divided naturally into groups containing the variability of the population. The strata represented by the participating universities are set out in Tables 2 and 3. In these, the universities present the number of students that enrolled in 2012, as well as population size and sample size estimated by career. For the determination of the sample size was established a confidence level of 95% and an estimated error of 5%. The population is composed of university freshmen of both sexes, from Mexico for the school year 2011-2012 of the ICBI of the University, and from Panama of the UP in the following faculties: Faculty of Exact Natural Sciences and Technology; Faculty of Architecture; Faculty of Electronics and Telecommunications.

In the research line called affective domain are located studies related to attitudes towards mathematics. This arises from the need to build theoretical framework derived from considering the teaching and learning of mathematical aspects such as: the conceptions, beliefs, motivations, powers, ideas, visions, beliefs, opinions, feelings, emotions and attitudes that have students and teachers toward mathematics, teaching, learning or assessment obtained from mathematical learning.

Pérez-Tyteca et al. (2011) conceptualized that students learn predisposition to respond positively or negatively to Mathematics, which determines their intention and influences their behavior in the field. Thus, in their study, aimed at students who had just entered the university, concluded that there are significant differences between the areas of knowledge of Technical Education, Health Sciences and Social Sciences -scientific area- that determine significant differences, statistically, between men and women in their anxiety about mathematics, where the former are those who have less anxiety.

Academic performance and their indicators

In this work, academic performance is defined operationally with the average of the qualifications obtained in the subject at the end of the course: January-July 2012 in Mexico, and March-July 2012 in Panama.

For practical purposes according to the hypothesis, we have defined four different categories for this variable, but the main one for this study is the outstanding academic performance. The student is considered as high merit individual; there is a high
**Figure 1.** Outline on research methodology.

**Table 2.** Population and sample of students, generation 2011-2012.

<table>
<thead>
<tr>
<th>Autonomous University of the State of Hidalgo</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Industrial Engineering</td>
<td>110</td>
<td>86</td>
</tr>
<tr>
<td>Bachelor of Civil Engineering</td>
<td>85</td>
<td>70</td>
</tr>
<tr>
<td>Biology Degree</td>
<td>45</td>
<td>41</td>
</tr>
<tr>
<td>Bachelor of Engineering in Environmental Geology</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>Degree in Chemistry</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td>Bachelor of Food Chemistry</td>
<td>45</td>
<td>41</td>
</tr>
<tr>
<td>Bachelor of Computer Systems</td>
<td>137</td>
<td>102</td>
</tr>
<tr>
<td>Bachelor of Architecture</td>
<td>116</td>
<td>84</td>
</tr>
<tr>
<td>Bachelor of Engineering in Electronics and Telecommunications</td>
<td>66</td>
<td>57</td>
</tr>
<tr>
<td>Bachelor of Engineering in Material Science</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Mexico’s total</td>
<td>679</td>
<td>546</td>
</tr>
</tbody>
</table>

**Table 3.** Strata: population and sample of students - generation 2012.

<table>
<thead>
<tr>
<th>University of Panama</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree in Physics</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Degree in Mathematics</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Biology Degree</td>
<td>206</td>
<td>136</td>
</tr>
<tr>
<td>Bachelor of Engineering in Geology</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Degree in Chemistry</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Degree in Industrial Engineering Chemistry</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Bachelor of Computing</td>
<td>116</td>
<td>90</td>
</tr>
<tr>
<td>Bachelor of Architecture</td>
<td>287</td>
<td>165</td>
</tr>
<tr>
<td>Bachelor of Engineering in Electronics and Telecommunications</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Bachelor of Surveying and Geodesy</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Panama’s total</td>
<td>679</td>
<td>546</td>
</tr>
</tbody>
</table>
Maure and Marimón

Table 4. Categorization of the level of academic performance.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mexico Numerical grade</th>
<th>Panama Numerical grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Insufficient (I)</td>
<td>Insufficient</td>
</tr>
<tr>
<td>1 to 5</td>
<td>Poorly (D)</td>
<td>61 to 70 (D)</td>
</tr>
<tr>
<td>6 to 7</td>
<td>Average (R)</td>
<td>71 to 80 (C)</td>
</tr>
<tr>
<td>8 to 9</td>
<td>Good (B)</td>
<td>81 to 90 (B)</td>
</tr>
<tr>
<td>10</td>
<td>Excellent (E)</td>
<td>81 to 100 (A)</td>
</tr>
</tbody>
</table>

Table 5. Component and indicators within the scale of attitude toward mathematics.

<table>
<thead>
<tr>
<th>Cognitive component</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators</td>
<td></td>
</tr>
<tr>
<td>Belief</td>
<td>1</td>
</tr>
<tr>
<td>Mathematical proficiency</td>
<td>2</td>
</tr>
<tr>
<td>Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>Anxiety</td>
<td>4</td>
</tr>
<tr>
<td>Affective Component</td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>5</td>
</tr>
<tr>
<td>Interest</td>
<td>6</td>
</tr>
<tr>
<td>Emotional block</td>
<td>7</td>
</tr>
<tr>
<td>acceptance</td>
<td>8</td>
</tr>
<tr>
<td>Behavioral Component</td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td></td>
</tr>
<tr>
<td>Rejection</td>
<td>9</td>
</tr>
<tr>
<td>Confidence</td>
<td>10</td>
</tr>
<tr>
<td>Fellowship</td>
<td>11</td>
</tr>
<tr>
<td>Curiosity</td>
<td>12</td>
</tr>
</tbody>
</table>

congruence between what is taught and what he proves to have at the end of the educational process and the condition of school success and failure focused on the student grades.

1. Insufficient performance: corresponds to a score of 0 for the student of UAEH and 0 to 60 for the student of the UP.
2. Poorly performance: this group consists of students with a score between 1 to 5 in UAEH and 61 to 70 for the student of the UP.
3. Average performance: this group consists of students with a score of 6 to 7 in UAEH and 71 to 80 students at the UP.
4. Outstanding performance: here are students who have a score in the qualification route of 8 to 10 in UAEH and 81 to 100 in the UP.

In the system of evaluation of school learning that governs the Autonomous University of the State of Hidalgo (UAEH), most of the ratings are based on the decimal system, from 0 to 10. At the University of Panama (UP), rating is assigned on a scale from 0 to 100, based on letters. These two systems in which the retrieved score translates in the categorization of the achievement of learning may vary from well done to poor learning. In this study, criteria used in evaluation of both educational systems were adopted to conceptualize academic performance in mathematics (Table 4). In Mexico and Panama, academic performance is the process achieved by students on the basis of the programmed objectives.

Attitude and their indicators

Attitude is treated as a quantitative variable that is related to its components, cognitive, affective and behavioral. The attitude towards mathematics is defined, according to Petriz et al. (2010), as a series of provisions that make the individual to familiarize or not with certain mathematical contents.

This variable is treated as categorical; it is a scale graded in a positive and negative level, in terms of components, cognitive, affective and behavioral, using the scale developed by Morales (2009), adapted to the two countries. Each component possesses indicators, which are the scores obtained by sample on the scale of attitudes. Then, the measurement of this variable was carried out considering several categories for each of the components of attitude among a sample of students during the semester from January to July 2012. The categories that make up each of the components in the scale of attitude toward mathematics created for this study are presented in Table 5.

RESULTS AND DISCUSSION

First comes a descriptive analysis to characterize the
sample according to different variables included in the study. Measures of central tendency and dispersion were calculated. The results are presented in tables and figures.

**Analysis of the academic achievement of students participating in mathematics**

Figure 2 presents the level of academic performance achieved by the students of the sample of both countries. As noted above, took into account the conceptualization of performance proposed by Lent et al., (1994). So studies focused on the problems existing in the process of teaching and learning of mathematics have incorporated affective and socio-cultural type variables, which have concluded that the cognitive factor is not the only participant in the learning, since it is a process shared between love and the context of the subject learning (Planchart et al., 2005).

**Description of the attitudes in the total simple**

The data collected with the attitude toward mathematics scale were analyzed initially using a frequency distribution analysis organized in two ways: with the total sample and segregated by country. We found that students show a concentration in points 3 and 4 of the scale, which means that they have an attitude of indecision to partially positive. In addition, there is a low frequency in points 2 (negative attitude) and 5 (positive attitude) of the scale. If it well tends to be favorable in the beginning, the negative evolution that occurs over time and the persistence of this unfavorable nuance are very specific features that you should present to understand future reactions of the student and intervene appropriately in them (Auzmendi, 1992) (Figure 3).

This study took into account the following ethical guidelines: participants were informed of the study objectives, admission was voluntary and do not cause harm or discomfort in the session in which the Attitude scale was
Correlation of variables in study.

<table>
<thead>
<tr>
<th></th>
<th>Attitude</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Global</td>
<td>Panama</td>
<td>Mexico</td>
</tr>
<tr>
<td>Men</td>
<td>Academic achievement</td>
<td>Coefic. ($\rho$)</td>
<td>0.767**</td>
<td>0.815**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Significance</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Women</td>
<td>Academic achievement</td>
<td>Coefic. ($\rho$)</td>
<td>0.740**</td>
<td>0.829**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Significance</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

* significance level of 0.01; * Significance level of 0.05. ** Significant from normal control, **$P < 0.01$.

Figure 4. Diagram of dispersion performance and attitude in mathematics.

Correlation between academic performance and attitude

Another type of analysis data on attitudes towards the mathematics consisted of assessing the relationship between them and academic performance in mathematics. The Spearman Correlation Coefficient was used for this. Correlated scores on the scale of attitude had scores of students in the school term from January to July 2012 (Table 6).

The results of the analysis suggest that academic achievement correlates positively with attitude. The value of the correlation coefficient ranged between 0.725 ($\rho \leq 0.01$), students from Mexico and 0.829 ($\rho < 0.01$), students of Panama. That is, the positive attitude towards mathematics is related to increased academic performance in the field. In this way, the results indicate that attitudes toward mathematics in freshmen of both universities are associated with academic performance in mathematics; particularly, there is a propensity to higher performance in the field corresponding to a positive attitude toward Mathematics (Figure 4). The implication of this, in accordance with Auzmendi (1992), is that: “attitudes affect the learning process and, at the same time, education has a broad power over them. Thus, is intended to better that which agrees or is consistent with our own attitudes or which produces greater pleasure, and a proper education can improve them in students in a given area”(p. 18).

Lim et al. (2009), who concluded that attitudes towards this discipline are a multidimensional phenomenon, also studied these aspects recently; they found that these components influence the learning of students in the sense to provide them with an overview of the math with real world connections. The findings of this study are similar to those found by Álvarez and Soler (2010) in regards to that students perceive mathematics as a useful discipline, not only in the academic field but also in the labor one. However, they express mistrust and anxiety in situations that involve the use of mathematical procedures.

The result suggests that the greater the attitude towards mathematics the greater is students’ academic achievement.
Table 7. Descriptive statistics of scores of attitude toward mathematics by gender of students.

<table>
<thead>
<tr>
<th>ATTITUDE</th>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Global</td>
<td>3.24</td>
<td>0.75</td>
</tr>
<tr>
<td>SEX</td>
<td>Men</td>
<td>3.21</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>3.28</td>
<td>0.80</td>
</tr>
<tr>
<td>PANAMA</td>
<td>Global</td>
<td>3.33</td>
<td>0.74</td>
</tr>
<tr>
<td>SEX</td>
<td>Men</td>
<td>3.29</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>3.36</td>
<td>0.76</td>
</tr>
<tr>
<td>MEXICO</td>
<td>Global</td>
<td>3.22</td>
<td>0.54</td>
</tr>
<tr>
<td>SEX</td>
<td>Men</td>
<td>3.20</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>3.27</td>
<td>0.55</td>
</tr>
</tbody>
</table>

In addition, we evaluated the correlation between academic performance and each of the components of the attitude: the cognitive, the emotional and the behavioral. With regard to the gender difference in attitudes was found that the average for females is 3.28 points ($s = 0.80$); for males was 3.21 points ($s = 0.71$). Furthermore, by analyzing the behavior of attitudes according to the age of the students we found the following: Students with less than or equal to 18 years of age had a mean attitude of 3.21 points ($s = 0.80$). In contrast, over 18 years had an average of 3.27 points ($s = 0.68$) (Table 7). This result is inconsistent with the approach of some authors aforementioned, since there a common decrease in positive attitudes towards some school subjects related to science.

Analysis performed to contrast the differences between the mean scores on the scale of attitudes among male and female students showed that the difference is not significant.

There is a significant positive correlation between academic achievement and cognitive dimension in Panama ($r = 0.637$, $p = 0$) and Mexico ($r = 0.466$, $p = 0$). This indicates that there is a high probability that the cognitive development of the student directly affects academic performance in a positive way, implying that greater understanding of mathematical knowledge leads to better academic performance. It is shown that the value obtained gives as a result a strong correlation between attitude and academic performance in Panama and Mexico, being the estimation of this value directly linked to the objective in this research. Apparently, the result corresponds to the expectation of the study: increased attitude towards mathematics by the student leads to higher academic performance.

On the other hand, the cognitive development of an individual is intimately linked with solving problems. However, the majority of respondents are aware that solving a problem involves a comprehensive analysis, the application of concepts and a well-marked strategy as Pólya (2001). You can see that half of the students consider that they have feelings of anxiety that affects the resolution of mathematical problems and this is manifested in their poor academic performance. With this found correlation, you can set an interdependence between the cognitive development of a subject and its attitude towards resolutions of problems specifically for mathematics.

Taking into account what we have exposed here it can...
be considered positive to incorporate psycocentric and empiriocentric approaches in the curricular treatment of mathematics again. The first requires you to do a math more linked to experience and involves the application of the principles of reality, necessity and usefulness. The second is to respect the characteristics of the person who learns and leads to the realization of objectives and activities according to their possibilities. The positive state of mind causes people to think, feel and act in ways that promote both the construction of resources and the generation of links (Ramírez and sources, 2013).

Consideration of the aforementioned approaches, as well as the use of appropriate organizational structures avoid, huge gaps currently occurring between the didactic proposals and possibilities of learning of students. That is why viable psycocentric and empiriocentric approaches are integrated at the level of the curriculum planning, which is a modification of the learning programs and a more coherent adaptation to the cognitive potential of our students (Gairín, 1987, p.138). This means, for example, and among other things, abandoning the idea that for every school year there must be an increase of mathematical knowledge. Farias and Pérez (2010) show that to get students to learn is not enough to explain the subject and urge them to learn. It is necessary to arouse their attention, creating in them a genuine interest in the study, stimulate their desire to achieve the intended results and cultivate the taste by the schoolwork.

Conclusion

There have been elements that support the hypothesis initially formulated for this work, since there were significant correlations between the attitudes toward mathematics and academic performance by students, since students who have positive attitudes towards the mathematical learning have better grades and academic performance is outstanding. Within the aspects found, there are strong links between the developments of mathematical problems; (cognitive component) resolutions and the affective part of a subject are presented. It is recommended, that when a student registers at the university he/she must make a series of adjustments to adapt to the demands of this level of education. In this way, he/she will not be moving to another career because he/she is sure about what he/she wants to study. Frequently, these students come from an upper level where they have developed poor or inadequate study habits and may even have some deficiency in skills.

Studies on this subject, due to the shortcomings of a large number of students about basic math skills for performance in different areas of life are relevant to both education systems. From this work, it is suggested to encourage the development of good attitudes toward math learning through educational and motivational activities by teachers, students and even throughout the educational system. That is, the teacher is one of the main actors of the educational phenomenon, since he/she not only transmits content, but also promotes values, beliefs, needs and, of course, attitudes.

Conflict of Interests

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

Attitude: Having an attitude means being ready to respond in a given way to a social object. Attitude towards mathematics: number of provisions that expresses the individual to accept or not familiar with certain mathematical content.

Behavioral dimension: are verbal and nonverbal skills that show a behavioral adaptation to the situation and context that favors communicate effectively.

Dimension Attitude: Each of the magnitudes of a set used to define a phenomenon. The magnitudes vary attitudes are direction, intensity, prominence, degree of differentiation, action orientation, and content.

Educational Positioning: Fixed useful knowledge for people at a strategic time to give back to the society.

Construct: concepts that are directly manipulated by us, just as it is physical, but are inferable through conduct that is studying psychology.

Scale: perform a number of mathematical calculations of some nature in a tabular format to facilitate the task of performing these calculations to the public or a specific audience.

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Full Length Research Paper

An Interaction of learning and teaching styles influencing mathematic achievements of ninth-grade students: A multilevel approach

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The purposes of this study were to explore students’ learning styles and teachers’ teaching styles and study the effects and interaction effects of learning styles and teaching styles on mathematics achievements. The subjects were 3,382 ninth-grade students and 110 mathematic teachers. The main results revealed that most students were categorized in the reflector style (26.11%), whereas most teachers were categorized in the facilitator style (34.55%). Also, the two groups of learning styles and the three groups of teaching styles had direct effects significantly, and they had 76.47% interaction effects in all matching between them (30.77% matching and 69.23% mismatching) on mathematic achievements. The theorist students were the most advantageous group whereas the reflector students were the most disadvantageous group of learning styles in learning mathematics.

Key words: Learning styles, teaching styles, mathematics achievement, multilevel analysis, moderating effect, interaction effect.

INTRODUCTION

Mathematics is an important subject for science and technological careers but many students still have difficulties and poor performance in the subject and failure in learning it (Peker, 2009; Education, Audiovisual, and Culture Executive Agency, 2011). The foundations of students’ learning mathematics are particularly complex and depend upon numerous factors from students, families, teachers, and schools. Researchers and educators have been trying to depict the factors affecting the learning outcome in mathematics and found interesting factors including learning styles, teaching styles, and interaction effects, either positive (matching) or negative (mismatching) effects (Zhang, 2005; Yazicilar and Güven, 2009; Khandaghi and Farasat, 2011; Sriphai et al., 2011).

There has been a great deal of research about learning style in education. For example, Duff (2001) defined a learning style to be the composite of characteristics cognitive, affective, and psychological factors that serves as an indicator of how an individual interacts with and
responses to individual differences. Entwistle (1991) Cassidy (2004) and Tulbure (2012) defined learning style as a habitual process of perceiving and thinking. It is qualitatively distinct and associated with personality, affection, and motivation characteristics; moreover, it is an important factor to predict students’ success in classroom activities and future learning. The learner with strong learning style preference can especially benefit in academic outcomes (Altun and Yazici, 2010). However, not all students learn the same way; therefore, it becomes imperative that teachers realize the learning style differences and teach in a manner in which all learning styles are incorporated (Cano et al., 1992) to ensure that the largest number of students can learn equally and effectively. Allinson and Hayes (1988) and Butler (1988) state that identifying individual students’ learning characteristics may both help the students to be aware of their strength and weakness in the subject matter and also help the educators to improve their course design and choose helpful and appropriate learning outcomes. However, not only learning styles affect the student outcomes, but the teaching styles also have important role to improve the students’ outcomes.

Teaching styles are teaching roles comprising attitudes, behaviors, preferred methods and techniques (Vaughn and Baker, 2001; Visser et al., 2006). They can vary between a lecturer/teacher-centered approach and a student/learner-centered approach based on a teacher’s thoughts, ability, and beliefs about what constitutes a good teaching (Alhussain, 2012). Some teachers believe that a class should be teacher-centered, where the teacher is the expert and authority in presenting information. In contrast, others take a learner-centered approach, where teachers view their role more like a facilitator for students learning. Teaching style awareness may also impact on the classroom setting, activities assessment, and teacher-student interactions which become information for better understanding, changing, modifying, and supporting to improve their interaction with students while maintaining all contextual aspects of teaching. Due to the various types of both teaching styles and learning styles in every classroom, many educators have suggested that learning and teaching styles interaction might reduce inequality of learning by getting more information of their matching styles (Vermunt and Verloop, 1999; Lage et al., 2000; Alhussain, 2012).

Many recent studies have confirmed that there are causal relationships between learning and teaching styles from “matching” and “mismatching” on their student achievements (Vosser et al., 2006; Perterson et al, 2009; Naimie et al., 2010; Kinshuk et al., 2010). They have hypothesized that matching is considered as the congruence between the learner, the lecturer and the subject matter (Hayes and Allinson, 1996; Ford and Chen, 2001, Damrongpanit et al., 2013) which affect positive learning outcomes. Mismatching is between the preferred learning styles, the nature of the subject matter and teaching method which would result in lower motivation, poorer performance and perhaps in attrition (Felder and Silverman, 1988; Akdemir and Koszalka, 2008; Rahimi and Asadollahi, 2011). Several studies suggested that matching may be significantly more effective in creating a learning environment that is conductive to learning than mismatching (Nor, 2006). According to the literature review, it is clear that learning style and teaching style are closely congruent with student development, and it is possible for each class to achieve the development together both in matching and mismatching. However, when teachers apply this knowledge in the classroom, they have to be careful about their teaching styles because they may mismatch particular student learning style in order not to have negative effects of mismatching. This is because recent studies did not show clear results of the interaction effect of style by style (Ford and Chen, 2001). In addition, there has been limitation concerning the scope of research in terms of subject matters and methodology (Peterson et al., 2009; Ghada et al., 2011), so it is difficult to apply the results to the subject matters which are necessary for the development of students’ basic skills such as mathematics, science and linguistics.

Thailand is one of the countries trying to solve the problems of students’ learning achievement. As a result of a study of the knowledge on learning style and teaching styles, the researchers could explain the problems caused by mismatching which is ignored in the classroom. This can be seen by the continuous assessments which show low learning achievement and learning skills resulting in students’ skipping classes, negative attitude towards learning, and conflict and violence in schools. These problems tend to continue although there have been a variety of developments of learning management. The researcher has summarized the literature review and thinks that this research finding would bring up a new different perspective for revising and supplementing the policy more carefully and efficiently than ever.

Objectives

The two research objectives were 1) to explore the students’ learning styles and teachers’ teaching styles and 2) study the effects of the learning styles and teaching styles on mathematics achievements.

Research hypothesis

Based on the literature review, the learning and teaching styles were dominantly a character on their own in the definition. Therefore, it was hypothesized for the effects and the interaction effects (matching) as follows: 1) the theorist student had the highest effect on mathematic
achievement; 2) the expert teacher had the highest effect on students’ mathematic achievement; and 3) the positive (matching) and negative (mismatching) interaction effects comprised the expert teacher matched with the theorist and the pragmatist students, the formal authority teacher matched with the activist and the theorist students but mismatched for the reflector and the pragmatist students, the personal model teacher matched with the activist and the theorist students but mismatched for the reflector and the pragmatist students, the facilitator teacher matched with the activist and the pragmatist students but mismatched for the theorist and the reflector students, and the last group, the delegator teacher matched with the pragmatist and the reflector students but mismatched with the theorist and the activist students.

LITERATURE REVIEWS

Learning styles

Learning styles were the individual’s natural or habitual pattern of acquiring and processing information in learning situations. A core concept is that individuals differ in how they learn. The idea of individualized learning styles originated in the 1960s, and has been the focus of such a lot of research and practitioner-base studies in the area. There are a variety of definitions, theoretical positions, models, interpretation and measures of the construct (Beck, 2001; Cassidy, 2004). The well-known and most implemented work was conducted and inspired by Witkin (1962) and Pask (1972) who proposed the global/analytic differences in a very wide range of human activity from basic perception to career choice. Pavio (1971) proposed the verbalizer/visualizer to investigate cognitive personality, Kolb (1984), Honey and Mumford (1996), and Vermunt (1994) proposed the learning style models emphasizing the students’ information processing and learning centered method. Dunn et al. (1989) and Keefe and Monks (1986) proposed the learning style model emphasizing instructional preference and social interaction. Although there were various approaches, Honey and Mumford learning style investigation which is widely cited and issued in education and training, emphasized view about information processing. Peterson et al. (2009) have summarized studies in this area and found out that approximately 27 percent recommend this concept.

Based on Kolb’s Experiential Learning Model (ELM) (1984), which consists of two dimensions between information receiving (which explains concrete experimentation and abstract conceptualization), and information processing (which explains active experimentation and reflective observation) (Rayner and Riding, 1997). Honey and Mumford devised a new model which was specifically aimed at middle/senior manager in business. Their reasoning was that Kolb’s framework seemed to have little validity with the manager, and it was far more preferable to the quiz managers on their general behavioral patterns than to ask them upfront how they go about to learn. Their model involved two adaptations to Kolb’s framework, reworded the stages in the learning cycles to be applicable to the managerial experiences of decision-making and problem-solving: having experience, reviewing and reflecting on the experience, concluding and drawing their own conclusion, and planning the next steps by putting the theory into practice. Then, they proceeded to align the stages with specific characteristics, namely the Activist (ACTV) (Kolb’s active experimentation) defined as one who learns by doing, needs to get their hands dirty, and dive in with both feet first. Having an open-minded approach to learning, involving themselves fully and without bias in new experiences, the Theorist (THEO) (Kolb’s abstract conceptualization) is one who likes to understand the theory behind the actions. They need models, concepts and facts in order to engage in the learning process. Preferring to analyze and synthesize, drawing new information into a systematic and logical ‘theory’, the Reflector (REFC) (Kolb’s reflective observation) is one who learns by observing and thinking about what happened. They may avoid leaping in and prefer to watch from the sidelines. Preferring to stand back and view experiences from a number of different perspectives, collecting data and taking the time to work towards an appropriate conclusion, and the Pragmatist (PRAG) (Kolb’s concrete experience) is one who needs to be able to see how to put the learning into practice in the real world. Abstract concepts and games are of limited use unless they can see a way to put the ideas into action in their lives (Visser et al., 2006). It is important to note that Honey and Mumford considered these traits to be adaptable and acquired preferences – and not fixed personality characteristics.

Teaching styles

Teaching styles also vary as much as learning styles do, but they have been written about less than learning styles. Teachers have different strengths and preferences with regards to how they develop an individual’s learning and learning styles (Visser et al., 2006). Some instructors give lectures, while others demonstrate or discuss. Some focus on rules, and others on examples. Some emphasize memory, and others understanding.

Teaching style is expressed through the behaviors, characteristics and mannerisms that reflect teachers teaching philosophy and the role the teachers prefer to take when conveying information in a classroom. It is defined based on four components including creation, continuity, effectiveness, and evaluation (Khandaghi and Farasat, 2011). The most common teaching styles inventory was developed by Grasha and Riechman (1996) who
identified five potential approaches for classroom teachers: the Expert (EXPT), defined as one who possesses knowledge and expertise oversees, guides, and directs learners, gains status through knowledge, and focuses on facts; the Formal Authority (AUTH), defined as one who possesses status among learners because of knowledge and authority or position, follows “traditions” and standards of medical practice, focuses on rules and expectations for learners, and supervises learners closely with critical eye toward standard practices and procedures; the Personal Model (PMOD), defined as one who leads by personal examples, suggests prototypes for appropriate behavior in office, shows learners how to do things, and wants learners to observe and emulate approach; the Facilitator (FACT), defined as one who emphasizes personal nature of teaching-learning relationship, asks questions, explores options with learners, and focuses on learner responsibility, independence and initiative; and the Delegator (DELG), defined as one who encourages learner responsibility and initiative when appropriate to have a learner function autonomously, takes the role of a “resource person”, answers questions, and periodically reviews a learner progress. In sum, it could approximately be divided into two styles: teacher-centered style (direct), which consists of Expert, Authority, and Personal Model, and learning-based style (indirect), comprising Facilitator and Delegator (Khandaghi and Farasat, 2011)

Matching of learning and teaching styles

A considerable amount of research suggests that matching the teaching and learning styles, an individual’s learning style preference to specific learning activity, will help to enhance students’ outcomes. Although they have a perfect congruence in findings, Peacock (2001), Vosser et al. (2006) Naimie and friends (2010) and Kinshuk et al. (2010) assert that students’ and teachers’ styles are better matches, for students are likely to work harder both in and outside the classroom, and also to benefit much more from their learning outcomes. Reid (1996) suggests that matching the teaching style with the learning style gives all learners an equal chance in the classroom, and builds student self-awareness. In contrast, Felder and Spurlin (2005) state that when mismatching, the students may become bored and inattentive, do poorly on test, get discouraged about the course and the curriculum. In addition, they themselves, in some cases, change to other curricular or drop out of school. For this reason, it has been suggested that teachers should be aware of their styles and help students to identify their learning styles. Attention to learning and teaching styles has been described as part of the desirable trend toward learning-centered and “need-based instruction”. It has also been suggested that teachers should help students to identify their learning styles and become more flexible (Peacock, 2001; Visser et al., 2006; Yazicilar and Guven, 2009; Naimie et al., 2010; Ghada et al., 2011) and make equal chances to learn in the classroom. This results in an efficient teaching and learning process (Reid, 1996).

However, although many of the research results have shown the important impact of both the teaching and the learning style, there is still unclear evidence of how to implement them. Most of the researches on the teaching and the learning styles have been cross-sectional in nature (Visser et al., 2006). Many of the studies were conducted in higher education (Peacock, 2001; Visser et al., 2006; Naimie et al., 2010; Ghada et al., 2011; Kinshuk et al., 2009), in specific courses such as English, accounting or online courses (Peacock, 2001; Naimie et al., 2010; Visser et al., 2006; Ford and Chen, 2001). However, they showed only the results with significant statistics due to small sample size (Ghada et al., 2011; Kinshuk et al., 2009). They could not explain which pair of the learning and teaching style was matching and mismatching (Ford and Chen, 2001; Naimie et al., 2010, Ghada et al., 2011), and showed the matching of learning style of student and learning style of teacher instead of matching learning and teaching styles of the students and the teacher. Hence, inside the classroom, there is the challenge of appreciating how various instructional approaches and fields of studies interact with students of different abilities and variable attitudinal orientations. Therefore, it is not only difficult to explain the stability, the type of matching and mismatching style but also to clarify conclusions in different subjects.

METHODOLOGY

Participants

The data were collected from 3,382 ninth-grade students (38.60% boys and 61.40% girls) who enrolled in the academic year of 2012 and, correlated with, 110 mathematics teachers in the north east area of Thailand. These subjects were selected by multistage random sampling.

Instruments

1. The Learning Style Questionnaire (LSQ) based on Honey and Mumford’s learning style questionnaire (1996) which was designed to evaluate the comparative strengths of the four students’ learning styles: Activist (ACTV), Theorist (THEO), Reflector (REFC), and Pragmatist (PRAG) was adapted by translating LSQ, which comprised 80 items (divided in 20 items for each learning style), in the Thai language. The meaning of each sentence was checked by the English language specialists and was tried out with 71 ninth-grade students. According to the four learning styles scoring and unifying the discrimination index by item-total correlation method between ($r_{iv}$) 0.263-0.732 at .05 significant level, the reliability ($\alpha$) for each learning styles was 0.831, 0.822, 0.870, and 0.860 respectively.

2. Teaching Style Inventory (TSI) in the Thai language version based on Grasha’s Teaching Style Inventory (2002) was designed to evaluate the comparative strengths of the different five teachers’
teaching styles: Expert (EXPT), Authority (AUTH), Personal Model (PMOD), Facilitator (FACT), and Delegator (DELG). The TSI, which consisted of 40 items (divided in 5 items for each teaching style) in Thai language was checked by the English language specialists and was tried out with 40 teachers involved with ninth-grade students. The result of TSI revealed that the discrimination index by item-total correlation method between ($r_i$) 0.263-0.732 and the reliability ($\alpha$) for each teaching styles were 0.789, 0.757, 0.896, 0.889, and 0.757, respectively. 

3. The Mathematic Achievement Test, which consisted of 30 items in multiple choices, was tried out, and the results showed that the difficulty of items ($p$) and the discrimination ($r$) were ranged from 0.212-0.647 and 0.222-0.889 respectively, and the reliability (KR20) was 0.873.

Data collection and analysis

The students were given one hour to complete the test and unlimited time to complete the LSQ under the suggestion of the researcher. Then the data structures between students’ achievements and learning styles and teachers’ teaching styles were organized. For the teachers, they were given unlimited time to complete the TSI. The answers from LSQ and TSI were checked and used as dummy variables to indicate only one learning style for each student and only one teaching style for each teacher. The student and the teacher received 1 when they had the highest mean score of learning or teaching style, based on scoring on the prototype questionnaire criteria, and 0 for the rest of the lower mean score of learning or teaching styles. For mathematic achievement, the researcher used composite raw scores to analyze the hypothesis model.

Cross-tabulation analysis was used to explore the learning styles and the teaching styles. Multilevel regression analysis with the random slope was used to study effects of learning and teaching styles and interaction effects between them on achievement by using Mplus program (version 7).

**FINDINGS**

The main research results were as follows:

According to the learning and teaching style survey, it was found that 3,382 ninth-grade students were categorized in each learning style closely ranging from 23.74 to 26.11%. The biggest group of students appeared to be in the REFCC style, whereas the smallest group was in the THEO style. For 110 mathematics teachers, it was found that there was a different proportion between each style ranging from 6.36 to 34.55%. The biggest groups of teachers closely appeared to be in the FACT and the EXPT styles, whereas the smallest group was in the AUTH style (Table 1).

From the multilevel regression analysis, the results showed that the intraclass correlation (ICC) of mathematic achievement was 0.556. The model showed the goodness of fit with LR=8484.943, AIC=17031.887, BIC=17221.799, and ABIC=17123.298.

As for the learning and teaching style effects, the mean of slopes of THEO and PRAG, or mean of regression coefficients from learning styles on mathematic achievements, was positively statistical significant at .01 level (2.555 and 1.908 respectively). In the teacher level, three regression coefficients from the teaching styles on classroom mathematic achievements which consisted of DELG, PMOD, and FACT were positively statistical significant at .01 level (bDELG=10.631, bPMOD=3.758 and bFACT=3.342).

In relation to the interaction effects of learning and teaching styles, the 13 out of 17 interaction effects (76.47%) were statistical significant at 0.05 level (Table 2; Figure 1). They can be divided into 4 positive effects or “matching” (30.77%) and 9 negative effects or “mismatching” (69.23%) on students’ achievement. The ACTV students were matching with the AUTH ($b_{AUTH}=3.029$) and the FACT ($b_{FACT}=1.177$) teachers, but they were mismatching with the DELG ($b_{DELG}=-3.332$) and the PMOD ($b_{PMOD}=-0.697$) teachers. The THEO students were matching with the EXPT ($b_{EXPT}=2.356$) and the

<table>
<thead>
<tr>
<th>Table 1. Result of learning and teaching styles survey.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Styles</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>EXPT (33)(^a)</td>
</tr>
<tr>
<td>(30.00%)</td>
</tr>
<tr>
<td>AUTH (7)(^a)</td>
</tr>
<tr>
<td>(6.36%)</td>
</tr>
<tr>
<td>PMOD (16)(^a)</td>
</tr>
<tr>
<td>(14.55%)</td>
</tr>
<tr>
<td>FACT (38)(^a)</td>
</tr>
<tr>
<td>(34.55%)</td>
</tr>
<tr>
<td>DELG (16)(^a)</td>
</tr>
<tr>
<td>(14.55%)</td>
</tr>
<tr>
<td>Total (110)(^a)</td>
</tr>
<tr>
<td>(100%)</td>
</tr>
</tbody>
</table>

Note: \(^a\) number of teachers.
<table>
<thead>
<tr>
<th>DV</th>
<th>IV</th>
<th>b</th>
<th>S.E.</th>
<th>Z</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>-</td>
<td>7.340**</td>
<td>0.679</td>
<td>10.810</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Teacher Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>MATH</td>
<td>6.178a</td>
<td>0.000</td>
<td>999.000</td>
<td>999.000</td>
</tr>
<tr>
<td></td>
<td>$S_{ACTV}$</td>
<td>0.918</td>
<td>0.853</td>
<td>1.076</td>
<td>0.282</td>
</tr>
<tr>
<td></td>
<td>$S_{THEO}$</td>
<td>2.555**</td>
<td>0.898</td>
<td>2.844</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>$S_{RECT}$</td>
<td>1.277</td>
<td>0.922</td>
<td>1.384</td>
<td>0.166</td>
</tr>
<tr>
<td></td>
<td>$S_{PRAG}$</td>
<td>1.908**</td>
<td>0.507</td>
<td>3.763</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>MATH</strong></td>
<td>EXPT</td>
<td>0.149</td>
<td>1.088</td>
<td>0.137</td>
<td>0.891</td>
</tr>
<tr>
<td>(Classroom Achievements)</td>
<td>AUTH</td>
<td>1.000a</td>
<td>0.000</td>
<td>999.000</td>
<td>999.000</td>
</tr>
<tr>
<td></td>
<td>PMOD</td>
<td>3.758**</td>
<td>1.120</td>
<td>3.356</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>FACT</td>
<td>3.342**</td>
<td>1.017</td>
<td>3.286</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>DELG</td>
<td>10.631**</td>
<td>1.168</td>
<td>9.104</td>
<td>0.000</td>
</tr>
<tr>
<td>$S_{ACTV}$</td>
<td>EXPT</td>
<td>0.148</td>
<td>0.341</td>
<td>0.434</td>
<td>0.664</td>
</tr>
<tr>
<td>(Mean of slope from ACTV to MATH)</td>
<td>AUTH</td>
<td>3.029**</td>
<td>0.998</td>
<td>3.035</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>PMOD</td>
<td>-0.679*</td>
<td>0.324</td>
<td>-2.098</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>FACT</td>
<td>1.177**</td>
<td>0.338</td>
<td>3.479</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>DELG</td>
<td>-3.332**</td>
<td>0.733</td>
<td>-4.545</td>
<td>0.000</td>
</tr>
<tr>
<td>$S_{THEO}$</td>
<td>EXPT</td>
<td>2.365**</td>
<td>0.235</td>
<td>10.075</td>
<td>0.000</td>
</tr>
<tr>
<td>(Mean of slope from THEO to MATH)</td>
<td>AUTH</td>
<td>-2.260**</td>
<td>0.187</td>
<td>-12.106</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>PMOD</td>
<td>-2.555**</td>
<td>0.618</td>
<td>-4.137</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>FACT</td>
<td>-0.978**</td>
<td>0.197</td>
<td>-4.968</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>DELG</td>
<td>1.026*</td>
<td>0.475</td>
<td>2.160</td>
<td>0.031</td>
</tr>
<tr>
<td>$S_{REFC}$</td>
<td>EXPT</td>
<td>1.000a</td>
<td>0.000</td>
<td>999.000</td>
<td>999.000</td>
</tr>
<tr>
<td>(Mean of slope from REFC to MATH)</td>
<td>PMOD</td>
<td>-2.634**</td>
<td>0.665</td>
<td>-3.959</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>FACT</td>
<td>-1.820*</td>
<td>0.800</td>
<td>-2.275</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>DELG</td>
<td>-0.256</td>
<td>0.320</td>
<td>-0.801</td>
<td>0.423</td>
</tr>
<tr>
<td>$S_{PRAG}$</td>
<td>EXPT</td>
<td>2.433</td>
<td>1.278</td>
<td>1.905</td>
<td>0.057</td>
</tr>
<tr>
<td>(Mean of slope from PRAG to MATH)</td>
<td>PMOD</td>
<td>0.428</td>
<td>1.279</td>
<td>0.334</td>
<td>0.738</td>
</tr>
<tr>
<td></td>
<td>FACT</td>
<td>-3.576**</td>
<td>1.156</td>
<td>-3.095</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>DELG</td>
<td>-2.403*</td>
<td>1.175</td>
<td>-2.045</td>
<td>0.041</td>
</tr>
<tr>
<td>Residual</td>
<td>MATH</td>
<td>5.682**</td>
<td>1.265</td>
<td>4.492</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>$S_{ACTV}$</td>
<td>2.999**</td>
<td>0.532</td>
<td>5.638</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>$S_{THEO}$</td>
<td>2.186**</td>
<td>0.629</td>
<td>3.476</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>$S_{RECT}$</td>
<td>0.001</td>
<td>0.003</td>
<td>0.417</td>
<td>0.677</td>
</tr>
<tr>
<td></td>
<td>$S_{PRAG}$</td>
<td>1.260**</td>
<td>0.409</td>
<td>3.081</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Note: 1) *fixed value as one to be the reference group, 2) * p-value<0.05, ** p-value<0.01.

DELG (bDELG = 1.026) teachers, but they were mismatching with the PMOD (bPMOD = -2.555) and the FACT (bFACT = -0.978) teachers. The REFC students were mismatching with the PMOD (bPMOD = -2.596) and the FACT (bFACT = -1.820) teachers. The PRAG students were matching with the EXPT (bEXPT = -3.576) and the DELG (bDELG = -2.403) teachers.

**Conclusion**

Although the learning styles and teaching styles have been broadly researched, little knowledge was known about the Thai students’ learning styles and mathematic teachers’ teaching styles. The purposes of this study were to explore the students’ learning styles and
teachers' teaching styles and to study effects of learning styles and teaching styles on mathematics achievements. The research results showed various magnitudes and patterns of matching and mismatching between learning and teaching styles on achievements. It was implied that the suitable theoretical framework could be explained by the individual difference of both the Thai students and the mathematics teachers. The researcher has surprisingly noted narrow percentage between each learning style, that is, approximately 25%. Whereas, it was obvious in the different percentage for mathematics teachers' teaching style, which was inclined to be the facilitator and the expert styles. These were related to a number of prior studies that had found a variety of learning and teaching styles. This is a good reason to support teachers to avoid the two mistakes to assume that the model of teaching is a fix or inflexible formula and that each learner has a fix style of learning (Joyce and Well, 2004).

In addition, the researcher was not surprised about the theorist and the pragmatist students that appeared to be dominant in mathematic learning. By definition, the theorist and the pragmatist students, were commonly strong in reasoning and concept in response to mathematics, science and engineering, which were fields of study that are abstract, logical, and reasoning relying on a content based learning. On the other hand, the activist and the reflector students were strong in activity and experience based learning (Honey and Mumford, 1982). These abilities are directly beneficial in mathematics learning by nature. These results were relative to the studies of Orhun (2012) Okura and Bahar (2010) Peker (2009) and Ozgen (2013) that have explained students' mathematic outcome by Kolb’s ELM and found that the Assimilator and the Converge (the Theorist and the Pragmatist in Hunny and Mumford’s concept respectively) had higher mathematical self-efficacy and lower mathematic anxiety than those of the rest of the two groups of learning styles. The reflector student in particular, the only learning style, was affected negatively from all teaching styles. The activist and the reflector students were strong in activity and experience based learning (Honey and Mumford, 1982). These abilities are directly beneficial in mathematics learning by nature. These results were relative to the studies of Orhun (2012) Okura and Bahar (2010) Peker (2009) and Ozgen (2013) that have explained students' mathematic outcome by Kolb’s ELM and found that the Assimilator and the Converge (the Theorist and the Pragmatist in Hunny and Mumford’s concept respectively) had higher mathematical self-efficacy and lower mathematic anxiety than those of the rest of the two groups of learning styles. The reflector student in particular, the only learning style, was affected negatively from all teaching styles. They should be closely observed on their learning from all mathematics teachers. This is the weakest and most sensitive learning style, and the students received the teaching instruction bias from all teachers. In relation to this problem, the researcher hypothesized that their learning method was accentuated in data collection, observation, and summarization which might be contrast to the nature of the subject. Hyman and Rosoff (1984) suggested the related factors to investigate the relationship between how teachers teach and how students learn which consisted of the teacher, student, and subject matter. For this reason, the activist and the reflector styles might be dominant in other subjects relevant to where their capability belongs.

As for teaching styles, the three teaching styles (delegator, personal model, and facilitator) have significantly positive effects on mathematic achievements, especially the DELG style. These three groups have the common characteristic of encouraging a student's response to their initiative and support students' need to learn independently (Grasha, 1996). Hugh (2011) described these manners as a progressive teacher type who support their students and had an active role or learner-center approach. Not only can they promote academic outcomes, but also the progressive teachers foster the positive relationship in the classroom and create more flexible activities in learning processes (Education, Audiovisual, and Culture Executive Agency, 2011).

Now that there are more details than ever, the matching results have strongly confirmed the interaction effect on students’ achievement for every learning and teaching style. The results showed style by style matching and mismatching both positively and negatively. This could be explained by Grasha's suggestion (2002 p. 93) about “the instructional method bias” in the classroom management system which makes inequality for learning. Various patterns were found to rely on the dominant style of teachers and students. According to the main results, the six pairs of matching consisted of the theorist and the pragmatist students matching with the expert teacher; the activist student matching with the formal authority and the facilitator teachers; and the activist and the reflector students mismatching with the formal authority teacher. These matching and mismatching were congruence with research hypotheses. In contrast, the rest of the twelve pairs of matching were different from the research hypothesis in the manner of the direction of the interaction and statistical significance. This may be incongruence due to specific subject, specific groups of students and teachers in specific culture in Thailand. All these different conditions were the important influential factors to consider how learning and teaching styles interact (Hyman and Rosoff, 1984; Dunn and Dunn, 1992). It should be underlined about the reflector achievement mismatching with all the teaching styles. There may be three main reasons to explain. Firstly, the mathematic nature and the logical and content-based subject were the impediment for the students with reflector learning style who were strong in listening and elaborately thinking. No matter how the teaching styles were implemented, it is still difficult to enhance mathematic achievement for this group if they lack the necessary basic content in the field. Secondly, in Thai mathematic classrooms, almost all of the teaching methods emphasize lectures, and individual students are given limited time, which was in contrast to the reflector who prefer to listen and to observe for their learning (Honey and Mumford, 1996; Herasymowycz, 1997).

In conclusion, each learning style and teaching style had effects on mathematic achievement of students unequally, both positively and negatively. Also, these effects could be changed when interaction effects are considered. In these cases, 76.47% of students were affected. These can be divided in 30.77% positive and 69.23% negative effects, by approximation. Based on the
results, the researcher have concerns about the importance of matching research areas to give more necessary details for implementations in the classrooms and schools based on many educators' and researchers' suggestions (Hayman and Rosoff, 1984; Peacock, 2001; Visser et al., 2006; Naimie et al., 2010; Ghada et al., 2011).

Recommendations

Based on the evidences, the students should be responsible for their own learning. Effects of both learning and teaching styles distinctly appeared in every classroom system. Most instructors always teach the ways they like, but they neglect to consider the students' information for learning management. The researchers strongly supported to use the information from the research results urgently. This can be applied step by step. Firstly, the researcher strongly agreed with what many educators have been suggesting to impulse teachers' awareness of students' different learning styles, and this is their direct responsibility to create equality for their students. It is the most important to take the knowledge of learning and teaching styles as an important part in learning achievement. Teachers should accommodate students' learning styles to design lesson plans before the first semester begins every academic year. However, the progressive teachers affected more on mathematics achievements than the traditional teachers. The traditional teachers, especially the experts, affected positively on students' learning mathematics. This implied the important role of the expert for all learning styles even if the expert did not significantly affect directly on mathematics. Also, it should be noted for teachers to oversee, guide, and focus on facts in mathematics content to prepare their students. As the learning-center students construct their basic concept by themselves, it is not a good choice for enhancing mathematic achievement, but it might be different in other subjects. Secondly, it is hardly possible for teachers to use all teaching methods in any one lesson, and they could not select or plan to teach the right student for positive matching of their own teaching style in the classroom. Changing one's teaching style may not benefit enough students and may limit the instructor's ability to impart all the information in the classroom. The administrators should support their teachers' realization of teaching and learning styles to share the experience between teaching styles, enhance using various media types, and cover learning styles of students in the classroom. Finally, the school administrators and policy makers should rapidly help the teachers, especially in the personal model style, to understand how to adapt their teaching method or use more educational media for student learning process, and to help the students especially in the reflector students who received negative effects from matching more than the others in mathematics.

For future studies, the researcher believe that the effects of learning and teaching styles not only appeared in mathematics but also in other important subjects based on what the prior literature reviews have implied the different effects from matching or mismatching in different subjects. Even though they used different theoretical frameworks, they did not imply research results in the students and teachers in Thailand because of the many different factors in the Thai culture. Furthermore, it may be a good shortcut if the future study directs towards mismatched student for elucidating half of the Thai students' improvement, such as the alternative educational media, assessment, or homework characteristics for supplementing the mismatched students efficiently.

Conflict of Interests

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENT

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REFERENCES

Full Length Research Paper

Lifelong learning perceptions of pre-school pre-service teachers

Çiğdem Kılıç

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The purpose of this study is to determine the perception level of pre-school pre-service teachers concerning lifelong learning and to verify if there is a meaningful relationship between lifelong learning perception and gender/grade levels of students. The study group of the research designed by scanning model is made up of Abant Izzet Baysal University Bolu Preschool Education Teaching program students (N= 217). The research data were obtained from the application of "Lifelong Learning Perception Scale". Mean, standard deviation and t- tests were used in data analysis. As a result of the research, it was concluded that pre-school pre-service teachers do believe in the necessity and importance of life-long learning, but show no interest concerning lifelong learning activities in cultural terms aside of their profession. On the other hand, no significant correlation was found between the students’ perceptions of lifelong learning and the gender variable. In terms of grade variable, final grade students have presented more favorable opinion compared to lower grades.

Key words: Life long learning, adult education, pre-school education, pre-service teachers.

INTRODUCTION

Mankind starts learning while still in the womb and this adventure continues till the end of his life. Learning process is a set of lifelong activity that is spread to the human’s entire life and that can not be limited with school education. Basic concept of lifelong learning has first been launched by a group of UNESCO experts, used and strongly emphasized in the mid 90s and modified as learning “from cradle to grave” (EC, 2003). According to Ulutasdemir et al. (2011, 2226), learning can spread to every single stage of life as from pre-school to post-retirement, from formal education in schools and/or universities to vocational training at work or from the usage of various technologies that families grasp from their children to learning during TV watching or even museum visits.

People -at all stages of their lives- feel the necessity to learn something due to the changing lifestyles or their increased responsibilities. It is not possible for school education -covering the early stages of life- to serve for the training needs all life long. Moreover, as a result of rapid developments in science and technology today, information is outdated very quickly. According to Yilmaz (2000,34) the information taught in formal education institutions can be outdated as soon as formal education

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ends or even merely before it ends. In such a case, person needs continually to educate, change, renew himself.

On the other hand, European Union has built up its the education strategies on three main issues: shortage of skilled labor, global competition and increasingly aging society. According to data on hand, within the next thirty years, one-third of European Union citizens will be aged 60 and over. This situation highlights the importance of the required new educational policies in order to let the elder people be present in economic and social lives for many years. In other words, this has surfaced the need for starting seminars, courses, hobby shops, cinema/theater clubs, holidays and sightseeing tours or creative, educational and social activities like computer and language courses in order to meet the educational needs of elder people while appealing the training for life (Orlanova, 2012, 3-4). Currently, in Turkey, aging population together with its inevitable economic and social problems is not a big issue when compared with EU countries, but still is a pending item to be solved considering the improved quality of life not only in Turkey but also in many other countries of the world.

Life-long learning basically has three main functions: (i) lifelong learning for economic development; (ii) lifelong learning for personal development and self-realization; (iii) lifelong learning for social inclusion and democratic understanding (Commission of the European Communities, 2006). Within the context of lifelong learning serving for the realization of those three main functions, there are other variations like formal learning, non-formal learning, vocational training, technical training, on-the-job and off-the-job trainings. Therefore, lifelong learning can be expressed to be realized anywhere...at home, at work, at school or anywhere the individual is present. According to Dinevski and Dinevski (2004), lifelong learning offers equal opportunities to individuals while removing the restrictions on concepts like place, time, age, socio-economic level, educational level (Gunuc et al., 2012, 310).

It will be more accurate to rephrase the lifelong learning as modern way of contemporary learning instead of substituting lifelong learning alternatively with contemporary learning which inevitably is differentiated by the political and economic development of the people (Toprak and Erdogan, 2012, 73). In this context, four features of lifelong learning are coming forward when compared with contemporary learning: providing a systemic learning view (covering whole learning styles from structured to unstructured associated with life cycle and taking into account demand and supply in terms of learning opportunities); putting the learner in the center (the diversity of the learner’s needs); motivation of the learning (pointing at one’s own tempo and learning based on self-motivation); emphasis on multiple objectives of the education policy (economic, social and cultural achievements, personal development and citizenship) (CERI, 2001; OECD Observer, 2004).

Strategies for lifelong learning respond to the convergence between the economic imperative dictated by the needs of the knowledge society and the societal need to promote social cohesion by providing long-term benefits for the individual, the enterprise, the economy and the society more generally. For the individual, lifelong learning emphasises creativity, initiative and responsiveness – attributes which contribute to self-fulfillment, higher earnings and employment, and to innovation and productivity. The skills and competence of the workforce are a major factor in economic performance and success at the enterprise level. For the economy, there is a positive relationship between educational attainment and economic growth (OECD, 2007,10).

Although having many positive features, the concept of lifelong learning is seriously criticised by educators. The main criticism towards lifelong learning is raised by the question of what purposes lifelong learning is serving. According to Miser (2011, 111-112), lifelong learning is perceived as a form of social control. Initially, within the concept, the human development perspective was preponderant as being more concerned about learning for enrichment and expansion of people’s lives via cultural and recreational pursuits; however in time, since 1996, it is asserted that lifelong learning is merely relevant for learning for business life. Therefore, due to the intensity of economic stress within the concept of lifelong learning, lifelong learning should rather be restated as lifelong earning and learning for earning (Lifelong 'L'Earning and Learning to 'L'Earn) which is sort of a manifest to economic perspective (Toprak and Erdogan, 2012, 73; Miser, 2011, 113).

Despite the fact that a remarkable criticism is raised, because of changing socio-economic conditions. It is crucial that the individuals completing the formal education should not stay away from educational activities. Individuals should be guided to participate in lifelong learning activities starting from early ages. At this stage, the most important task relies on the teacher (Gencel, 2013, 242). Assuring that teachers and teacher candidates are qualified enough for lifelong learning, it will effectively serve for the realization of the role of "being intermediary in achieving social change" (UNESCO, 1996). In order to assure teachers are skillful enough for lifelong learning, these qualifications are required to be revealed during teacher education. Indeed, Fenwick (2001) mentions two tendencies in teacher education which are effective since the 1990s. The first one is concerned with broadening the professional development process of teachers by the concept of lifelong learning, while the second is concerned with extending the learning capabilities of teachers by actual practices in the society. Similarly, Davis and Sumara (1997) have also pointed out the importance of the fact that teachers are required to be
qualified for lifelong learning as it directly affects the society. In Turkey, researches focusing on teachers or pre-service teachers' lifelong learning skills are very limited in number. According to the results of studies carried out so far in Turkey, teacher candidates' currently studying at universities- lifelong learning tendency is low (Coskun and Demirel, 2012). Teacher candidates take lifelong learning as necessary and important; however, they have misunderstanding of its meaning and scope (Kara and Kuru, 2007). Additionally, teacher candidates consider supporting facilities in universities as insufficient (Koksal and Cogmen, 2013). This study aiming to analyze lifelong learning opinions of prospective teachers studying at preschool teaching departments in Turkey, being a developing country- is assumed to contribute to international literature. While revealing the perspectives of the university students on learning, it is important to determine their perception concerning lifelong learning. Discovering the interests, attitudes, expectations and perceptions of pre-service teachers regarding lifelong learning will serve for development of useful programs accordingly.

In this context, the study was generated under three categories:

1. How is the perception of preschool pre-service teachers regarding lifelong learning?
2. Is there any relationship between the gender of preschool pre-service teachers and their perceptions regarding lifelong learning?
3. Is there any relationship between the grade levels of preschool pre-service teachers and their perceptions regarding lifelong learning?

MATERIALS AND METHODS

Research method

Descriptive method useful for current status screening was applied in this study. Descriptive method is a research approach aiming to picture a past/present condition or event as it is (Karasar, 2005:77).

Sample

The study group is made up of Abant Izzet Baysal University Preschool Education Program students. While determining the work group, it was intended to reach all target population. 217 participants out of 256 have answered the questionnaire. In this descriptive results, 29% of pre-service teachers who participated (n=62) is first grade; 24% (n=51) second grade, 23% (n=50); third grade, 24% (n=53); fourth grade students. 93% of respondents (n=202) were females and 7% (n=15) were males.

Data collection

The "Lifelong Learning Perception Scale" used in the study was developed by the researcher as a quinary Likert scale rating from "(5) strongly disagree" to "(1) strongly agree". Related literature and sample scales related to lifelong learning perceptions was reviewed before developing the scale, then a sample scale was given to adult education experts for having some criticisms and different point of views. Finally, it was decided that the scale may have four dimensions such as positive attitude towards lifelong learning, negative attitude towards lifelong learning, life-long learning need and learning perseverance.

In order to determine the reliability of the measurement tool, a trial scale consisting of 36 items was applied to a preliminary group of 30 students, and according to the results obtained, 6 items were excluded from the scale which tend to decrease the reliability. The Cronbach's alpha coefficient of final scale having 30 items was calculated to be .81. The final scale consists of 30 items classified as positive attitude towards lifelong learning (8 items), negative attitude towards lifelong learning (8 items), life-long learning need (6 items) and learning perseverance (6 items).

Data analysis

To analyze and interpret the data, percent, mean and t tests were used to understand the differences between groups at p<0.05 significance level. The results were evaluated and calculated by means of SPSS (Statistical package for social sciences).

RESULTS AND DISCUSSION

The average and standard deviation of the responses offered by the measurement tool in order to determine the overall perception of the pre-school pre-service teachers concerning lifelong learning are listed in Table 1.

While analyzing the level of participation of pre-school pre-service teachers regarding statements about lifelong learning, students did strongly agree with the statement that "people can learn at any age" and thought that learning was an ageless activity. Likely, students did agree with the statements, "I am passionate about learning new things all the time", "I am thinking of attending all the required courses in order to progress in my profession", "I feel unnecessary to attend any course since internet is offering all kinds of information", "I have no curiosity in learning different subjects other than my profession", "I would like to study if there will be a tangible return on me; otherwise I'm not interested in training activities", "If I might secure a financially comfortable life in the future, I do not want to further struggle to improve myself", "If there is anything that's stuck in my mind, I somehow find a way to learn it", "I think people should continue learning lifelong instead of only throughout the school years", "I feel uncomfortable by constantly feeling the need to learn new knowledge and skills", "I trust myself to learn when faced with brand new information".

In this regard, it is concluded that pre-school pre-service teachers do believe in the necessity of lifelong learning; however they do feel the pressure if constantly
learning new things become a “must” for them. They expressed their willingness to learn new things in order to progress in their own professions and their self-confidence and pleasure in learning new things, while underlying that expressions that the only basis for continuity of learning could be the expectation of tangible outcomes and instead of attending a course for a brand new issue, searching in the web would be much easier and practical.

On the other hand, students gave uncertain feedbacks concerning the statements such as “I think graduate education is necessary for my professional development”, “People are required to have enough financial sources to continue lifelong learning”, “Lifelong learning pushes people to work harder and compete more”. Accordingly, it was concluded that the students did hesitate about having graduate study in terms of professional progress, and rather they believed they could improve themselves with alternative educational activities. Concerning the rest of the uncertain feedbacks, students preferred not to express any opinion about the cost of lifelong learning probably because they had lack of information regarding the social and economic consequences of lifelong learning.

Respondent pre-service teachers did not agree with the statements, "I want to learn something new only when I need to", "I prefer my education life is over as soon as I graduate from the university", "I think undergraduate education is enough for my professional development". They expressed the willingness to learn new things although they might not need at that moment, to attend courses even after undergraduate study rationalizing that vocational education during undergraduate study would not be sufficient during their whole professional lives.

The relationship between the gender variable of the pre-school pre-service teachers and their perceptions concerning lifelong learning was calculated to be statistically insignificant at p<0.05 level. On the other hand, when analyzing the relationship between the grade level of the students (1st and 4th) and their perceptions concerning lifelong learning, the significantly related statements are listed in Table 2.

When considering the T-test results and mean of the groups together, it appears that 4th grade students do believe that everyone should have the chance to learn during lifetime in comparison with 1st grade students. This indicates that as a result of the undergraduate study, students developed positive attitudes for lifelong learning. In another statement that had significant relationship between grades and the lifelong learning attitudes, 1st grade students had less interest in non-vocational subjects when compared with 4th grades. In other words, 4th grade students—as a result of their undergraduate study—did gain the vision of stating teaching as a

### Table 1. The distribution of the opinions of the pre-school pre-service teachers concerning lifelong learning.

<table>
<thead>
<tr>
<th>Statement</th>
<th>N</th>
<th>Mean</th>
<th>Std.Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am passionate about learning new things all the time</td>
<td>217</td>
<td>3.8387</td>
<td>.90101</td>
</tr>
<tr>
<td>A person can learn at any age</td>
<td>216</td>
<td>4.3704</td>
<td>.98446</td>
</tr>
<tr>
<td>I want to learn something new only when I need to.</td>
<td>213</td>
<td>2.4836</td>
<td>1.01682</td>
</tr>
<tr>
<td>I feel my education life is over as soon as I graduate from university</td>
<td>214</td>
<td>2.6168</td>
<td>1.26450</td>
</tr>
<tr>
<td>I think of attending all courses in order to progress in my profession.</td>
<td>217</td>
<td>3.6866</td>
<td>.87848</td>
</tr>
<tr>
<td>It is not necessary to attend any course since internet is offering all kinds of information</td>
<td>217</td>
<td>3.8618</td>
<td>.85487</td>
</tr>
<tr>
<td>I have no curiosity in learning different subjects other than my profession</td>
<td>217</td>
<td>4.0046</td>
<td>.88453</td>
</tr>
<tr>
<td>I would like to study if there will be a tangible return; otherwise I'm not interested in training activities</td>
<td>217</td>
<td>3.6498</td>
<td>.97035</td>
</tr>
<tr>
<td>If I might secure a financially comfortable life in the future, I do not want to further struggle to improve myself</td>
<td>216</td>
<td>3.8333</td>
<td>1.06967</td>
</tr>
<tr>
<td>If there is anything that's stuck in my mind, I somehow find a way to learn it</td>
<td>217</td>
<td>3.9724</td>
<td>.73860</td>
</tr>
<tr>
<td>I think undergraduate education is necessary for my professional development</td>
<td>216</td>
<td>3.3796</td>
<td>1.03175</td>
</tr>
<tr>
<td>I think people should continue learning lifelong instead of only throughout the school years</td>
<td>217</td>
<td>4.2857</td>
<td>.85061</td>
</tr>
<tr>
<td>People are required to have enough financial sources to continue lifelong learning</td>
<td>215</td>
<td>3.0698</td>
<td>1.11480</td>
</tr>
<tr>
<td>I feel uncomfortable to learn new knowledge and skills</td>
<td>217</td>
<td>3.5115</td>
<td>1.06767</td>
</tr>
<tr>
<td>I trust myself to learn when faced with brand new information</td>
<td>214</td>
<td>3.9439</td>
<td>.75473</td>
</tr>
<tr>
<td>I think vocational education of teaching in college will be enough for my life long</td>
<td>215</td>
<td>2.5628</td>
<td>1.08279</td>
</tr>
<tr>
<td>Lifelong learning pushes people to work harder and compete more</td>
<td>217</td>
<td>3.4286</td>
<td>1.09532</td>
</tr>
</tbody>
</table>
profession requiring not only vocational education but also liberal education. However, on the other hand, 4th grades do not want struggle more in the future unless they secure a financially comfortable life. So, given the fact that students are assumed to be financially secured, the learning perseverance decreases towards graduation. It can be alternatively stated as, 4th grades do link the lifelong learning effort more with financial satisfaction. It can be concluded that 1st grades do not have financial expectation on lifelong learning activities; however, 4th grades do impose more financial outcomes on any extra educational activity while getting closer to graduation and earning his/her own living. Lastly, 4th grade students are more self-confident in learning new things when compared with 1st grades proving that self-confidence concerning learning skills proportionally increases as the educational experience accumulates.

Conclusion

According to the results of the study, pre-school pre-service teachers do believe in the need and the importance of lifelong learning, however, they do not feel comfortable about the fact that lifelong learning adventure is becoming a burden. Learning for adults, due to its nature, should be asked and realized on voluntary basis. So, it is quite meaningful that during their entire lives, teachers do “voluntarily” want to learn something, instead of being forced to.

Furthermore, it is concluded that pre-school pre-service teachers have grasped the fact that professional development needs to be maintained throughout their lives even before actually starting their professional lives. It is promising that candidates of teaching profession requiring sophisticated professional and personal development are thinking in the above stated way. On the other hand, another noteworthy finding is that although the pre-service teachers have positive approach concerning lifelong learning, they showed no interest in learning new subjects other than their profession that will have eventually a tangible return. This indicates that one of the criticism factors of lifelong learning which is (Learning to "L" Earn) understanding does also affect preschool pre-service teachers.

According to the survey results, 4th grade pre-service teachers were observed to express extra favorable opinions concerning lifelong learning in comparison to 1st grades as a result of their undergraduate study. Another positive finding of the study is that although there is no course in the undergraduate program of Abant Izzet Baysal University, Department of Pre-School Education that can be associated with the lifelong learning, the undergraduate program has somehow created the need and awareness for the concept in students’ minds. However, considering the fact that only awareness will not be enough to emphasize the importance of lifelong learning, a necessity to develop teacher education programs will arise by adding lifelong courses in the program. Through this course, lifelong learning can be discussed in multi-dimensional perspective such as importance, necessity, positive and negative sides etc

Conflict of Interests

The author has not declared any conflict of interests.

REFERENCES


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Table 2. The distribution of the grade levels of the pre-school pre-service teachers and their perceptions concerning lifelong learning.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tail)</th>
<th>Std.error difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyone should have the chance to be educated during his own life</td>
<td>1.grade: 4.1774</td>
<td>1.043</td>
<td>113</td>
<td>.041</td>
<td>.17354</td>
</tr>
<tr>
<td>I have no curiosity in learning different subjects other than my profession</td>
<td>1.grade: 4.0484</td>
<td>.492</td>
<td>113</td>
<td>.022</td>
<td>.17491</td>
</tr>
<tr>
<td>If I might secure a financially comfortable life in the future, I do not want to further struggle to improve myself</td>
<td>1.grade: 3.6290</td>
<td>-1.296</td>
<td>113</td>
<td>.000</td>
<td>.21337</td>
</tr>
<tr>
<td>I would like to study if there will be a tangible return for me; otherwise I’m not interested in training activities</td>
<td>1.grade: 3.5000</td>
<td>.890</td>
<td>113</td>
<td>.041</td>
<td>.20146</td>
</tr>
<tr>
<td>I trust myself to learn when faced with brand new information</td>
<td>1.grade: 3.9760</td>
<td>-.090</td>
<td>66</td>
<td>.050</td>
<td>.14335</td>
</tr>
</tbody>
</table>


Full Length Research Paper

The effect of letter-writing activities for learning purposes on the students’ learning of the science course and scientific attitude

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The aim of this study is to examine the impact of writing tasks on the 5th grade students’ academic achievement and scientific attitude in science and technology course. The research is a quasi-experimental research including pre-test and post-test designs. These tests were administered as pre-test and post test to the groups. A total of sixty-two 5th grade students studying in the center of Erzurum in the 2012-2013 academic year have created the sample of the study. In the study, the groups were determined as to form purposive sampling. The study is carried out by using two different teaching methods. The first of these methods is writing-supported student-centered teaching method (experimental group) and the other is student-centered teaching method (control group). There are 32 students in the experimental group and 30 students in the control group. But immediately after the end of the application, the experiment group was provided to tell in a letter to one of their 4th grade friends what they have learned about the unit. The data of the research were evaluated by t-test. After the completion of the application, the results of the achievement test and the scientific attitudes scale have revealed that there is a statistically significant difference in favor of the experimental group.

Key words: Writing letters for learning purposes, science achievement test, scientific attitude scale

INTRODUCTION

Science is not only a set of accuracy proven information that scientists obtained as a result of various investigations. But also it is human endeavor which is shown for better understanding of the natural world; it requires imagination and creativity and it is affected by the structure of the society they live in (Çepni and Çil, 2009; Çepni and Çil, 2012).

For a meaningful learning in the science lessons; there are needs of such learning environments where the validity of students’ prior knowledge is checked, the events they come across in real life are based on, the students are always active mentally, mostly active physically and the conceptual change is achieved. These learning environments must offer opportunities to the students in order to reinforce newly learned concepts (MEB, 2007). In order to realize this better, science education in schools has been revised; drastic changes have been made in the science curriculum. The science
and technology course teaching program has been arranged according to the constructivism approach and a student-centered education mentality has been adopted (MEB, 2006). Along with the understanding of constructivism approach, the idea that the students can be offered better learning environments has become dominant in the educational environments (Elen et al., 2007; Wang, 2011).

In the constructivist learning environment, various strategies which can provide learning of the students may be considered. The common features of these strategies are that they activate the students, help their thinking, allow them to configure new information on their old information, make students active and help their learning in the usage of writing activities for learning purposes (Uzoğlu, 2012; Yildiz, 2012; Mason and Boscolo, 2000). Teachers are required to acquire a series of knowledge and competence such as use of effective pedagogy, belief in the benefits of the activity, and the things required to be done during the implementation process in order to use writing to learn activities effectively in the class environment. However, very little time is spared especially for writing in classrooms in Turkey. The main reasons listed are that the teachers perceive writing only as a tool to take notes, and an engagement which takes time because writing requires spending time.

In the teaching-learning process many different methods are used to make the students active and responsible for their own learning. The animation supported teaching method, cooperative learning method, discussion method, computer assisted teaching method and writing activities for learning purposes are among the significant methods used to assist learning. The effect of these methods on the students’ achievement and attitudes has been investigated, and positive results were obtained. Of these methods, the use of writing activities for learning purposes in the teaching-learning process has become widely in our country recently and has been the subject of many studies and research (Uzoğlu, 2012; Yazıcı and Uzoğlu, 2012; Yildiz, 2012; Demirbağ, 2011; Yildiz and Büyükkasap, 2011; Atilla et al., 2010; Günel et al., 2009c; Uzoğlu et al., 2008).

Writing for learning purposes is not only a tool used in the process of knowledge construction but also it is a communication and querying tool which enables the transmission of ideas to different readers (Prain and Hand, 1999). The writing for learning purposes (Holiday et al., 1994; Hand and Prain, 2002; Mason and Boscola, 2000) which is a learning tool rather than an assessment tool can be considered as a powerful tool that helps the students to learn science (Levin and Wagner, 2006). When viewed from this perspective, the writing activities for learning purposes must be used effectively in the classroom settings.

When literature was analysed, four basic benefits of writing to learn activities can be summarized. The benefits can be listed as follows (Uzoğlu, 2010):

1. Writing to learn enables the conceptual change of the individuals. Moreover, it develops the communication and study skills of the students.
2. Writing to learn converts the immature thoughts of the individuals to more consistent and more permanent knowledge.
3. Writing to learn enables retention of knowledge for a long time and also helps the individuals to reinforce the new information they have learned.
4. Writing to learn helps the difficult concepts to be learned by providing an opportunity for the individuals to process the knowledge in their minds.

When analyzing the literature, especially the national literature, it is noteworthy that the studies about how effectively writing activity contributes to the learning are insufficient. Therefore, it is aimed to overcome this deficiency through this work.

The purpose of the study

The purpose of this study is to determine the effect of the letter writing activities for learning purposes on the learning of the science course and scientific attitudes of students. For this purpose, the answers to the following questions have been sought.

1. Does the letter writing activity have any effect on the academic achievement of students in science lessons?
2. Does the letter writing activity have any effect on the scientific attitudes of students in science lessons?
3. What are the opinions of the students about writing letters?

METHOD

The research is a quasi-experimental research; it was carried out with a total of 62 fifth grade students from a secondary school in Erzurum. In the quasi-experimental method, while there is an intervention to the experiment group from the experimental and control groups, there is not any intervention in the control group. At the end of the research the data obtained from the experimental and the control groups have been compared (Pektaş et al., 2009). The experimental and control groups were determined randomly by the researcher. In this study, when carrying out letter-writing activity to the experiment group in addition to the model of constructivist approach in the science teacher guidebooks, the constructivist approach model situated also in the teacher guidebooks has been applied to the control group (Table 1).

Sampling of the study

The sample of the study consisted of 62 students. The students were assigned to experimental group (32) and control group (30) via purposeful sampling method. Purposive sampling, also known as judgmental sampling, is based on the judgment of the researcher for the selection of a sample of individuals with a particular purpose in mind (Balci, 2005).

The research has been applied in a central secondary school of Erzurum in 2012-2013 academic year. There is no difference
between the academic knowledge/achievements and backgrounds of the students in the selected application groups because the notes of the 4th grade students and the trial exam results which were conducted by different publishing houses are quite similar to each other. In addition, students economically, socially and culturally come from similar environments.

Data collection tools

The Science Achievement Test (SAT) and the Scientific Attitude Scale (SAS) have been used as the data collection tool in the research. The SAT was formed according to different publishing houses’ questions that are appropriate to the unit gains of the teacher guidebooks. In order to ensure the reliability and validity of these questions, the opinions and suggestions of an assistant professors and two science and technology teachers who are experts in their field have been taken into consideration. In the light of their opinions, the number of questions was determined as 25. The reliability coefficient of these questions was determined as 0.80 by applying to the 57 students who have the necessary knowledge in this unit.

The Scientific Attitude Scale used in the study was developed by Moore and Foy (1997) and its Turkish adaptation was made by Demirbaş (2005). The scale was formed by forty items. The Cronbach's alpha reliability coefficient of the scale was 0.76 and the correlation of Spearman Brown two half test has been found as 0.84 (Afacan, 2008). The scoring in the face of the attitude sentences of the scale which is improved as 5-point Likert-type is given in the following way; "Strongly Disagree (1)", "Disagree (2)", "Undecided (3)", "Agree (4)" and "Strongly Agree (5)". The scoring in the negative items is its inverse. The scientific attitude scale was administered as pre-test - post-test to the experimental and control group students. While the minimum score a student can get is 40 points as a result of Scientific Attitude Scale, the maximum score is 200. The high scores obtained from the scales represent that the students show positive attitudes toward science and technology lesson.

Application

This study was carried out in relation to the subjects Earth, the Sun and the Moon's shape and size, our world is frisky and say and say grandfather month what's the secret of these changes which are in the light unit of 5th grade science lesson of the secondary school. The application has been completed in accordance with the annual plan for 16 lesson hours. Before the beginning of the light unit, the scientific attitude scale was applied to the experimental and control groups as a pre-test. A letter-writing activity was carried out with the students in the experiment group in addition to the model of constructivist approach in the science teacher guidebooks. In this activity, immediately after completion of the unit the description of the subject is provided in a letter to a friend of 4th grade by the students in the experimental group. The letters written by the students were read in the class according to their wishes. The constructivist approach model which is still in the teacher guidebooks was applied to the control group. At the end of the application the science achievement test was applied to both groups. Furthermore, the attitude scale applied as pre-test was applied as a final test after the completion of study.

Analysis of data

The SPSS 16.0 software package was used for the analysis of the data obtained from the attitude scale and academic achievement test. The meaningfulness of the differences between academic achievement and attitudes of the secondary school 5th grade students was resolved by the independent t test, arithmetic mean (X̄). The level of statistical significance was taken as p < 0.05 for all the tests and comparative studies.

FINDINGS

The data obtained in this study, the SAS and SAT results are given in Tables 2 and Table 3.

According to the results of the post SAT test analysis given in Table 2, the arithmetic average score of the experimental group is 69.75 and the arithmetic average score of the control group is 60.71. According to the independent t-test analysis, there is a statistically difference between test average scores (t(60)= 2.184; p=0.033; p<0.05). According to these results, it can be said that the use of letter writing activity in the light unit of 5th grade science lesson of secondary school makes a positive impact on the students' academic success.

According to the results of SAS pre-test analysis in Table 3, the arithmetic average score of the experimental group is 138.59 and arithmetic average score of the control group is 137.39. There is no statistically difference between the pre-test average scores of the experimental and control groups according to the independent t-test analysis (t(60)= 0.399 ; p=0.692; p >0.05). According to this result it can be concluded that scientific attitude and skills of students who have received the same education in the same school may be the same. When we look at the SAS last test analysis applied after the completion of the process, the arithmetic average score of the experimental group is 144.92 and the arithmetic average score of the control group is 136.94. According to the independent t-test analysis there is a statistically significant difference between the mean scores of SAS recent tests of the experimental and control groups in favor of the experimental group (t(60)= 2.722 ; p=0.008; p <0.05). Based on this result, it can be concluded that the letter writing activities for learning purposes in the secondary school science course help the development of students’ scientific attitudes.

In accordance with the data in Figure 1 students’
Table 2. The results of independent t-test points obtained from post test of SAT questions.

<table>
<thead>
<tr>
<th>Test</th>
<th>Groups</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last test</td>
<td>Experiment</td>
<td>32</td>
<td>69,75</td>
<td>12,273</td>
<td>2,184</td>
<td>0,033</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>30</td>
<td>60,71</td>
<td>21,983</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Max score: 100.

Table 3. The results of independent t-test points obtained from the pre-test and post test of SAT questions.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Groups</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>Experiment</td>
<td>32</td>
<td>138,59</td>
<td>15,612</td>
<td>0,399</td>
<td>0,692</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>30</td>
<td>137,39</td>
<td>9,598</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last test</td>
<td>Experiment</td>
<td>32</td>
<td>144,92</td>
<td>12,818</td>
<td>2,722</td>
<td>0,008</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>30</td>
<td>136,94</td>
<td>10,908</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Max score: 200.

Figure 1. Some students’ opinions about letter writing activity.

opinions about writing activities are positive.

**DISCUSSION AND CONCLUSION**

In this study, the determination of the effect of the realization of letter-writing activities for learning purposes in the light unit of the fifth class of the secondary school on the students’ learning of the science course and their scientific attitude is aimed. Before making research, assuming that the experimental and control groups are homogenous because of 4th grade science notes of the
students and the similarity of the trial results made by different publishing houses, the data of science achievement test has been obtained with the static group comparison (only the last test). The data of scientific attitude and skills were obtained with the classic experiment comparison (pre-test, post-test). Considering the static group comparison results (Table 2) the presence of statistically significant difference in favor of the experimental group is observed (t(60)=2.184; p=0.033; p<0.05). Based on this result, it can be concluded that the realization of letter writing activity in the light unit of 5th grade science lesson of secondary school has provided the students’ learning the topics better (Tynjala, 1998; Hohenshell, 2004), better configurations of the knowledge (Yıldız and Büyükkasap, 2011; Uzoğlu, 2012), the development of their thinking skills, the consolidation of the learned topics and remembering of the concepts (Tynjala, 1998; Hume, 2009). The results obtained from this study are in concordance with the results of some researchers (Günel et al., 2007; Günel et al., 2009a; Günel et al., 2009b; Tynjala, 1998; Hand and Prain, 2002; Mason and Boscolo, 2000). Yıldız and Büyükkasap (2011) explore the opinion of students on Heisenberg uncertainty principle and the impact of writing activities for learning purposes on academic success. It mentions that many students cannot write any equation about the principle. It notes that writing activities about the principle enable the students to retain scientific knowledge. It also emphasizes that such activities facilitate the conceptual changes in students. Günel et al., (2007) in their study suggest that the usage of writing as a learning tool in science classes has drawn attention for the last ten years; and writing to learn activities, a learning tool rather than an assessment tool, is a very strong tool that helps students learn science. Writing to learn not only help individuals learn science but also it is very important for the individuals’ growth and it is a fact that it serves different functions. The study of Uzoğlu (2012) investigates the effect of journal keeping (journal writing), a writing to learn activity, on the student’s academic achievement and attitude in science and technology course. The results of research which were carried out at the end of the subject and topic-based revealed that the students of writing group were statistically more successful than the students control group in terms of total post-test points and total post-test concept points.

Before the beginning of the work it is seen that there is not a statistically significant difference between the BTÖ pre-test average scores applied to the experimental and control groups (Table 3, t (60) = 0.399, p = 0.692, p> 0.05. Based on this result, it can be said that the scientific attitudes of the students in the experimental and control groups are similar. A statistically significant difference is seen between the average scores of BTÖ final test applied immediately after the application (Table 3, t (60) = 2.722, p = 0.008, p <0.05). Based on this result, it can be concluded that the use of letter writing activity for learning purposes in the science lessons helps the students to like the course and develop positive attitudes towards the course (Uzoğlu, 2010). The results obtained from this study are not compatible with the that of Uzoğlu (2012). The study of Uzoğlu (2012) showed that science and technology attitude scale revealed that there was not a statistically meaningful difference between the groups. Based on the results obtained in the study it is concluded that the realization of the writing activities for learning purposes in the science lesson of the secondary school contributes to the academic achievement and scientific attitudes of the students. Moreover, it is concluded that the writing activities for learning purposes help one remember learned information and develop comment, practice and communication skills (Cousin et al., 1999).

Conflict of Interests

The author has not declared any conflict of interests.

REFERENCES


Demirbaş M (2011). An argumentation-based approach to learning science in science classes that use the modal imagery training and writing skills of the students’ science achievement effects. Unpublished Master’s Thesis. Kirşehir University of Science and Technology, Kirşehir.


Comparison of values in 5th, 6th, 7th and 8th grade primary education music class students' workbooks according to Rokeach's and Akbaş's value classifications

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The aim of the present study is to compare the values in the songs of 5th, 6th, 7th and 8th grade primary education music classes students' workbooks according to the value categorizations proposed by Rokeach and Akbaş and which values among the categories mentioned are taught to the students in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks. The study sample consists of 102 school songs included in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks. Data are collected through the international prominent Rokeach Value Survey and Akbaş Value Classification System. Content analysis was made from the data collected and the values of the songs are presented in tables. Upon determining the frequency of the values expressed in the books, they have been compared with Rokeach and Akbaş value classification lists. The results of the present study reveal that the values present in the students' workbooks do not confirm with the majority of the values expressed in the lists of both value categorizations. The study is in line with qualitative research design and aims to determine a present condition. It is based on 102 school songs in the students' workbooks published by Turkish Ministry of Education.

Key words: Music, music education, values education, value

INTRODUCTION

The aim of music education is to develop individual at the most convenient level as a whole including their physical, cognitive, affective, and psycho-motor aspects in a balanced way and contributes to individual's physical and mental development as much as possible. Music education can be defined as the process of creating intentional changes in individuals' musical and overall behavior by enabling them to experience music via providing education on musical hearing, reading, writing, singing, playing instruments, listening to music, being musically-informed, creating music, developing a taste for music and ultimately develop their musical personality (Uçan, 1994, p. 35). Although, the basic aim of music education is to promote a love for music, among its
Values affect peoples' attitudes and behavior; they play an important role in determining, shaping and guiding attitudes and behavior. It is difficult to understand, evaluate and interpret individuals' important problems and values without obtaining reliable information about them. We can predict, to a large extent, the attitudes and the behavior of individuals, groups and various cultures through obtaining information about their values (Başaran, 1992 as cited in Dilmac, 2012, p. 1).

Although there is not a clear consensus on the selection of the values, the value classifications made by educators such as Rokeach, Schwartz and Akbaş are often used in educational studies. Out of these classifications, classifications made by Rokeach and Schwartz is the most prominent one in the international literature (Yiğittir, 2012, p.3)

Rokeach's value classification is very comprehensive and has been recognized by many researchers. According to this classification, values are divided into two categories, namely, "terminal values" and "instrumental values". The values in this classification are presented in the Table 1 (as cited in Yiğittir and Öcal, 2010, 410)

In his study conducted to determine to what extent the affective objectives of the Turkish National Education system were realized considering the students in the secondary schools, Akbaş made a classification of the values included in the Basic objectives of the National education and categorized these values as follows (Yiğittir and Öcal, 2010, 410) (Table 2).

Value concept has been a subject of interests in almost all sciences. Initially studied as the focus of philosophy and associated with the codes of ethics. The concept of value is nowadays more within the interest of sciences such as psychology, sociology, business, medicine and education (Baloglu and Balgalmış, 2005: 21). The value concept, in the field of education, has recently been introduced to music education which is a sub branch of education.

Considering the goals of the Turkish National Education, most of these goals include a variety of values such as loyalty to national values, cleanliness, protecting health, tidiness, fairness, respect, responsibility, benevolence, being patience and honesty. On studying primary school curricula, it can be noticed that teaching values are emphasized in the courses that include social sciences (Life Sciences, Turkish, Music, Social Studies, Religion and Ethics, Games and Physical Activities, Human Rights, Citizenship and Democracy) more than in any other course. In addition, when the academic studies conducted on education are considered, it is seen that there are more studies conducted regarding the primary school social sciences classes. All these findings suggest that music classes are among the important classes in which values education is provided.

This study was conducted to compare the values taught in the songs of the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks
with the values list of Rokeach and values classified in the doctoral study of Akbaş. The findings of the present study reveals that the values in the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks do not overlap with the value classifications of Rokeach and Akbaş.

**METHODOLOGY**

**Research model**

The present research is a qualitative research design and is conducted to determine a case.

Qualitative research design aims to determine perceptions and events in their natural environments using qualitative data collection techniques such as observation, interviews and document analysis. A case study is a research method that investigates a contemporary phenomenon within its real-life context; in which the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yıldırım and Şimşek, p. 278 derived from Yin, 1984, p.23)

**The instrument**

The instrument consists of the 102 songs in the 5th, 6th, 7th and 8th grade primary education music class students’ workbooks published by the Ministry of Turkish National Education.

**Data collection and analysis**

Data collection and analysis was based on document analysis. Document analysis is a data collection tool used while collecting, analyzing and evaluating formal or informal records. The reason why this technique was employed in the present study is that it enables collecting data from a variety of sources and the impossibility of conducting this research using another technique (Ekiz, 2009: 70).

The process of collecting data through obtaining and analyzing records and documents is called document analysis (Karasar, 1999, 9). What is important here is that the researcher should know how to search for what, why, how and where (Sönmez and Alacapınar, 2011: 83).

Documents are one of the data collection techniques used in explanatory case studies in the qualitative research model. The documents analyzed in the present study are students’ workbooks published by the Ministry of Turkish National Education to be used in music classes throughout primary education. Hence, first the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks were downloaded from the official site of the Turkish Ministry of Education.

Second, the songs in these workbooks were counted and enumerated. Afterwards, the wordings of these songs were scanned and coded according to the values expressed in their themes. Thus, the values expressed in each of these were determined.

Data collected were analyzed using content analysis. The main aim of content analysis is to obtain concepts and relations that can explain the data collected.

The collected data in the descriptive section are analyzed in depth using content analysis in order to reveal unrecognized concepts and themes. The basic process in content analysis is combining data around certain concepts - themes and organize - interpret them in an understandable way. Therefore, the data collected for this purpose are first conceptualized, than according the emerging concepts organized logically in an intelligible way and finally the themes explaining the present data were determined (Yıldırım and Şimşek, 2011, p. 227).

<table>
<thead>
<tr>
<th>Terminal values</th>
<th>Instrumental values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortable life</td>
<td>Peace of mind</td>
</tr>
<tr>
<td>An exciting life</td>
<td>Real love</td>
</tr>
<tr>
<td>Sense of achievement</td>
<td>National security</td>
</tr>
<tr>
<td>A world of peace</td>
<td>Pleasure</td>
</tr>
<tr>
<td>World of beauty</td>
<td>Salvation</td>
</tr>
<tr>
<td>Equality</td>
<td>Self-esteem</td>
</tr>
<tr>
<td>Family safety</td>
<td>Social recognition</td>
</tr>
<tr>
<td>Freedom</td>
<td>True friendship</td>
</tr>
<tr>
<td>Happiness</td>
<td>Wisdom</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value groups</th>
<th>Value examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>National security, be helpful, family safety, be sparing of, to be reliable, accept what the life gave</td>
</tr>
<tr>
<td>Democratic</td>
<td>Be respectful, being polite, forbear, cooperate</td>
</tr>
<tr>
<td>Work-business</td>
<td>Be diligent, be ambitious, be entrepreneur, to be responsible</td>
</tr>
<tr>
<td>Scientific</td>
<td>Being researcher, be creative, be hot for, be scientific, to be critical</td>
</tr>
<tr>
<td>Basic</td>
<td>Aesthetic, be healthy, protect the environment, to be clean</td>
</tr>
</tbody>
</table>

Table 1. Rokeach’s values list.

Table 2. Akbaş’s values list.
### Table 3. List of Values According to the Songs in the 5th grade primary education music class students’ workbook.

<table>
<thead>
<tr>
<th>Values</th>
<th>Song 1</th>
<th>Song 2</th>
<th>Song 3</th>
<th>Song 4</th>
<th>Song 5</th>
<th>Song 6</th>
<th>Song 7</th>
<th>Song 8</th>
<th>Song 9</th>
<th>Song 10</th>
<th>Song 11</th>
<th>Song 12</th>
<th>Song 13</th>
<th>Song 14</th>
<th>Song 15</th>
<th>Song 16</th>
<th>Song 17</th>
<th>Song 18</th>
<th>Song 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>love</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>respect</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>responsibility</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. List of Values According to the Songs in the 6th grade primary education music class students’ workbook.

| Values     | Song 1 | Song 2 | Song 3 | Song 4 | Song 5 | Song 6 | Song 7 | Song 8 | Song 9 | Song 10 | Song 11 | Song 12 | Song 13 | Song 14 | Song 15 | Song 16 | Song 17 | Song 18 | Song 19 | Song 20 | Song 21 | Song 22 | Song 23 | Song 24 | Song 25 | Song 26 | Song 27 | Song 28 | Song 29 | Song 30 | Song 31 | Song 32 | Song 33 | Song 34 |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| love       | x      | x      | x      | x      | x      | x      | x      | x      | x      | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       |
| respect    |        | x      | x      | x      |        | x      | x      |        |        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| responsibility | x  |        |        |        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| self-control | x    |        |        |        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |

### Table 5. List of Values According to the Songs in the 7th grade primary education music class students’ workbook.

| Values     | Song 1 | Song 2 | Song 3 | Song 4 | Song 5 | Song 6 | Song 7 | Song 8 | Song 9 | Song 10 | Song 11 | Song 12 | Song 13 | Song 14 | Song 15 | Song 16 | Song 17 | Song 18 | Song 19 | Song 20 | Song 21 | Song 22 | Song 23 | Song 24 | Song 25 | Song 26 | Song 27 | Song 28 | Song 29 | Song 30 | Song 31 |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| love       | x      | x      | x      | x      | x      | x      | x      | x      | x      | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       |
| respect    |        | x      | x      | x      | x      | x      | x      | x      | x      | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       | x       |
| responsibility | x  |        |        |        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| self-control | x    |        |        |        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |

### FINDINGS

**Distribution of values in the 5th, 6th, 7th, and 8th grade primary education music classes students’ workbooks**

The 5th grade primary education music class students’ workbook contained 19 songs which were analyzed in Table 3. The values of love, respect and responsibility were present in the songs of the 5th grade primary education music class students’ workbook. The analyses revealed that 12 (63%) songs were on love out of 19; 5(26%) on respect and 2 (11%) on responsibility; these were valued.

34 songs were presented in the 6th grade primary education music class students’ workbook. These were analyzed in Table 4 and the values mentioned in these songs were tabulated. Accordingly, the values of love, respect, responsibility and self-control were included in the themes of the songs. The analysis made revealed that out of the 34 songs in the 6th grade primary education music class students’ workbook, the values of love were taught in 18 (53%), respect in 8 (23%), responsibility in 5 (15%), self-control in 3 (9%) songs. Compared to the 5th grade primary education music class students’ workbook, the 6th grade primary education music class students’ workbook contained the value of self-control.

24 songs were included in the 7th grade primary education music class students’ workbook. Table 5 shows the values expressed in these songs. Accordingly, the values of love, health, respect, responsibility and self-control were among the themes of the 7th grade primary education music class students’ workbook songs. Out of the 24 songs in 7th grade primary education music class
students' workbook, 10 were on love (42%); 6, respect (25%); 6, responsibility (25%); and 2, self-control (8%); they were highlighted according to the analysis made. Like the 6th grade primary education music class students' workbook, the 7th grade music class students' workbook also contained self-control value.

The 8th grade primary education music class students' workbook contained 25 songs. These were analyzed and presented in Table 6. Accordingly, the values of love, respect and responsibility were among the themes of the 8th grade primary education music class students' workbook songs. The analyses revealed that out of the 34 songs in the 8th grade primary education music class students' workbook 18 emphasized love (60%), 8 respect (21.5%) and 5 responsibility (19.6%). The 8th grade primary education music class students' workbook included the same values as the 5th grade primary education music class students' workbook.

### Table 6. List of Values According to the Songs in the 8th grade primary education music class students' workbook.

| Values          | Song 1 | Song 2 | Song 3 | Song 4 | Song 5 | Song 6 | Song 7 | Song 8 | Song 9 | Song 10 | Song 11 | Song 12 | Song 13 | Song 14 | Song 15 | Song 16 | Song 17 | Song 18 | Song 19 | Song 20 | Song 21 | Song 22 | Song 23 | Song 24 | Song 25 |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|        |
| love            | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  |          |
| respect         | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  |          |
| responsibility  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  | x                  |          |

---

**Overall analysis of the value in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks**

Figure 1 shows the overall analysis of the values in the songs of 5th, 6th, 7th and 8th grade primary education music classes students' workbooks. Accordingly, in the songs 5th, 6th, 7th and 8th grade primary education music classes students' workbooks values such as love (54%), respect (21.5%), responsibility (19.6%) and self-control (4.9%) come to the fore. It can be seen that 4 values are dealt with in the songs of 5th, 6th, 7th and 8th grade primary education music classes students' workbook and these are processed together quite insufficiently. Likewise, among the values processed, the ratio of the love value is acceptable; yet, the ratio of the other values is quite insufficient.

**Distribution of the values in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks according to the classification of values by Rokeach and Akbaş**

Table 7 shows the comparison of the values presented in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks and the list of values presented in the Akbaş study conducted to determine to what extent the affective objectives of the Turkish National Education system were realized by secondary
school students. Akbaş’s value list consists of five main groups; namely, traditional, democratic, work-business, scientific and basic. According to the findings of the present study, on comparing the outcomes with the value list provided by Akbaş, the values in the 5th, 6th, 7th and 8th grade primary education music class students’ workbooks fit with the sample values in the traditional, democratic and work-business main groups. These are written in bold and consistent with the sample values (be sparing of / self-control, be respectful / respect, forbear / love and to be responsible / responsibility) of Akbaş. According to the findings of the present study, among the values in the 5th, 6th, 7th, and 8th grade primary education music class students’ workbooks, there are no other terminal and instrumental values defined by Rokeach.

### Conclusion

Values are among the elements that mitigate the members to form a society, increase their self-awareness and ensure their acculturation. Likewise, individuals acquiring these values make up a healthier more enlightened and conscious society. The children songs in the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks, within the context of general music education, contribute to cognitive and affective development of the children through the messages in the lyrics and the musical behavior to be taught.

This study analyzed the values taught in the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks published by the Ministry of Turkish National Education and compared them with the classifications made by Rokeach and Akbaş. According to the findings of the present study, in the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks the values of love, self-esteem, responsibility and self-control are emphasized within the songs.

It was concluded that the concepts of values such as

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### Table 7. Comparison of the Values in the 5th, 6th, 7th, and 8th Grade Primary Education Music Classes Students’ Workbooks with Akbaş’s Value List.

<table>
<thead>
<tr>
<th>Value Groups</th>
<th>Value Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>National security, be helpful, family safety, be sparing of,(self-control)to be reliable, accept what the life gave</td>
</tr>
<tr>
<td>Democratic</td>
<td>Be respectful,(Respect)being polite, forbear, (Love)cooperate</td>
</tr>
<tr>
<td>Work-business</td>
<td>Be diligent, be ambitious, be entrepreneur, to be responsible (Responsibility)</td>
</tr>
<tr>
<td>Scientific</td>
<td>Being researcher, be creative, be hot for, be scientific, to be critical</td>
</tr>
<tr>
<td>Basic</td>
<td>Aesthetic, be healthy, protect the environment, to be clean</td>
</tr>
</tbody>
</table>

---

### Table 8. Comparison of the Values in the 5th, 6th, 7th, and 8th Grade Primary Education Music Classes Students’ Workbooks with Rokeach’s Value List.

<table>
<thead>
<tr>
<th>Terminal Values</th>
<th>Instrumental Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortable life</td>
<td>Ambitious/keen</td>
</tr>
<tr>
<td>An exciting life</td>
<td>Imaginative</td>
</tr>
<tr>
<td>Sense of achievement</td>
<td>To e broad minded</td>
</tr>
<tr>
<td>A world of peace</td>
<td>Intellectual</td>
</tr>
<tr>
<td>World of beauty</td>
<td>Logical</td>
</tr>
<tr>
<td>Equality</td>
<td>Adoring/Caressing(Love)</td>
</tr>
<tr>
<td>Family safety</td>
<td>Parenting</td>
</tr>
<tr>
<td>Freedom</td>
<td>Responsible</td>
</tr>
<tr>
<td>Happiness</td>
<td></td>
</tr>
</tbody>
</table>

Values are written in bold within the table. Among the values in the 5th, 6th, 7th, and 8th grade primary education music classes students’ workbooks there are no other terminal and instrumental values defined by Rokeach.
"love, respect, responsibility and self-control" were taught through the themes in the lyrics of the songs available in the 5th, 6th, 7th and 8th grade primary education music classes students’ workbooks at a (54%) rate for love, at (21.5%) for respect, at (19.6%) for responsibility and at a (4.9%) rate for self-control.

When the values obtained through the study were compared with Rokeach and Akbaş's value classifications lists, it could be seen that according to Rokeach, the value of respect was in the terminal values, while love was both in of terminal and instrumental value groups. Responsibility and self-control were among the instrumental values according to Rokeach's list of values classification. The values present in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks overlap at 2% with the terminal and instrumental values defined by Rokeach.

Considering Akbaş's list of values, the values in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks are among the traditional (self-control), democratic (love, respect) and work-business (responsibility) main value groups. Among the value classification list proposed by Akbaş, in the 5th, 6th, 7th and 8th grade primary education music classes students' workbooks no values were related to the value categories scientific (being a researcher, being creative, being curious, being scientific, being critical) and basic (Aesthetic, being healthy, protecting and keeping the environment clean).

Considering the importance of music education during values education, more values are to be included in the course and workbooks used for teaching music. Recent studies are in line with the findings of the present study.

Muldma and Kilu (2012) concluded in their study that music teachers believe the effect of music on social values was at the highest level and that they learn to take into consideration the feelings of value and dignity; theirs and others' success, to respect differences and show tolerance to others through the musical activities. In their study entitled "The Views on Goodness of The Children Singing School Songs on Goodness", Sevinç and Kurtaslan, stressed that verbal elements are also important as well as the vocal and rhythmic elements that compose music in school songs and therefore one of the most important objectives of school songs is to include words and topics that are educational in nature (Sevinç and Kurtaslan, 2009, p. 464).

In the study entitled "The Effects of Music Education on Child Development", Eskioğlu concluded that music education improves children's off-music as well as musical skills and that music education is important given that it acts a moral value that binds and develops society (Eskioğlu, 2003, p. 122).

In conclusion, given that concepts of value are a part of affective education, music education plays an important role in providing affective education. Hence, the national music curricula should be revised and values to be taught by means of school songs should be included in the music class workbooks. Hereby, especially, the values determined as lacking in the present study are to be included in the 5th, 6th, 7th and 8th grade primary education music class materials. In this way, it will be possible to raise highly conscious, enlightened generations with high moral values.

**Conflict of Interests**

The author has not declared any conflict of interests.
Opinions of secondary school mathematics teachers on mathematical modelling

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The aim of this study is to identify the opinions of secondary school mathematics teachers about mathematical modelling. Qualitative research was used. The participants of the study were 40 secondary school teachers working in the Bingöl Province in Turkey during 2012-2013 education year. Semi-structured interview form prepared by the researcher was used for data collection and content analysis using coding method. As a result of the study it has been concluded that knowledge level of teachers regarding mathematical modelling is not adequate, the examples the participants provided for mathematical modelling were in parallel with those in the coursebook, duration of course is not enough for mathematical modelling, mathematical modelling is mostly used for fractions, students’ interest increases during the courses in which mathematical modelling is used, mathematical modelling should be included in the program, difficulty level of making mathematical model shows variety from topic to topic.

Key words: Mathematical modelling, modelling, process of making mathematical model.

INTRODUCTION

As in all over the world, developments and changes in science and technology are also continuing in an increasing way in our country, which naturally affects education programmes. As a result of the new primary school programme implemented in 2005, new applications in mathematics teaching programme were introduced. Changing duties of teachers and students, changes in educational contexts, variations in the approaches to assessment and evaluation are some of them. In the new programme one of the most important things that draws attention is the fact that for the first time that the terms mathematical model and modelling have been handled so comprehensively (MEB, 2005). In the new programme modelling has become one of the basic elements since mathematical modelling finds its way in teaching programmes of many countries as a result of the improvements in mathematics teaching (Güzel and Uğurel, 2010).

In recent years, the importance of mathematical modelling has been emphasized by NCTM (2001) and many mathematics teachers (Kertil, 2008). Nowadays mathematical modelling is not only used in the area of mathematics but also in technology, architecture, economy, engineering, medicine and many others. In order to keep up with the rapid changes in society individuals who are at peace with technology, have creative thinking ability and can make mathematical model are needed (Lingefjard, 2002). Mathematical
modelling has become a necessity for those who have their education in these areas. The fact that mathematical modelling is used in different areas accounts for its importance.

Studies on mathematical model and modelling receive increasing attention (Blum and Ferri, 2009). There are limited number of studies on the terms model and modelling in our country (Erarslan, 2011). In his study, Keskin (2008) made use of mathematical modelling questionnaire and aptitude tests in order to have knowledge of opinions and skills of third grade preservice mathematics teachers. Aydın (2008) carried out a qualitative study as to the opinions of teachers and students in England about the use of modelling of movable objects in their courses. In another qualitative study it was researched on how problem solving skills of mathematics preservice teachers emerged in the process of mathematical modelling (Kertil, 2008). Güzel and Uğurel (2010) observed the relationship between mathematics preservice teachers’ success in Analysis I and their opinions about mathematical modelling. Finally, Erarslan (2011) observed opinions of primary school mathematics preservice teachers about teachers’ efficiency in preparing models and contribution of these models into mathematic education.

Problem status

In this study, literature was scanned in detail and research question was identified as ‘what are the opinions of secondary school mathematics teachers about mathematical modelling?’ Sub-problems in the process of data collection and analysis are as follows:

1. What is knowledge level of secondary school mathematics teachers as to mathematical modelling?
2. What are the opinions of secondary school mathematics teachers as to the appearance of mathematical modelling in secondary school mathematics programme?
3. How do attitudes of students towards the course in which mathematical modelling is used change?
4. What are the opinions of secondary school mathematics teachers about their mathematical modelling skills?
5. What are the opinions of secondary school mathematics teachers about the contribution of departmental courses to mathematical modelling.

In this study opinions of secondary school mathematics teachers as to the mathematical modelling were analyzed. In the light of the related literature it was seen that there were not many studies in this area which accounts for the importance of this study. It is thought that this study will present significant data for prospective studies and make important contributions to mathematics education.

METHOD

Model of the study

In educational research there exists qualitative and quantitative methods in terms of data collection and analysis and which one to use is the most important element in identifying the nature of the study.

In this study interview technique as a method of qualitative research was used in order to identify the opinions of secondary school mathematics teachers about mathematical modelling.

Study group

The participants of the study were 40 secondary school mathematics teachers working in the Bingöl Province in Turkey 2012-2013 education year. Statistical data about the participants are presented in Table 1.

When Table 1 is observed, it is seen that 40% of the participants are females and 60% of them are males. All of the participants are graduates of education faculty. 65% of the participants have 1-5 years of working experience, 27.5% have 6-10 years, 5% have 11-15 years and 2.5% have more than 16 years of work experience.

Data Collection Tools

In this study semi structured interview form was used for data collection. Before the preparation of the interview form a comprehensive literature scanning about modelling and mathematical modelling was carried out by the researcher. In the light of the related literature firstly an interview form consisting of 12 questions was prepared by the researcher. Before the implementation of the form pilot study was carried out. In the pilot study 12 secondary school mathematics teachers who worked in 3 different schools in Bingöl were selected and the interview form was implemented. The form was made to be examined by 4 expert educators, as a result of which questions were taken out of the form in order to provide its content validity. As it is known in qualitative studies internal validity is related to whether the researcher can really measure the data with the tool or method that he uses in order to measure it (Yıldırım and Şimşek, 2004).
Table 1. Features of participants.

<table>
<thead>
<tr>
<th>Gender</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education Status</th>
<th>40</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Faculty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Experience</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 year</td>
<td>26</td>
<td>65</td>
</tr>
<tr>
<td>6-10 year</td>
<td>11</td>
<td>27.5</td>
</tr>
<tr>
<td>11-15 year</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>More than 16 years</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Data analysis

In this study data analysis consists of two phases in the first of which descriptive analysis was carried out in order to evaluate the data in terms of problem status (Yıldırım and Şimşek, 2011). In the second phase content analysis method was utilized. Content analysis is described as a systematic and replicable technique in which some words of a text are summarized with smaller content categories by means of particular codifications (Büyüköztürk, 2008). Categories were specified by making codification of the raw data categorized under these categories in order to make it meaningful for the reader. The processes of codification and categorization were carried out repeatedly by the researcher. Therefore unnecessary codifications were removed and new codifications were added when necessary. As a result tables in which ideas of each participant could be seen separately were attained.

FINDINGS AND INTERPRETATIONS

In this section findings are presented in tables and column charts were used in order to show numerical value of each answer and to facilitate visual elements. In addition some of the answers of the teachers were presented after scanning.

Question 1 and its findings are as follows.

The answers of the participants are presented in Table 2.

The answers of the participants are presented in Table 3. When Table 3 is observed it can be seen that the answers of the participants have been categorized under 4 main titles which are easy, time consuming, depends on the subject and difficult. According to Table 3 30% of teachers think that creating mathematical modelling is easy, 20% of them think it is time consuming, 32.5% of them think it depends on the subject and finally 17.5% of them think it is difficult.

Question 4 and its findings are as follows:

The answers of the participants are presented in Table 4. When Table 4 is observed it can be seen that the answers have been categorized under 5 main titles. These are fractions, counters, algebraic statements, identities, pattern and decoration. According to Table 4, 37.5% of teachers use mathematical modelling for fractions, 20% of them for counters, 12.5% of them for algebraic statements and 10% of the teachers use mathematical modelling for pattern and decoration.

Question 5 and its findings are as follows:

The answers of the participants are presented in Table 5. When Table 5 is observed it can be seen that the answers have been categorized under 3 main titles which are change negatively, not change, change positively. According to Table 5, 75% of teachers believe that there will be positive changes in attitudes of students towards the course in which mathematical modelling is used. While 15% of teachers believe that there is no change regarding the attitudes of students, 10% of teachers think the change will be negative.

Question 6 and its findings are as follows:

The answers of the participants are presented in Table 6. When Table 6 is observed it can be seen that the answers have been categorized under 3 main titles: These are 30-40 min; 50-60 min and depend on the subject. According to Table 6, 12.5% of teachers spend 30-40 min for mathematical modelling, 47.5% of teachers spend 50-60 min and according to 40% of teachers time spent for mathematical modelling depends on the subject. In addition the results are presented graphically below. The following graphic shows the numerical value of the answers of teachers about time necessary for
Table 2. Analysis results of the answers for question 1

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concretization of Mathematical Statements</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>Attempts to Use Materials</td>
<td>5</td>
<td>12,5</td>
</tr>
<tr>
<td>Visualization of Mathematical Statements</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Exemplification with Figures and Schemes</td>
<td>5</td>
<td>12,5</td>
</tr>
</tbody>
</table>

Table 3. Analysis results of the answers for question 3

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Time Consuming</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Depends on the Subject</td>
<td>13</td>
<td>32,5</td>
</tr>
<tr>
<td>Difficult</td>
<td>7</td>
<td>17,5</td>
</tr>
</tbody>
</table>

Table 4. Analysis results of the answers for question 4.

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractions</td>
<td>15</td>
<td>37,5</td>
</tr>
<tr>
<td>Counters</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Algebraic Statements</td>
<td>5</td>
<td>12,5</td>
</tr>
<tr>
<td>Identities</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Pattern and decoration</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 5. Analysis results of the answers for question 5.

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change positively</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>Don’t change</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Change negatively</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>
Table 6. Analysis results of the answers for question 6

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40 Min</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>50-60 Min</td>
<td>19</td>
<td>47.5</td>
</tr>
<tr>
<td>Depends on the subject</td>
<td>16</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 7. Analysis results of the answers for question 7.

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not beneficial</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Slightly beneficial</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Quite beneficial</td>
<td>22</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 8. Analysis results of the answers for question 8.

<table>
<thead>
<tr>
<th>Categories</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should be included</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Should be included for particular subjects</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Should definitely be included</td>
<td>20</td>
<td>50</td>
</tr>
</tbody>
</table>

mathematical modelling.

Question 7 and its findings are as follows:

The answers of the participants are presented in Table 7. When Table 7 is observed it can be seen that the answers have been categorized under 3 main titles which are not beneficial, slightly beneficial and quite beneficial. According to Table 7, 35% of teachers think the courses they took at university are not beneficial for mathematical modelling. 10% of teachers think they provide slight benefit for mathematical modelling and 55% of teachers think they are quite beneficial for mathematical modelling.

Question 8 and its findings are as follows:

The answers of the participants are presented in Table 8. When Table 8 is observed it can be seen that the answers have been categorized under 3 main titles. These are should be included, should be included for particular subjects, should definitely be included. According to Table 8 35% of teachers think mathematical modelling should be included in the program, 15% of teachers think it should be included for only particular subjects while 50% of teachers think it should definitely be included in the program.

**DISCUSSION AND CONCLUSION**

In this section the results have been presented under titles and these results have been compared with the related literature. The titles have been selected based on
the problem situations of the study.

Conclusions as to the knowledge level of mathematics teachers about mathematical modelling

This study in addition to presenting the ideas of secondary school mathematics teachers’ opinions on mathematical modelling, aims at showing how often mathematical modelling is used by teachers. For this purpose interviews with 40 teachers in Bingöl were carried out. Findings were analyzed in accordance with the sub problems of the study.

When opinions of secondary school mathematics teachers about the definition of mathematical modelling were observed, it was seen that the terms concretization of mathematical statements, attempts to use materials, visualization of mathematical statements, exemplification with figures and diagrams were frequently used. While Niss (1999) defines mathematical modelling as the integration of one or more than one mathematical formation selected for the aim of representing real life situations and the relationship between them, Galbraith and Catworthy (1990) define it as the application of mathematics into the problems not structured in real life. Verschaffel et al. (2002) define mathematical modelling in the most general sense as the process of interpreting events and relationship between these events mathematically and to create mathematical patterns among these events. When the results are compared with the related literature, it can be said that the participants could not make a complete correct definition of the term ‘mathematical modelling’. Keskin (2008), in his study on the improvement of preservice mathematics teachers’ skills of making mathematical model, concluded that preservice teachers could not make the complete definition of mathematical modelling, which is in parallel with the result of this study. It was seen that the examples preservice teachers gave for mathematical modelling generally consisted of the subjects of the course and there were few examples from daily life.

Results of the opinions of teachers about the involvement of mathematical modelling in the programme

When teachers’ opinions about the involvement of mathematical modelling in secondary school mathematics programme were observed, it was concluded that it should be included in the programme. Teachers’ providing students with variety of presentations will help students learn algebra and to understand mathematics by making associations with real life. In teaching contexts suitable methods and techniques should be used based on interests, needs and individual differences of students.

For that it will be useful to know learning styles of students and to use different materials in the learning process (MEB, 2005). Thus it will help to improve problem solving skills of students. In Messmer’s (1989), Hermann and Hirsberg’s (1989) studies they expressed that mathematical modelling should be included in teaching programme. Maab (2007) stated mathematical modelling should be included in teaching programme of secondary schools and Anker (1989) stated that it should be included in primary school mathematics teaching programme.

These results of the literature overlap with the result of this study. In addition some of the teachers expressed that mathematical applications course at 5th grade could include mathematical modelling applications.

Teachers’ opinions about attitudes of students towards the course in which mathematical modelling is used

When opinions of teachers were observed about the attitudes of students, it was concluded that attitudes of students towards the course changed positively, which also meant that their interest in the course increased. Yu and Chang (2009) stated that students’ listening to teacher lecture for a long time and doing only what was wanted could hinder their creative thinking ability. In mathematics courses mostly students memorize formulas, about which they do not have any idea, and make calculations. Therefore teaching methods should be revised so that students can improve their abilities of thinking, expressing and interpreting. In that context model setting activities which enable high level thinking can be helpful (Eraslan, 2011). Lesh and Doerr (2003) stated that students could define, explain, interpret real life problems, create different solutions, and produce designs by means of model making activities. The importance of making use of different representational systems and making switches between these systems in
the process of problem solving and teaching and learning of mathematical terms was emphasized by many researchers like Kaput (1987) and Goldin (1998). The result of this study is in parallel with the results in the literature.

Results of mathematics teachers’ making mathematical model

As a result of the interviews with the 40 participants of the study, it was concluded that difficulty level of making a mathematical model for mathematics teachers was subject dependant, changing from topic to topic. As Mayer (1998) states what preservice teachers should be careful with while making models is to know when and how to use appropriate terms and procedures. In their studies Bozkurt and Polat (2011) carried out interviews with teachers about the effect of modelling with counters to the learning of whole numbers and concluded that teachers did not lean on modelling with counters. Harman and Akin (2008) investigated the effect of teaching Pascal’s triangle and some identities by using perfect cube model and concluded that teaching by making use of perfect cube model had a positive effect on students' success. In his study Eraslan (2011) concluded that when model making activities were planned with particular limits, they could be applied at all levels and would contribute to mathematical development of children. When secondary school mathematics teacher’s preferences for the subjects to use mathematical modelling are observed it can be seen that they mostly tend to use it in fractions and counters. When Primary School Mathematics Teaching Programme (2008) is observed it is seen that there exists a number of modelling examples for fractions, based on which it can be said that teachers make use of examples that overlap with the ones in the curriculum. As for the opinions of teachers about the duration of course for mathematical modelling, it is stated that it depends on the subject. Teachers expressed the main reason of not being able to use mathematical modelling in their courses as time limitations.

Teachers’ ideas on the contribution of the courses they took at university to the process of making mathematical model

When secondary school mathematics teachers’ ideas on the contribution of the courses they took at university to the process of making mathematical model are observed it is seen that there is a high consensus among teachers about courses like instructional technologies and material development, computer programming, computer assisted mathematics teaching, teaching of dynamic geometry, special teaching methods contributed a lot to the making of mathematical model. Zambujo (1989) and Rose (1974) stated that most of the courses taken at university were necessary for mathematical modelling. Hermann and Hirsberg (1989) stated that examples of mathematical modelling on differential equations should be included in the curriculum. Moreover some of secondary school mathematics teachers expressed that the courses they took at university had no contribution to mathematical modelling. Macgregory and Stacey (1997) stated that the misconceptions of students about algebraic symbols were not only related to cognitive development but also to several environmental factors and teaching methods and techniques. (Hubbard, 2003, p:1). Kertil (2008) as a result of his study emphasized that university curriculum should include courses about mathematical modelling activities. The literature results presented above supports the result of this study.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

Full Length Research Paper

Teacher candidates’ comprehension of first and high order quantifiers

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The purpose of this study was to investigate the quantifier structuring processes of teacher candidates doing the Abstract Mathematics course of the Elementary School Mathematics Teaching program. Educational activities assisting the students’ structuring of quantifiers were provided through transitions between verbal (written) expressions and symbolic expression in open statements that contained first, second, and third order quantifiers. The data of this study, based on an APOS (Action, Process, Object, and Schema) theoretical framework, were obtained by using a problem form. This form consists of four questions on quantization prepared by the researcher to investigate the cognitive development of the students; clinical interviews were performed at the end of the study period with five students. At the end of the study, it was determined that the students were unable to fully understand expressions regarding first and high order quantifier structures, and that they developed opinions according to their own perceptions. Furthermore, important results were obtained during the study that demonstrated the level of comprehension of students regarding first, second, and third order quantifier structures.

Key words: The quantifier concept, universal quantifier, existential quantifier, genetic decompositions, APOS.

INTRODUCTION

“\textit{I think therefore I am.}” While searching for the truth, the famous mathematician and philosopher Descartes determined that the expression, “\textit{I think therefore I am}” is the embodiment of an unshakable, solid, and reliable truth, and hence considered it without hesitation as the first principle of the philosophical system he was building [Descartes, 2013]. According to this principle, the ability to think is both proof of mankind’s existence and his greatest strength. In science, we witness mankind seeking and finding truths in the universe due to his curiosity and ability to think. The key to this success of mankind is also due to another product born from mankind’s thoughts and creativity: mathematics. This product is so exceptional that it has always been clearly understood by societies using different languages, and even peoples living in different time periods. This ability has made mathematics “the queen of science.” The strength of mathematics ultimately stems from its own language. The main elements of the language of mathematics are quantifiers, which are designated as either universal or existential.

Quantifiers have an undeniable importance in giving meaning to mathematical information. Furthermore, the
ability to work with quantifiers is important not only to be able to obtain mathematical information, but also to effectively using the wide range of conceptual structures in mathematics (Dubinsky et al., 1998). On the other hand, it is known that students receiving secondary education and university education experience considerable difficulties in understanding quantifiers.

Mathematical expressions that include existential and universal quantifiers are frequently used in undergraduate university courses. Undergraduate students first encounter mathematical expressions consisting of multiple quantifiers while covering the subject of limit and continuity during the “Analysis I” course. Students who do more advanced mathematics courses have to work even more extensively with such expressions (for example, while learning fundamental concepts in advanced analysis, abstract algebra and topology, such as derivatives, linear independence, coset, normal subgroups, compactness, etc...). Although students frequently use expressions with multiple quantifiers, they generally have difficulties understanding them. This difficulty experienced by the students adversely affects their ability to comprehend and prove mathematical notions. For this reason, it is rather important to determine how students define quantifiers, and to also identify the underlying reasons for the definitions they provide. Dubinsky et al. (1998) described that due to the quantifier-rich nature of undergraduate level university mathematics courses, it is necessary to determine the method of teaching that will allow students to better comprehend quantifiers, as well as the approaches that will assist their ability to give meaning to advanced mathematical notions. However, the number of studies in the literature regarding quantifiers is relatively limited.

Tall and Chin (2002) described that when defining reflexivity (one of the properties of the equivalence relation), students generally disregarded its role as a universal quantifier. In other studies, Dubinsky et al. investigated students’ ability to comprehend compound sentences/expressions containing multiple order quantifiers (Dubinsky, 1997; Dubinsky et al., 1988), and concluded that students had difficulties negating these expressions. Dubinsky (1997) also determined that using ISETL computer programs, when teaching quantifiers, improved the students’ ability to give meaning to expressions containing quantifiers, as well as their ability to work with quantifiers.

Dubinsky and Yiparaki (2000) conducted a study in which they investigated the way students gave meaning to expressions consisting of two quantifiers, when one was universal and the other existential. In their study, they also attempted to determine how students interpreted and defined in mathematics and daily life expressions that contained universal-existential quantifiers (\(\forall x\exists y\)) (in the mentioned sequence) and existential-universal quantifiers (also in the mentioned sequence). Thus, they aimed to identify whether different methods of thinking assumed by the students assisted their learning of quantifiers in mathematics. However, they determined that from the students’ perspective, examples from situations in daily life were not an effective means of giving meaning to quantifiers in mathematics. Moreover, it was determined that students did not know the difference between universal-existential quantifiers (\(\forall x\exists y\)) and existential-universal quantifiers (\(\exists y\forall x\)). The students were more willing to interpret and define English expressions that included universal-existential quantifiers than expressions that included existential-universal quantifiers (\(\exists y\forall x\)).

Piatek-Jimenes (2010) investigated the reasoning used by students when interpreting mathematical expressions consisting of both existential and universal quantifiers, and also evaluated the factors that affected this reasoning. They also determined in their study that the matching of two similar expressions that differed only in the sequence of their quantifiers was difficult for the students, often leading to conflicts in their reasoning. As such, students had difficulties with expressions containing multiple quantifiers in which the existential quantifier came before the universal quantifier. Based on these observations, it was concluded that although mathematical expressions with multiple quantifiers are frequently encountered in advanced mathematics courses, the students had many difficulties in interpreting and proving these expressions.

The current study investigated the students’ structuring of quantifiers in mathematics. The study included, at the same time, distinct theoretical, observational, and practical components. The study included a theoretical aspect with regards to the evaluation of mental frameworks that allowed the learning of the quantifier concept, and the epistemology related to these concepts. The study included an experimental aspect with regards to the assessment of whether mental frameworks assisted students in their learning. Finally, the study also included a practical aspect with regards to the evaluation of how students developed mental frameworks when learning the quantifier concept in mathematics, and the identification of difficulties experienced by the students when forming these frameworks.

Prior to more detailed explanations regarding the roles of quantifiers in giving meaning in mathematics, definitions regarding the concepts of open statements and quantifiers will first be provided.

### Open statements (statement-valued function) and quantifiers

All fields of scientific research – whether they are empirical studies performed on certain cases or formal studies regarding abstract relationships – are based on a system of logic (Yıldırım, 2011). The building blocks of these systems of logic are known as “statements.” In mathematics, statements are expressions that are used
to determine validity or invalidity. Furthermore, expressions that contain at least one variable, and in which the validity or invalidity of the expression depends on the objects that are assigned to the variables, are known as "open statements." If an open statement is dependent on the variables $x, y, z, \ldots$, it will be shown with the symbols $p(x, y, z, \ldots)$.

When an open statement of $p(x)$ and a set of $A$ are given, the expression "\( \forall x \ p(x) \)" means that "(x) is valid for every $x$ element of $A$." Here, the symbol $\forall$ can be used for the words "every $x$," "each single $x$" and "any $x$;" it is thus called a "universal quantifier." The expression "\( \exists x \ p(x) \) means that "$p(x)$ is valid for at least one $x$ element of $A." Here, the symbol " $\exists$ " can be used for the words "at least one $x$," or "some $x;" it is thus called an "existential quantifier."

### The importance of quantifiers in understanding mathematics

Aside from the conflicts and differences in the philosophical opinions of professional and amateur mathematicians regarding the nature of mathematics, there is no consensus regarding the use of quantifiers in advanced mathematics. Quantifiers play an important role in giving meaning to advanced mathematical concepts, and in ensuring that new mathematical concepts can be accepted without leading to doubts or uncertainty.

In advanced mathematical studies, there are no subjects or areas in which quantifiers are not used. Quantifiers are particularly important for defining the concepts belonging to a mathematical theory, for determining the relationship between concepts, and for making sense of a theory. For example, the definition of the unit element and the axiom of the inverse element (both of which are part of the group theory) are composed of two quantifiers. These two concepts are used in abstract algebra, and play an important role in giving meaning to concepts in many branches of mathematics such as geometry. The sequence in which quantifiers are used is important for properly understanding the definition of the unit element and the axiom of the inverse element. In the definition, the existential quantifier comes first, followed by the universal quantifier; while in the axiom, the universal quantifier comes first, followed by the existential quantifier. Failure on the students' part to notice this structure will result in an inability to understand the group theory even at its initial stages.

According to Dubinsky and Yiparaki (2000), rather than focusing on good analogies and explanations when teaching mathematics, emphasis should be placed more on ensuring that students understand what quantifiers are, and that they learn how they can use them to form complex mental images.

### Study purpose

This study investigated how students used the quantifier concept in the Abstract Mathematics course of the Elementary School Mathematics Teaching program. When structuring the quantifier concept, a new statement containing a universal or existential quantifier is obtained by determining the truth values of the elements of a statement set. Following this, new statements are obtained by combining two or more quantifiers with complex mathematical statements. The formation of quantifier concepts by the students was investigated during the Abstract Mathematics course by evaluating the developments in their ability to form quantifier concepts. During the process of forming the quantifier concept, answers were sought to the following questions by taking into account that the statements were part of the prerequisite information of the algebraic and single-variable function concept:

1. What is the relationship between the formation of quantifier concepts by the students and the verbal and symbolic representations of the statements?
2. What is the relationship between the formation of quantifier concepts by the students and their knowledge regarding single and multiple variable functions?

### THEORETICAL FRAMEWORK

The APOS (Action, Process, Object, and Schema) theoretical framework was used within the context of this study. APOS is a special framework used at the undergraduate level for developing and studying programs.

The special mental structures used during the learning process of a concept are called "genetic decomposition." The APOS study framework aims to determine the genetic decomposition of the relevant concepts. The APOS study framework consisted of three components, which were theoretical analysis, teaching and the evaluation of the students' learning.

First of all, a theoretical analysis was performed by using the learning theory, the epistemology of the concept found in previous studies in the literature, and the mathematical knowledge of the researchers. The aim of this theoretical analysis was to determine the genetic decomposition or the cognitive model. Genetic decomposition refers to the mental structures a student is obliged to develop in order to learn the concept in a manner that is understandable for him/her. These mental structures are called action, process, object, and schema.

After determining the initial form of the genetic decomposition, the education process is planned and implemented. Various data collection tools are used to investigate which mental structures are formed by the students.
Theoretical analysis of quantifiers

Prior to evaluating the genetic decomposition of quantifiers, let us consider a statement regarding the nature of mathematical knowledge, and on how it is internalized:

Internalized mathematical knowledge refers to a student’s response to a problem encountered in daily life; to the actions, processes and objects regarding a problem; and to the structuring and restructuring of these actions, processes and objects by organizing them according to a certain scheme.

From this statement, it is understood that internalized mathematical knowledge refers to the coherent and compatible restructuring of actions, processes, objects, and schemes that represent mental structures regarding a particular mathematical problem.

According to the APOS theory, action is a transformation performed individually on mathematical objects according to a certain algorithm. Based on this transformation, the action is perceived by the subject as an external stimulus. For this reason, the action is also considered as a reaction of the subject to the stimulus. The action tends to control the individual. To further clarify this, let us consider the statement “Every member of my family is a teacher.” If the individual considers the validity of the statement only with respect to certain individuals within his/her family, the comprehensibility of the statement is part of the action process. In this case, there is no indication that the individual considers whether the statement is valid for all members of his/her extended family, because the individual is actually focusing only on whether certain persons in his/her family are teachers.

If the individual can apply an internal process similar to the one he/she applied to the transformations (and can also reflect this on the action), then the action is considered to be internalized into the process. In this respect, the individual establishes control on the action, and can perform the action to a greater extent by using the images of the transformation and without applying the action openly. In the given example, it is possible to determine the validity or invalidity of the expression by controlling the summary of all obtained data – that is, by checking for every individual in the person’s family (or, in someone else’s family) whether they are actually teachers.

When the individual thinks in depth regarding the actions applied onto this process, he becomes aware of the process as a whole, notices his ability to move onto the process (either in action or in process), and can actually establish these types of transformations; the individual is then considered to have adopted the process as an object of thought. To be able to consider the actions in greater depth with regards to the process, the individuals must first encapsulate to ensure that the process becomes an entity or an object. In many mathematical processes, an object must be formed as a result of the encapsulation of the process, and work must be conducted with the process that created the object.

Looking back at the previous example, the individual can choose to negate the relevant expression, and think that it is valid for one family, but not for another. Thus, the expression will become an object with different situations that are dependent on the family in question. On the other hand, there is a certain claim for each family that is either valid or invalid.

In conclusion, a scheme is a collection that is in agreement with objects, processes, and previously formed schemes.

The levels of comprehension of quantifiers in the APOS learning theory

The genetic decomposition of quantifiers as described by Dubinsky et al. is shown below in Figure 1 [1991].

In the genetic decomposition of quantifiers, basic mental objects are simple statements that express a judgment on whether something is correct or incorrect. First, a set consisting of simple statements is defined. By using the function schemes necessary for the learning of the quantifier concept, the variables for obtaining open statements are defined. This is interpreted as the process. This means that the individual can think about the reiterations obtained in the domain by checking the validity or invalidity of the statement for each value in the domain of the function. For example, let us define the statement $p(x): x + 2 \geq 3$ on the integer set. In the expression $p$, $x$ will be used, which will provide the statement set

$$P = \{..., p(-3), p(-2), p(-1), p(0), p(1), p(2), p(3), ... \}$$

for each integer.

Here, the expression $p$ is actually considered as a statement-valued function defined on a set of integers. The $P$ set is an image set of the $p$ function. The image set represents statements with a truth value of 1 for integers $\geq 1$, and a truth value of 0 for integers $<1$. Following these stages, it is determined that the $p$ statement valued function is correct for some of the integer values. This situation is expressed as “for at least one $x$ integer value, $p(x)$ is valid.” Here, the expression “at least” indicates an existential quantifier. At the end of this process, the symbolic expression $\exists x, p(x)$ is obtained.

Secondly, there is the combination of two or more statements with standard logical connections that are either connective or divisive. Thus, a mental process is obtained through the combination of mental actions applied to the statements, and the internalization of the mental actions.

When the two processes described above are structured as necessary, the student is then ready to bring the structure to the stage of first order quantifiers.

At this order, statements include only a single quantifier...
(either universal or existential), and are only applied to statement-valued functions with single variables. Transition to first order quantifiers is performed through the coordination of two previously structured processes. In other words, the statements obtained for various variable values are either combined with the universal quantifier or divided by the existential quantifier, such that only a single statement is obtained in the solution. Thus, the student internalizes (or encapsulates) the reiteration process of a variable in the domain to obtain a statement set in which a quantifier is used.

In second order quantifiers (which represent the next step), two different quantifiers are generally applied consecutively in statement-valued functions with two variables. To be able to structure the second order quantifier concept, first order quantifiers need to be included into a statement. This results in the elimination of a variable from the process. If the original statement-valued function has two variables, the object is dependent on the value of the other variable, and the scheme belonging to first order quantifiers can be reapplied to this statement-valued function. Thus, while analyzing statements that include second order quantifiers and two variables, it is possible to determine a student’s ability to analyze the two quantifiers contained by the statements. In statement-valued functions with two variables, there is an inner quantifier on one of the variables, and an outer quantifier on the other variable. This new process, formed by the coordination of inner and outer quantifiers, should be included in order to obtain a single statement that will be a second order quantifier. When a third order quantifier expression is provided, the student can group the expression with two inner quantifiers, and once again apply a second order scheme to the outermost variable to obtain a defined statement. As before, this statement-valued function is included in order to obtain a single statement.

In conclusion, to obtain a quantifier of any other, this method is repeated as necessary and indeterminately.

METHODS

This study aimed to determine the mental structures developed by students in the process of forming quantifier concepts, and was designed as a qualitative study to be conducted within the context of the Abstract Mathematics course of the Elementary School Mathematics Teaching program.

Participants

In qualitative studies, the researcher directly spends time in the study area/field, meets with people within the context of the study, and utilizes the perspectives and experiences he/she acquired during the study in the analysis of the collected data (Yıldırım and Şimşek, 2003, p.23). The 97 students who attended the Abstract Mathematics courses during the 2012-2013 academic year constituted the participants of the study. The researcher of this study is the instructor of the said Abstract Mathematics course. According to Baki (2004), in the context of a mathematical study or problem-solving activity, mental structures are defined as images or words. It is thus possible to state that the students’ mental structures regarding mathematical expressions that contain quantifiers are, in fact, visible on paper. Based on this, the problem form consisting of four open-ended questions that were developed by the researcher was first administered to the 97 students. Following the administration of these questions, the criterion sampling method (which is one of the purposive sampling methods) was used to select five students with whom interviews would be performed. Criterion sampling involves the review and evaluation of all cases that satisfy a set of pre-defined criteria. In this context, the criterion used in the selection of students to be interviewed was the students’ ability to effectively understand the quantifier concept at a process level during the analyses performed by using the comprehension levels determined according to the APOS learning theory. The students’ ability to understand the quantifier concept was determined based on data from the problem forms.

Data collection tools and data collection process

In this study, a problem form consisting of four open-ended questions and clinical interview techniques were used as data collection tools. The open-ended questions were prepared such that they assessed the students’ understanding of the quantifier concept according to criteria selected from the literature.

In order to assess the students’ ability to determine and express with symbols the truth values of open statements expressed in writing (verbally), by taking into account the truth values for statements obtained for each variable of the variable set; the first question of the problem form was prepared as follows:

**Question 1:** The open statements \( p(x), q(x), r(x), s(x) \) and \( t(x) \) (which are defined from a set of integers) are defined as follows:

\[
\begin{align*}
  p(x) & : x > 0 \\
  q(x) & : 2^x + 1 \text{ is a prime number.} \\
  r(x) & : x \text{ is a perfect square.} \\
  s(x) & : x \text{ is the sum of two prime numbers} \\
  t(x) & : 4^x \geq x
\end{align*}
\]

Figure 1. Genetic decomposition of quantifiers.
By writing them in a symbolic form, determine whether the expressions below are correct or incorrect.

a) If the $2^x + 1$ value is a prime number when the $x$ value is an integer, then $x$ is a perfect square.
b) There is a natural number that is the sum of two prime numbers, and also a perfect square.
c) For the non-positive integer value, $4^x < x$!

The second question of the problem form aimed to determine the reasoning used by students to interpret a first order quantifier structures that contained a universal quantifier. With this question, we investigated the extent to which the students were able to encapsulate first order quantifiers within the theoretical framework of APOS.

**Question 2:** $A \neq \emptyset$ Assume any $A \neq \emptyset$, and two statements $p$ and $q$ defined according to the $A$ set. Based on this information, evaluate the validity of the statement below:

$$[(\forall x \in A, p(x)) \lor (\exists x \in A, q(x))] \Rightarrow [(\forall x \in A, p(x) \lor q(x))]$$

**Question 3:** $A = \{1, 2, 3, 4\}$ Determine the truth values of the statements defined according to the $A = \{1, 2, 3, 4\}$ set by writing down their verbal expressions, and explain your reasoning.

a) $\exists x, \forall y, x^2 < y + 1$
b) $\forall x, \exists y, x^2 + y^2 < 12$
c) $\forall x, \forall y, \forall z, x^2 + y^2 < 2z^2$
d) $\exists x, \exists y, \exists z, x^2 + y^2 < 2z$

**Question 4:** Assume that $p(x,y,z): x^2 + y^2 < 2xz$ is an open statement based on a set of integers. For each $x$ integer value, there is at least one $y$ integer value. As such, determine the truth-values for each $z$ integer value by writing the $x^2 + y^2 < 2xz$ statement in a symbolic form, and explain your reasoning.

In qualitative studies, "triangulation" is one of the methods used to ensure validity and reliability (Yıldırım and Şimşek, 2003). To ensure the validity and reliability of this study, data diversification was performed with the problem form and the clinical interviews. In addition, to ensure the content validity of the study, data diversification was performed with the problem form and the clinical interviews. The reliability of the test was determined by using the dual-coding method developed by Miles and Huberman (1994). The data obtained by using the tests were analyzed qualitatively through coding by two experts in the field, one of whom was the author of this study. Based on this analysis, the reliability of the study was determined to be 83%. This value demonstrated that the developed scale was suitable for consistently and reliably assessing the comprehension levels determined according to the APOS learning theory.

Following the qualitative analyses performed by coding the results of the tests that assessed the students' ability to form quantifier concepts, clinical interviews were used to collect further data. Clinical interview represents an interview technique that is frequently used in mathematics education, and which assists in determining the chain of thought of the students and in understanding their cognitive processes. Students who were included in the clinical interviews were selected among those whose cognitive levels were (at least) sufficient for forming first, second, and third order quantifier structures (as mentioned earlier in the "participants" section). Following the selection of students, clinical interviews were performed. The clinical interview questions were prepared with the assistance of experts' opinions. The final version of these questions is provided below. A pilot trial with the interview questions was performed with one of the students doing the Abstract Mathematics course.

**Question 1:** How would you define an "open statement"?

**Question 2:** Regarding the convergence set of triangles and rectangles, the following open statements are provided:

$p(x)$: all sides of $x$ are equal.
$q(x)$: all angles of $x$ are equal.
$r(x): x$ is an equilateral triangle.

According to the information above, describe whether the statement

$$\forall x \{[p(x) \land q(x)] \Rightarrow r(x)\}$$

is correct or incorrect by expressing this symbolic statement in a verbal form.

**Question 3:** $p(x,y): x + y = 9$ Assume that $p(x,y): x + y = 9$ is an open statement based on a set of integers. According to this, evaluate the equivalence of the open statement $\forall x \exists y p(x,y)$ with the open statement $\exists y \forall x p(x,y)$.

**Question 4:** $\exists y \forall x p(x,y) \land \exists y p(x,y)$ What is the implication between the statements $\exists y \forall x p(x,y)$ and $\forall x \exists y p(x,y)$?

**Question 5:** Regarding the set of real numbers, determine the truth-value of the following statement:

$$[\forall x \forall y (x > 0) \land (x > 0)] \Rightarrow [\exists z (xz > y)]$$

As described in the literature (Dubinsky, 1991), and as mentioned in the earlier sections of this paper, the main criteria for evaluating the structuring of first, second, and third order quantifier structures at a process level, and the assignments related to these criteria during the interview questions were as follows:

1. By generalizing the function scheme to the statement-valued function scheme, being able to determine the truth values of the statements obtained for each variable belonging to the set of statement-valued function variables (Questions 1 and 2).
2. Understanding second order quantifier structures (Questions 3 and 4).
3. Understanding third order quantifier structures (Question 5).

While seeking answers to these questions during the interviews, and depending on the responses of the students, simple questions such as "why?" and "how did you think of that?" were asked – without guiding the students – in order to allow them to more comprehensively demonstrate their way of thinking.

Clinical interviews were performed not only to determine, based on the analysis results, if the cognitive level of students was sufficient to grasp only processes regarding quantifiers, and whether they were able to comprehend further aspects regarding quantifiers at an object or schemes level; but also to ensure data reliability through data triangulation. Prior to beginning the clinical interviews, the students were first informed regarding the purpose of the interviews, and the way in which they would be conducted. The students' consent for the interview procedures was also obtained prior to the interviews. During the interviews, the students were provided with a sheet to work with; while the students were verbally informed by the interviewer regarding the interview questions, they were also asked to use the worksheet to solve the
questions. Furthermore, the students were asked not to erase any mistakes they made on the sheet, and to continue their work and calculations in the lines below. The interviews lasted an average of 40 min, and were also recorded with an audio recording device. As the researcher was also the instructor of the students during the Abstract Mathematics course, the interviews were performed after the final exams of this course were completed in order to avoid any undesirable influence on the students during the interview process. The researcher also remained impartial throughout the study procedures.

Analysis

The study data were analyzed qualitatively by using the coding method, and the analyses were supported with information from the current literature. The analyses were performed according to the criteria regarding the determination of comprehension levels within the APOS framework. The test consisted of three categories, which were first, second, and third order quantifier structures. As such, the analysis of the results was also performed according to these three categories.

During the process of forming first order quantifier structures, the students were expected to form the structures listed below:

1. To combine and coordinate two or more statements by using logical connections.
2. To generalize the function scheme to the statement-valued function scheme.
3. To determine the truth value of statements obtained for each variable value belonging to the set of statement-valued function variables.
4. To determine quantifiers by coordinating statements with iterations regarding the statement-valued functions.
5. To encompass the process for first order quantifiers in order to obtain a single statement.

During the process of forming single order quantifier structures, students who could generalize the function scheme to the statement-valued function scheme, and determine the truth value of statements obtained for each variable value belonging to the set of statement-valued function variables were considered to have an action level comprehension of quantifiers. If the students were able to determine quantifiers by coordinating statements with iterations regarding the statement-valued functions, they were then considered to have a process level comprehension of quantifiers. If the students were able to obtain a single quantifier and single variable statement by determining the quantifiers, and by taking into account the truth values regarding the statement-valued function variables, the students were then considered to have achieved an object level comprehension. Such students could be considered to have internalized (or encapsulated) first order quantifiers.

Following the internalization of first order quantifiers, the students were expected to form the structures listed below when working with second order quantifiers:

1. To determine the internal and external quantifiers of statements that contain two different (and generally consecutive) quantifiers, and which are formed from two-variable statement-valued functions.
2. To determine the truth value of the statement by coordinating internal and external quantifiers.
3. To encompass the process for second order quantifiers in order to obtain a single statement.

During the process of forming second order quantifier structures, students who could determine the internal and external quantifiers of statements that contain two different (and generally consecutive) quantifiers, and the truth value of the statement by taking into account the effect of the quantifiers on one another, were considered as having a process level comprehension of forming second order quantifiers. If the students could obtain two variable statement functions with two quantifiers through the coordination of internal and external quantifiers, the students were then considered to have an object level comprehension of second order quantifiers, and also to have internalized second order quantifier structures.

Finally, the students were expected to form third order quantifier structures by coordinating single order quantifier schemes for three quantifiers. Students who could group statements with three different quantifiers into two internal quantifiers, and employ the second order scheme to obtain a statement based on the most external variable were considered to have process level comprehension regarding the formation of third level quantifiers. If the obtained statement-valued function was (in a manner similar to previous structures) could be expressed as a three variable function three quantifiers, then the student was considered to have achieved object level comprehension of third order quantifiers, and to have internalized third orders quantifier structures.

RESULTS

The study results obtained in a question-answer format will be provided in this section in a descriptive manner. Based on the analysis results regarding the students’ comprehension of the quantifier concept (which were support with information from the current literature), the developments observed among the students are detailed and explained below by using the data for the individuals students who were interviewed.

Results regarding questions on first order quantifier structures

The answers provided to the first question of the problem form, which were based on structures that formed in the students’ minds within the APOS framework, are categorized and provided below.

Table 1 provides the results regarding the students’ ability to write in symbol form an open statement expressed in writing by coordinating it with logical connections.

Table 1 shows that although 55% of the students were able to write open statements that were expressed verbally in symbol form, by coordinating them with logical connections, they were nevertheless unable to determine the quantifiers contained by the statement. The students were considered partially successful. On the other hand, 29% of the students were able to use logical connections to write statements that were expressed verbally in symbol form, and to identify the relevant quantifiers in the process. Based on these results, it is possible to state that the students had great difficulties in identifying quantifiers in statements that were expressed verbally.

The students’ ability to determine the truth values of statements obtained for each variable belonging to the set of open statement variables, and their ability to identify the truth values of the open statements based on these reiterations are described in Table 2.
Table 1. Ability to write in a symbol form by using logical connection.

<table>
<thead>
<tr>
<th>Ability to write in a symbol form by using logical connections</th>
<th>No of students</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully able</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Partially able</td>
<td>53</td>
<td>55</td>
</tr>
<tr>
<td>Unable</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 2. The ability to determine the truth value of each open statement.

<table>
<thead>
<tr>
<th>The ability to determine the truth value of each open statement</th>
<th>No of students</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully able</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Partially able</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Unable</td>
<td>60</td>
<td>62</td>
</tr>
</tbody>
</table>

Table 3. The distribution of the ability to determine universal quantifier and existential quantifier.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal Quantifier</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>Existential Quantifier</td>
<td>18</td>
<td>64</td>
</tr>
</tbody>
</table>

Among the students, 9% were able to determine the truth value of each statement obtained for every variable belonging to the set of open statement variables. However, they were not able to coordinate the statements obtained through reiterations, and were thus unable to identify the quantifiers. Therefore, it was considered that these students had only a partial understanding regarding the truth values of open statements. On the other hand, 62% of the students described the truth values of the open statements erroneously. According to the data in Table 2, 9% of the students were able to structure first order quantifier structures within the APOS theoretical framework at an action level. Furthermore, 29% of the students were able to determine the quantifier that needed to be part of the open statement expression by determining the truth values of the statements obtained for the variable values belonging to the set of open statement variables, and by identifying the relationship between the obtained statements. Based on the logical processes they used, these students were able to correctly determine the truth value of the open statement. Thus, 29% of the students were able to internalize (or encapsulate) the ability to form first order quantifiers, and to structure these quantifiers according to the APOS theoretical framework at an object level.

Table 2 also shows that 71% of the students were unsuccessful and had great difficulties in identifying universal or existential quantifiers in open statements that were expressed verbally. In addition, the students' open statements with single order quantifier structures were evaluated according to the types of quantifier they contained. Based on the analyses, it was determined that the students were more successful in forming first order structures that contained existential quantifiers than first order structures that contained universal quantifiers. The results are provided in Table 3.

Results regarding the second question

The students’ ability to determine the truth value of compound statements belonging to a first order quantifier structure, and which are expressed in symbol form and contain a universal quantifier, is provided in Table 4.

As can be seen in Table 4, only 5% of the students were able to correctly determine the truth value of the statement by taking into account the role of the universal quantifier in a compound statement with a first order quantifier structure and a universal quantifier. Among the students, 11% attempted to demonstrate the validity of the statement by using universal quantifiers and algebra. However, these students made various errors of reasoning when using algebra. Table 4 also shows that the large majority of the students determined the truth value of the compound statement incorrectly. The reasoning or ways of thinking that led students to these incorrect results are listed below:

**Reasoning 1:** *If the statement $p(x)$ is incorrect for every value $x$ that belongs to the variable set $(A)$ of the compound statement, then the $\forall x \in A, p(x)$" statement is incorrect as well.*

**Reasoning 2:** *Determining only the truth values for the open statement obtained by combining "$\lor$" and "$\Rightarrow$", without taking the universal quantifier into account.*

**Reasoning 3:** *Attempting to simplify the expression by applying symbolic logical operations on the compound statements.*
Table 4. The distribution of the ability to determine the truth value of compound statements belonging to a first order quantifier structure.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct</th>
<th>%</th>
<th>Partially correct</th>
<th>%</th>
<th>Incorrect</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to determine the truth value of a compound statement with a first order quantifier structure and a universal quantifier</td>
<td>5</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>81</td>
<td>84</td>
</tr>
</tbody>
</table>

Table 5. The distribution of the reasoning used by students who incorrectly interpreted the compound statements with a first order structure and a universal quantifier.

<table>
<thead>
<tr>
<th>Items</th>
<th>Students</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasoning 1</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Reasoning 2</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>Reasoning 3</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Reasoning 4</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Reasoning 5</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Reasoning 6</td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>

Reasoning 4: The student attempts to determine the truth value of the compound statement \( [p(x_0) \lor q(x_0)] \Rightarrow [p(y_0) \lor q(y_0)] \) for a \( y_0 \) value that differs from \( x_0 \) and \( x_0 \) (which, respectively, belong to the statements \( p \) and \( q \) from the set of variables (A)).

Reasoning 5: The students erroneously assume that the truth value will be 1 for the \( a \) \( x_0 \) value that belongs to the variable set of an open statement that includes the universal quantifier (\( \forall \)).

Reasoning 6: Determining \( p \) and \( q \) such that the truth value of expression \( \forall x \in A, p(x) \lor q(x) \) is 0.

Based on the above categories, the distribution of the reasoning used by the students who incorrectly interpreted the compound statement with a first order structure and a universal quantifier is provided below in Table 5.

Table 5 shows that 25% of the students attempted to determine the truth value of the compound statement by disregarding the role of the universal quantifier, and by focusing instead on the symbolic logical connections’ \( \lor \) and \( \Rightarrow \) that were part of the compound statement. On the other hand, 20% of the students demonstrated the fourth type of reasoning. While attempting to identify the truth value of the compound statement expressed with symbols, these students erroneously attempted to determine the truth value of the statement \( [(p(x_0)) \lor (q(x_0))] \Rightarrow [(p(y_0) \lor q(y_0))] \) by utilizing the \( [(\forall x \in A, p(x)) \lor (\forall x \in A, q(x))] \) statement a \( x_0 \) value belonging to the \( A \) variable set of the compound statement; and for the \( (\forall x \in A, p(x) \lor q(x)) \) statement, a \( y_0 \) value belonging to the \( A \) variable set that is different from the \( x_0 \) value. Students demonstrated the fourth type of reasoning could be considered as having problems in applying the function scheme to the statement-valued functions. Among the students, 11% attempted to determine the statements \( p \) and \( q \) (which are variables of the compound statement) in a manner that rendered the compound statement of the question invalid. In this case, although the student is aware of the role of the universal quantifier, he/she is not aware that he/she is providing a special example that turns the compound statement (expressed in symbols) into a valid statement.

According to the results in Tables 4 and 5, it is possible to state that the students experienced difficulties in interpreting compound statements with a first order quantifier structure that contained a universal quantifier, mainly because they were not able, within the APOS framework, to structure the first order quantifier at an object level.

Results regarding questions on second and third order quantifier structures

Depending on the mental structures expected from the students while they formed second and third order quantifier structures in symbol form within the APOS framework, the answers to the third question of the problem form were classified as follows.

The students’ ability to verbally express two and three variable open statements that are provided in symbol form is shown in Table 6.

In Table 6, it can be seen that 92% of the students were able to express open statements with second and third order quantifier structures that were expressed verbally.

The results regarding the students’ ability to determine the truth value of open statements expressed in symbol form that had two variables and two quantifiers in differing order are provided in Table 7.

Table 7 showed that 41% of the students were able to determine the truth value of open statements with second order quantifiers that had quantifiers in the existential-universal order. Furthermore, it was observed that 8% of the students had the ability to determine the truth value of two variable open statements that had quantifiers in the
Table 6. The distribution of the students’ ability to verbally express two and three variable open statements.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct %</th>
<th>Incorrect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to verbally express second and third order quantifier statements that are provided in symbol form</td>
<td>89</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>92</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 7. The distribution of the students’ ability to determine the truth value of open statements expressed in symbol form that had two variable and two quantifier.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>∃∀</td>
<td>40</td>
<td>24</td>
</tr>
<tr>
<td>∀∃</td>
<td>8</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 8. The distribution of the students’ ability to determine the truth value of open statements expressed in symbol form that had three variable and three quantifier.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>∀∀∀</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>∀∃∀</td>
<td>10</td>
<td>34</td>
</tr>
</tbody>
</table>

universal-existential order. In light of this data, it was observed that students were more successful in forming second order quantifier structures with the ∃∀ order than the ∀∃ order.

Table 7 also showed that 51% of the students were unable to determine the truth value of open statements with second order quantifiers that were expressed in symbol form. An evaluation of the solutions provided by the students to these problems revealed that they generally ignored/overlooked the ordering of the quantifiers in front of the variables. It was thus determined that the students attempted to find the truth value of the open statements expressed in symbol form by using their own opinions regarding the statement.

The results regarding the students’ ability to determine the truth value of open statements expressed in symbol form that had three variables and three quantifiers in differing order are provided in Table 8.

Table 8 shows that 24% of the students were able to determine the truth value of an open statement with a third order quantifier structure that had an order of ∀∀∀, while 10% of the students were able to determine the truth value of an open statement with a third order quantifier structure that had an order of ∃∀∀. Thus, it can be seen that most students had difficulties in determining the truth value of structures with three quantifiers in different orders.

Table 8 also showed that 66% of the students were unable to determine the truth value of open statements with third order quantifiers that were expressed in symbol form. A review of the answers and solutions provided by these students to the problem form questions showed that they were unable to properly understand open statements with second order or third order quantifiers. When analyzing the quantifiers of open statements with three variables, most students overlooked the ordering of the quantifiers. As a result of this, they did not group quantifiers as external or internal. The students consequently failed to understand the open statements, and attempted to determine truth values of the symbolic expression based on their own opinions and perceptions.

When the results shown in Tables 7 and 8 are considered together, it can be seen that 49% of the students were able to form second order quantifier structures within the APOS theoretical framework, while 34% were able to form third order quantifier structures. Thus, the students had greater difficulty in forming third order quantifier structures than second order quantifier structures.

Results regarding questions on verbally-expressed third order quantifier structures

Depending on the mental structures expected from the students while they formed third order quantifier structures in symbol form within the APOS framework, the answers to the fourth question of the problem form were classified and evaluated as follows.

The students’ ability to express verbally three variable open statements provided in symbol form is shown in Table 9.

Table 9 also showed that 73% of the students were unable to determine the truth value of statements with third order quantifiers that were verbally expressed. Results regarding the students’ ability to determine the truth values of verbally-expressed open statements with third order quantifier structures by analyzing one external and two internal quantifiers is shown in Table 10.

Table 10 shows that only 7% of the students were able to determine the truth value of verbally-expressed open statements with three variables by analyzing the quantifiers it contained. On the other hand, 93% of the students were not able to properly understand open statements with third order quantifier structures that were
Table 9. The distribution of the students’ ability to express verbally three variable open statements.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct %</th>
<th>Incorrect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to write in symbol form statements with third order quantifier structures that are expressed verbally</td>
<td>71</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>73</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 10. The distribution of the students’ ability to determine the truth value of verbally-expressed open statements with third order quantifier structure.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Correct %</th>
<th>Incorrect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to analyze a statement with a third order quantifier structure by using external and internal quantifiers</td>
<td>7</td>
<td>90</td>
</tr>
</tbody>
</table>

expressed verbally. These students attempted to determine the truth value of the written statement based on their own opinions regarding the statement. This 93% failure rate possibly resulted from the students’ inability to form second and third order quantifier structures in their minds.

Interview results

Interviews were performed to ensure data diversification, and to thereby increase the reliability of the study. In addition to this, the interviews also served to determine the cognitive level of students. In other words, the interviews attempted to evaluate whether the interviewed students were at least at a process level, or whether they were at an object or scheme level.

Here, the interview students will be numbered from one to five. The analysis results for some of the students will be provided in detail, while similar results in other students will be described briefly.

Results for the first student

The student’s answers to the problem form and the results provided by this student during the interview were in agreement with one another. Through the use of logical connections, the student was able to write open statements in symbol form with first order quantifier structures that were expressed verbally. During the interview, it was observed that the student was able to determine the truth value of the statement obtained for each variable value from the variable set. This indicated that the students were able to utilize reiterations obtained from the variable set, and effectively form mental processes to solve this problem. However, even if the student was able to determine the existential quantifier in open statements with first order quantifier structures that were expressed verbally, the student was nevertheless unable to determine the universal quantifier. Based on these results, it was concluded that the student had a process level understanding of first order quantifiers. The results from the interview with this student supported this conclusion regarding the student.

Interviewer: Could you give an example of an open statement?
Student: Yes… Hmmm… For example, the statement $x + 2 > 5$ is an open statement. Here, we obtain the $4 > 5$ statement for $x = 2$, which is an incorrect statement; and the $10 > 5$ statement for $x = 8$. The truth value of this statement is one; in other words, it is correct...

Interviewer: What is the set of the variables for the open statement $x + 2 > 5$?
Student: Ummm… the integer set...

Interviewer: Good… So, considering this example, how would you define this open statement?
Student: It is a statement that is correct for certain values, and incorrect for other values.

Interviewer: Could you please write the expression for the statement provided in Question 2?
Student: “For each $x$; if the sides and angles of $x$ are equal, then $x$ is an equilateral triangle.”

Interviewer: So, what is the truth value of this statement? Could you explain your reasoning?
Student: The truth value of this statement is 1. The reason for this is as follows: Assume that $x = ABC$ is an equilateral triangle. In this case, the statement of the question should be “($p(ABC) \land q(ABC)) \Rightarrow r(ABC)$”; in other words, it should be “If all sides of $ABC$ are equal, and if all angles of $ABC$ are equal, then $ABC$ is an equilateral triangle.” Given these conditions, the truth value of the statement is 1, because of $1 \Rightarrow 1$. Now, let $x = DEF$ be an equilateral triangle. In this case, the statement of the question should be “($p(DEF) \land q(DEF)) \Rightarrow r(DEF)$”; in other words, it should be “If all sides of $DEF$ are equal, and if all angles of $DEF$ are equal, then $DEF$ is an equilateral triangle.” Given these conditions, the truth value of the statement is 1, because of $0 \Rightarrow 0$. Since these two situations are valid for all triangles, and because the symbolic expression in the
question is a universal quantifier, the truth value of the statement is 1.

Student: I guess not. This is because triangles in which the sides and angles are all equal can only be equilateral triangles. And the statement mentions triangle specifically.

This interview showed that the student was aware of the role of universal quantifiers when attempting to determine the truth values of a symbolically expressed statement with a first order quantifier structure that included a universal quantifier. However, the student overlooked the variable set of the open statement, and took only the verbal expression of the statement into account. The student failed to note that if \( x = ABCD \) were to be a square, then the truth value would have been 0. This observation indicated that the student had difficulties in generalizing the function at hand to the scheme of the statement-valued function when forming a first order quantifier structure.

In the third and fourth questions that were about second and third order quantifier structures, the first student attempted to determine the truth value of the statements by using a set of symbolic logic rules, instead of grouping the quantifiers as external and internal. Based on this, it is possible to state that the fact that the student did not structure the first order quantifier according to the APOS theoretical framework prevented him from understanding second and third order quantifiers.

**Results for the second student**

According to the answers provided by the student to the questions regarding first order quantifiers in the problem form, it was determined that the second student had an object level understanding of first order quantifiers within the APOS theoretical framework. This observation was further supported by the answers the student provided to questions 1 and 2 during the interview.

The second student also demonstrated a rather good performance in structuring second and third order quantifiers within the APOS theoretical framework when answering the third question of the problem form. On the other hand, the interview showed that the student had many difficulties regarding second order quantifier structures. The second student had difficulties in interpreting new expression obtained by changing the sequence of quantifiers in an open statement with two variables and a second order quantifier structure. The interview during which the interviewer questioned the student on this subject is summarized below:

**Interviewer:** How do you interpret the expressions \( \forall x \exists y p(x, y) \) and \( \exists y \forall x p(x, y) \)?

**Student:** The expression \( \forall x \exists y p(x, y) \) means “For each \( x \) integer value, there is at least one \( y \) integer value that allows the equation \( x + y = 9 \) to be valid.” On the other hand, \( \exists y \forall x p(x, y) \) means “There is at least one \( y \) integer value for which every \( x \) integer value allows the equation \( y + x = 9 \) is valid.”

**Interviewer:** Why did you write \( +x = 9 \) ?

**Student:** Because in the expression \( \exists y \forall x p(x, y) \), the sequence was: \( \exists y \forall x p(x, y) \). For this reason, the equation must be \( y + x = 9 \).

**Interviewer:** Do you think it should be \( \exists y \forall x p(y, x) \)?

**Student:** Yes… And because it is \( \forall x \exists y p(x, y) \), the sequence of \( \exists y \forall x p(x, y) \) would make \( p(y, x) \) valid.

**Interviewer:** Are \( p(y, x) \) and \( p(x, y) \) different from each other?

**Student:** In ordered pairs, changing the sequence should also change the meaning of the mathematical expression. I know this, but since the integers are \( x + y = y + x \), then \( p(y, x) \) and \( p(x, y) \) must be the same.

**Interviewer:** So, what do you think about the truth value of the statement: \( \exists y \forall x p(x, y) \)?

**Student:** Hmm… Since \( \exists y \forall x p(x, y) \) and “\( \forall x \exists y p(x, y) \)” are the same statements, either \( 1 \Rightarrow 1 \) or \( 0 \Rightarrow 0 \) should be applicable depending on whether the statement is correct or incorrect. In both cases, the truth value of the statement: \( \exists y \forall x p(x, y) \) is valid.”

The second student was aware that changing the sequence of the quantifiers, or the quantifiers in front of the variables, would change the meaning of an open statement with second order quantifier structure. However, the student erroneously assumed that changing the sequence of the quantifiers would also change the sequence of the ordered pairs within the open statement. In addition, the student attempted to analyze the open statement without determining whether its quantifiers were internal or external quantifiers, by considering only the symbolic expression of the statement. Therefore, according to the APOS theoretical framework, the cognitive level of the student in forming second order quantifier structures could be considered as being at a process stage.

While forming third order quantifier structures, the student experienced problems similar to those he had when forming second order quantifier structures.

**Interviewer:** What would you say the truth value of the fourth question is?

**Student:** Hmm… This compound statement has three quantifiers. As \( \exists x \in R \) is a real number expression, let us say that \( z = 3 \). Since the open statement is ordered as \( \forall x \forall y \), the statement corresponding to \( z = 3 \) would be correct for each value of \( x \) and \( y \). Then it should be \( x = 10 \) and \( y = 45 \). It that case, we obtain the statement \( 30 > 45 \). This shows that the statement is incorrect.

During the interview, the student overlooked the sequence of the quantifiers in the statement with the third order quantifier structure \( \forall \forall \exists \). As a result, he interpreted
the role of the existential quantifier incorrectly. Based on these results, it can be said that the student had a process level understanding of third order quantifiers.

Results for the third student

The third student’s level of cognitive development in forming first order quantifier structures was similar to that of the second student. However, the third student performed differently when forming second order quantifier structures. During the interview, it was noted that the student paid attention to the sequence of the quantifiers when analyzing two variable open statements with second order quantifier structure. The student also answered the question by determining the internal and external quantifiers.

Interviewer: Can you please verbally describe the expressions $\forall x \exists y (x + y = 9)$ and $\exists y \forall x, x + y = 9$?

Student: The expression $\forall x \exists y, x + y = 9$ means that “For every $x$ integer value, there is at least one $y$ integer value that satisfies the equation $x + y = 9$.” The expression $\exists y \forall x, x + y = 9$, on the other hand, means that “There is at least one $y$ integer value that satisfies the equation $x + y = 9$ for every $x$ integer value.”

Interviewer: So, what would you say about the equivalence between $\forall x \exists y (x + y = 9)$ and $\exists y \forall x, x + y = 9$?

Student: Those two expressions are different from one another…

Interviewer: Could you explain why?

Student: Hmm… For $x = 3$, the only value that satisfies the equation $x + y = 9$ is $y = 6$. For every integer value $x = x_0$ such as $x = 4, y = 5, x = 7, y = 2, x = 13, y = -4$, etc… there is a corresponding integer value of $y_0 = 9 - x_0$ ….. In that case, the open statement $\forall x \exists y (x + y = 9)$ is correct. On the other hand, considering the expression $\exists y \forall x, x + y = 9$, there is a value $y_0$ for which the equation $x + y_0 = 9$ is satisfied by the integer value $\forall x$. This means that $x = 7$ for $y_0 = 2$ and $x = 3$ for $3 + y_0 = 9$…... and so on. Taking these two equations into account, $y_0 = 2$ turns out to be self-contradictory. This indicates that the statement is incorrect, and that its truth value is 0. For this reason, $\forall x \exists y (x + y = 9)$ and $\exists y \forall x, x + y = 9$ are not equivalent…

Interviewer: What kind of an implication could there be between $\exists y \forall x p((x,y))$ and $\forall x \exists y p(x,y)$?

Student: Hmm… since the statement $\exists y \forall x p((x,y))$ is incorrect, and the statement $\forall x \exists y p(x,y)$ is correct, the statement $\exists y \forall x p((x,y)) \Rightarrow \forall x \exists y p(x,y)$ is not possible. But the statement $\forall x \exists y p(x,y) \Rightarrow \exists y \forall x p((x,y))$ is possible.

Interviewer: How did you determine whether the statements $\exists y \forall x p((x,y))$ and $\forall x \exists y p(x,y)$ were correct or incorrect?

Student: I just explained a few moments ago…

The third student was able to determine the external and internal quantifiers when analyzing statements with second order quantifier structures. By coordinating the external and internal quantifiers, and by determining the truth value of the open statement, the student was able to determine that they were not equivalent. This performance demonstrated that the student could structure second order quantifiers at an object level according to the APOS theoretical framework. However, when evaluating the implication between the open statements $\forall x \exists y p((x,y))$ and $\exists y \forall x p(x,y)$, the student was unable to consider $p(x,y)$ as a variable. This indicated that the student could not coordinate the function scheme and the algebra scheme.

Although the third student had internalized second order quantifier structures, he had difficulties when analyzing third order quantifier structures.

Interviewer: What is the truth value of the open statement?

$\left[ \forall x \exists y (x > 0) \land (y > 0) \right] \Rightarrow [ \exists z (x > y) ]$ which is defined according to a set of real numbers?

Student: Well… since $3z$, let us use $z = 3$… In the meantime, since we have $\forall x \exists y$, let us try to find if there are examples that make this statement incorrect… Also, let us assume that $x = 10$ and $y = 45$. It that case, we obtain the statement $30 > 45$. This statement is incorrect. In that case, the statement is incorrect, and its truth value is 0.

The student’s analysis of the open statement with a third order quantifier structure did not include the analysis of the sequence of quantifiers in the statement. Thus, the student’s analysis was performed by focusing only on the type of quantifiers, and the judgment of the statement. Based on this, it was observed that the student could not properly analyze and resolve the quantifiers within the open statement with third order quantifier structures. This demonstrated that the student could not structure third order quantifiers according to the APOS theoretical framework.

Results for the fourth student

The cognitive skills of the fourth student regarding the formation of first, second, and third order quantifier structures were generally similar to those of the third student. The main difference between the cognitive developments of the two students was that the fourth student was able to consider open statements with unknown values and second order quantifiers (such as $p, q, r$…) as functions. Thus, the student was able to reason by coordinating the function scheme with the algebra scheme. During the interview, it was observed that the student was able to verbally express a statement in written form.
Interviewer: What is the implication between the statements $\forall x \exists y \ p(x,y)$ and $\exists y \forall x \ p(x,y)$?

Student: The set $A$ is the set for mathematics department students, while the set $B$ is the set for physics department students. Thus, let us define statement $p(x,y)$ with set $A \times B$ as “$x$ likes $y$.” The expression $\exists y \forall x \ p(x,y)$ means “there is at least one physics department student who is liked by all of the mathematics department students.” In that case, there is at least one physics department student who is liked by all mathematics department students. For this reason, the equation must be $\exists y \forall x \ p(x,y) \Rightarrow \forall x \exists y \ p(x,y)$. On the other hand, the expression $\forall x \exists y \ p(x,y)$ means “there is at least one physics department student who is liked by all mathematics department students.” From this expression, we cannot say that there is at least one student who is liked by all mathematics department students. Then $\forall x \exists y \ p(x,y) \Rightarrow \exists y \forall x \ p(x,y)$ would not be possible.

The fourth student thus demonstrated that he was able to structure second order quantifiers at an object level according to the APOS theoretical framework. On the other hand, while analyzing a statement with three variables and three quantifiers, the student was unable to group the first two quantifiers to obtain a statement from the outermost variable. The dialogue between the interviewer and the student regarding the fifth question was as follows:

Interviewer: How would you determine the truth value of the following statement, which is defined from a real number set?

$$[\forall x \forall y \ (x > 0) \land (y > 0)] \Rightarrow [\exists z (xz > y)]$$

Student: For every real number $x$ and $y$, there is at least on real number $z$ that satisfies $z > y$. In that case, and since $x > 0$, we would obtain $xz > y$. In this case, the statement is correct.

Interviewer: What if we had $x \leq 0$ instead? Would that be possible?

Student: Since every ($\forall$) in the statement is $x$, it would certainly be possible...

Interviewer: Then what would happen if we had $x \leq 0$?

Student: If that case... since $x \leq 0$, we would have $xz \leq y$. Thus, the compound statement would have $0 = 0$; in other words, it would have a truth value of 1. The statement would thus be correct.

As was the case with the problem form, the student was not able to group the first two quantifiers of the statement and to coordinate the quantifier structures while analyzing the open statement with a third order quantifier structure. The analysis of the data from the interviews indicated that the student was able to structure first and second order quantifiers at an object level, and third order quantifiers at a process level.

**Results for the fifth student**

The fifth student demonstrated the best performance with both the problem form and in the interviews. It was observed that this student had an object level cognitive development regarding the formation of first order quantifier structures. While analyzing an open statement with second order quantifiers, the student could easily determine the external and internal quantifiers. As a result of this, the student was able to identify the truth values of the statements by coordinating the external and internal quantifiers. Thus, the fifth student was able to internalize first order quantifier structures. Furthermore, the student demonstrated an object level cognitive development regarding the formation of second order quantifier structures. An analysis of the students’ approach towards open statements with third order quantifier structures indicated that the student could coordinate external and internal quantifiers, and that he could structure second order quantifier structures at an object level. The results of the interview further supported these observations.

Interviewer: How did you analyze the open statement in the fourth question, which has a third order quantifier? Can you explain?

Student: First of all, in the open statement

$$[\forall x \forall y (x > 0) \land (y > 0)] \Rightarrow [\exists z (xz > y)]$$

let us define the external quantifier as a universal quantifier, and the internal quantifiers as universal and existential quantifiers. Thus we can write this statement such as $\forall x \forall y \exists z, [(x > 0) \land (y > 0)] \Rightarrow (xz > y)$. Due to the principle regarding the sequence of real number sets, for each $y$ real number value, there is at least one $z$, such that $z > y$. In that case, the truth value of the statement $\forall y \exists z, z > y$ is 1. If we consider the outermost universal quantifier, for any $x$ positive real number value, it will be $xz > y$, and the truth value of the statement will be 1 due to $1 \Rightarrow 1$. On the other hand, and $x$ negative real number value, we will have $xz < y$, and the truth value of the statement will be 1 due to $0 \Rightarrow 0$. In this case the statement is correct.

Interviewer: What would happen if we have $x = 0$?

Student: If we had $x = 0$, the truth value of the statement $\forall x \forall y (x > 0) \land (y > 0)$ would be zero. In such a case, the truth value of the compound statement would be 1, since $0 \Rightarrow 0$ or $0 \Rightarrow 1$ would be applicable. The statement would thus be correct.

While working on the problem form and answering the interview questions, the student demonstrated the ability to analyze statements with third order quantifiers by group the quantifiers as external and internal. Thus, the student could correctly determine the truth value of the statements based on the analyses that he performed. The obtained results indicated that the student had an object level ability to form first, second, and third order
quantifier structures.

CONCLUSION AND RECOMMENDATIONS

Quantifiers are the fundamental cornerstones of mathematical structures. The ability to give meaning to abstract and conceptual aspects of mathematics is directly related to the ability to comprehend expressions that contain quantifiers. In this context, it is important to teach quantifiers and their fundamental roles in mathematics during undergraduate mathematics education.

The current literature emphasizes the importance of forming mental structures with first and high order quantifiers, and of making transitions both from symbolic expression to verbal expressions and from verbal expression to symbolic expression. According to the data in Tables 6 and 9, it was observed that the students were more successful in performing transitions from symbolic form to verbal form than performing transitions from verbal form to symbolic form. In addition, a comparison of Tables 1 and 9 also revealed that when performing transitions from verbal/written form to symbolic form, the students were more successful with third order quantifier structures than they were with single order quantifier structures. The reason for this was possibly the fact that the quantifiers in open statements with third order quantifier structures were expressed more clearly in verbal/written form than the quantifiers in statements with first order quantifier structures. Furthermore, it was observed that students had difficulties in identifying the quantifiers within statements in case words such as “every, all, at least” (used to describe the universal and existential quantifiers) were absent from the verbal expression, especially in the case of first order quantifier structures. As a result of this, the students were not able to fully and correctly express the symbolic form of the relevant verbal expressions. Furthermore, it was observed that the students were able to determine the truth values of statements obtained by using each variable value belonging to the variable set of the open statement. Based on this, it was concluded that the students were able to effectively use statements and function schemes (which are the basic tools of logic) during the process of forming first order quantifier structures.

During the study, the students were more successful in determining the truth value of open statements with existential quantifiers within a first order quantifier structure than they were in determining the truth value of open statements with universal quantifiers. This was possibly due to the difficulties they had in understanding universal quantifiers in open statements expressed verbally with words such as “If... in case...” This finding is in parallel with the results of Epp's (2010) study. Based on this result, attempts were made to determine the reasoning used by students in interpreting mathematical expressions with universal quantifiers and first order quantifier structures, such as \((p \Rightarrow q) \land r\). In such expressions, the students generally overlooked the role of the universal quantifier, and formed their own opinions regarding the symbolic expression of the statement. Furthermore, the students had difficulties in realizing that \(p, q, r\) in the symbolic expression of the statement were actually variables. This was possibly due to the students’ inability to analyze open statements by combining the statement algebra and the function schemes. It was noted that the students had a tendency to simplify the expression of the statement by using various rules. Based on this observation, it is possible to state that the students were unable to structure first order quantifier structures at an object level according to the APOS theoretical framework.

In the context of undergraduate mathematics courses, second and third order quantifier structures are used more frequently than first order quantifier structures. For this reason, the current study also attempted to determine how students give meaning to second and third order quantifier structures.

During the study, it was observed that the student generally overlooked the sequence of quantifiers when analyzing open statements with high order quantifier structures. As result, the students did not group quantifiers as external and internal when working on open statements with second and third order quantifier structures. On the other hand, the students had a greater difficulty in giving meaning to symbolic expressions with a particular variable set (such as \(A = \{1,2,3,4\}\)) and a universal-existential quantifier sequence \((\forall \exists)\) than expressions with a existential-universal quantifier sequence \((\exists \forall)\). This observation contradicts with the results of Piatek-Jimenez (2010). Furthermore, with a variable set represented by \(p(x,y)\), the students experienced more difficulties in giving meaning to two-variable open statements with the \((\exists \forall p(x,y))\) expression than to two-variable open statements with the \((\forall \exists p(x,y))\) expression. Based on these results, it is possible to state that in statements that are included into the symbolic form of an expression (such as \(p, q, r \ldots\)), changing the sequence of quantifiers led confusion among the students. In third order quantifier structures, the students had greater difficulty in giving meaning to mathematical expressions with different quantifier sequences than to mathematical expressions with the same quantifier sequence. Based on this observation, it is possible to state that changing the sequence of quantifiers in high order quantifier structures led to considerable difficulties for the students when attempting to form mental objects with these structures. This finding is in agreement with the results of Piatek-Jimenez (2010).

It is believed that gaining knowledge of the reasoning used by students when forming first and high order quantifier structures, and also of the difficulties they experience in the process, will be beneficial in organizing undergraduate-level mathematics teaching activities in
manner that is more meaningful to the students. Performing educational activities in mathematics with greater knowledge of the importance of quantifiers will allow mathematics education to be better understood by the students, and will also strengthen the basis for mathematics learning. This, in turn, will assist students in better understanding the nature of mathematics taught in physics, engineering, and education faculties, and provide them with a better opinion on how to utilize or teach mathematics in their future occupations. In this context, mathematics instructors should plan their courses by taking into account the errors made by their students when forming quantifier structures, and attempt to remedy such errors by emphasizing the relevant aspects of quantifiers.

Conflict of Interests

The author has not declared any conflict of interests.

REFERENCES


Field trip to Kazdagi National Park: Views of prospective Biology teachers

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The purpose of the study was to investigate the views of the prospective biology teachers about the field trip to Kazdagi National Park. Participants were 12 prospective Biology teachers studying in Necatibey Faculty of Education in Balıkesir University, Turkey. A semi-structured interview form was used as a data collection instrument. Data were analyzed by descriptive and content analyses techniques. The study results revealed that the students’ views and expectations about the aims of the field trip were to a large extent fulfilled. The students were most impressed by Sarıkız Hill, the Legend of Sarıkız, and by being able to see the Kazdagi fir. They were able to learn in practice what they had learned in theory in the course, such as in Systematic Botany and Biogeography. They suggested that the students should be given preliminary information about plants, endemic plants and what was observed in Kazdagi, and the field trips should be well-planned.

Key words: Environmental awareness, field trip, Kazdagi, Kazdagi National Park, prospective Biology teachers.

INTRODUCTION

Protected area is “a clearly defined geographical space, recognized, dedicated and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Dudley, 2008). Natural parks are protected areas (Borrini-Feyerabend et al., 2013; Dudley, 2008).

Kazdagi National Park in Turkey, an area of 20.936 hectares, was proclaimed a national park on April 17, 1994. The Park is within the boundaries of the province of Çanakkale, lying to the north of the Gulf of Edremit. Known also as Mount Ida, Kazdagi was named in mythology as “Idaea of a thousand springs” because of its spring waters and cascades. Kazdagi area is an important social and cultural region. Mythological, the area is identified with Sarıkız Hill and the legend of Sarıkız. Besides the endemic plants, the Kazdagi fir - Abies nordmanniana subsp. equi-trojana-, the area is endowed with a rich covering of flora. There are approximately 800 plant taxa in the area of Kazdagi along with endemic plant taxa, of which the major component is the Kazdagi fir (Kaz Dağları National Park). There were 78 endemic plant taxa in Kazdagi, 30 of which were unique to the national park, and that for this reason, the entire region was an important area of plant (Satılı et al., 2006). 22 lungwort species are also found in Kazdagi National Park (Gökler and Özenoğlu, 1999). Although the lower levels of Kazdagi are dominated by 600-700 m. red
There are three types of field trips: An informal survey of a neighborhood, a more formal scavenger hunt and a virtual field trip using Google Earth (Krakowka, 2012). Field trips can be made to a natural history museum, a science center, a zoo, aquarium, observatory, cultural/history museum, art museum, city, state or national park, or to similar venues (Anderson and Zhang, 2003; Davidson et al., 2010; Kisiel, 2000). Kisiel (2005) stated that field trips provide eight types of motivation to science teachers. They are to connect with the classroom curriculum, to provide a general learning experience, to encourage lifelong learning, to enhance interest and motivation, to provide exposure to new experiences, to provide a change in setting or routine, to provide enjoyment, and to meet expectations about school. Kiesel reports that making a connection with the classroom curriculum is the most important one. Field trips provide prospective teachers with the opportunity to make a connection between the knowledge they learn in their classes with what they see and observe in a natural environment. Field trips are important for undergraduate experiential learning (Krakowka, 2012; Weeden et al., 2011). In the study of Faria and Chagas (2012), the teachers mainly preferred guided visits to an aquarium. In another study (Güler, 2009) 6 out of 24 teachers participating in ecology-based environmental training had contributed to their knowledge in that they had learned about endemic species, trees and plants. Four of the participants stated that this trip had taught them how a class on the environment could be held. Some participants said that they would use the information to share practical experiences in nature with their students, inspired to conduct field trips with students over the weekends to give them the opportunity to learn about nature. Munday (2008) concluded that 60 teachers found the field trips in geography education at ages 7-10 in Australia difficult to plan, but possible to overcome by working with other teachers. Hung et al. (2010) used a Personal Digital Assistant (PDA) integrated ecology observation worksheet and PDA is used mobile device in education recently. Hung et al. (2012) used a concept-map integrated dynamic assessment system for ecology observation. Palmberg and Kuru (2000) showed that 11-12 year olds students who participated in outdoor activities in Finland had strong and empathic relationship with nature and better social behavior than the group who had not. Demir (2007) stated that 23% of the prospective classroom teachers had never participated in an observational field trip.

A review of the literature fails to reveal any study reported in Turkey of a field trip to Kazdagi with prospective biology teachers. We think therefore the findings of the present study will contribute to the literature.

Purpose of the study

The purpose of the study was to define the views of fourth grade prospective Biology teachers studying in Necati Bey Faculty of Education in Balikesir University, Turkey about the field trip organized through Kazdagi National Park as part of their Biogeography course. Four research questions guided this study:

1. What are the prospective Biology teachers’ views on the aims and expectations of the field trip in Kazdagi National Park?
2. What are the prospective Biology teachers’ observations of the field trip in Kazdagi National Park?
3. What are the prospective biology teachers’ realization levels of their expectations about the field trip in Kazdagi National Park?
4. What are the prospective Biology teachers’ suggestions about the field trip in Kazdagi National Park?

METHODOLOGY

As this study is descriptive in nature, qualitative methodology was used to address the research questions (Yıldırım and Şimşek, 2006). The descriptive and content analysis techniques were used in the data analysis. This study is based on sound methodology. Sound methodology suggests an ideal match to a scientific question that never quite exists in empirical science. For all that the phrase implies, it should be replaced with something much more accurate, like “appropriate” or “persuasive” methodology. Granted, it does not connote the same trust and confidence as the word “sound,” although it may describe the process more accurately and honestly” (Davis, 2010).

Participants

A one-day field trip to Kazdagi National Park was organized with 30 fourth and 30 fifth grade prospective Biology teachers at the end of the spring term of the 2010-2011 academic years. Participants were
selected by using convenience sampling method in the study (Büyüköztürk et al., 2011). Participants were 12 volunteers from the group of 30 fourth grade prospective Biology teachers who were taking Biogeography course at Necatibey Faculty of Education, Balıkesir University Turkey during the 2011-2012 academic years.

Prospective Biology teachers in the study had taken General Biology I-II and General Biology Laboratory in the first year, Systematic Botany I-II, Systematic Botany Laboratory as well as Plant Anatomy and Plant Anatomy Laboratory in second year. Furthermore, they had also been offered elective classes such as Environmental Sciences, Environmental Education, and Vegetation of Turkey. In these courses, the students learn the general characteristics of plants, their internal and external structures, and the classification of plants, plant taxonomy and similar knowledge. Besides the knowledge that is offered to the students about the environment, they also learn about environmental protection, sustainability, attitudes and awareness about the environment and many other related topics.

The prospective Biology teachers take Biogeography for 2 h a week in the spring semester of fourth year. The subjects treated in Biogeography class are the following: the definition of biogeography, its history, floristic plant geography, regions and their geographic distribution, endemism and endemic regions, endemism in Turkey, the evolution of plants in the geological ages, the classification of the world’s floristic regions, plant geography in Turkey, groups of land plants, grassland, steppe, savannah, forest groups (Balıkesir University Information Package/Course Catalogue).

In this current study, a field trip was organized through Kazdağı National Park for the students in fourth year in the Department of Secondary Science and Mathematics Education (Biology Education) in Necatibey Faculty of Education in Balıkesir University. The trip was important in that it provided an opportunity for the students to combine their theoretical knowledge and the observations they had made on the trip organized to Uludağ National Park in their second year with their observations in Kazdağı National Park. The objectives of the field trip to Kazdağı National Park were: to observe the diversity and types of plants at Kazdağı National Park; see plants in their natural environment; observe the plant layers at Kazdağı National Park, the way they are spread, understand their ecological characteristics, particularly with respect to endemic plants of Kazdağı; to observe the Kazdağı fir, learn the meaning of a national park, and learn about the social and cultural features of this park. Another goal of the field trip was to make a connection between the subjects taught in class, particularly in Biogeography and Systematic Botany, and what was observed on the trip. Other aims were to increase students’ positive attitudes toward nature and environmental awareness. These kinds of field trips are social activities that are a combination of travel, entertainment, stress release and doing something together with the students.

Plants are introduced to students in class with images, photographs or by demonstration of particular plants. However, it is necessary that students see plants in their natural environment, get acquainted with them, and make a connection between what they see in class and what they observe in the natural environment. It is because of this that it is useful to organize different activities as part of the course curriculum. It was within this framework that the prospective teachers would be observing the plant layers in Kazdağı area, studying their ecology and the way they are spread out over the land, at the same time observing the plant diversity and the national park.

Data collection

After the field trip to Kazdağı National Park, semi-structured interviews were held with 12 volunteer prospective teachers. A semi-structured interview form was used in the interviews (Yıldırım and Şimşek, 2006; Büyüköztürk et al., 2013). A pilot study was conducted with 3 prospective biology teachers taking Biogeography course. The scope of the questions in the interview form was tested with a pilot study to determine the number of questions to be included in the interview form and their comprehensibility. After the needed revisions were made, the interview form took the final version including five open-ended questions. A mathematics educator in the education faculty validated the interview form. Interviews were conducted on a volunteer basis and were held face-to-face. The interviews were completed in approximately 10-15 min and were recorded on a voice recorder.

Data analysis

For an analysis of the interviews, the students’ voice recordings were first numbered from 1-12 and a transcription was made of each. Very little of the analysis of the questions in the study was conducted on the basis of predetermined themes and sub-themes (Güler, 2009). The themes and sub-themes for each question in the study were derived from the responses the students gave to the questions in the interview. The responses given by the students for each question were first gathered into a list and from these themes and sub-themes were then picked out. The themes and sub-themes corresponding to each question that were derived from the students’ responses were checked and re-checked and needed corrections were made. In other words, coding was repeated many times by the author at intervals. This provided intra-rater reliability. Frequencies were calculated for each sub-theme and tables were set up for each question. If only one person had expressed a statement or concept with respect to a sub-theme, this was not included in the table but sometimes the view of that person was inserted into the text. In order to check the reliability of the findings, the coding of the two faculty members was scored and consistency was found to be 90%.

Although there were 12 interviewees, sometimes students responded with more than one statement in answer to a question. These were gathered under different sub-themes. For this reason, in some questions, frequencies for all themes in a table sometimes exceed 12. The students were encoded in the text with a letter abbreviation for “Student” and a number, e.g., S5. Interesting parts of the students’ narratives were included in the text. These were expressed as exact quotes and attributed to the student using the student’s coded number. Example: “… ” (S5).

RESULTS

“Student’ expectations from the field trip to Kazdağı”

The answers given by the students when they were asked about the aims of the field trip in Kazdaği were grouped under two themes: Fulfilling the purposes of the course and seeing the endemic plants of Kazdağı (Table 1).

As can be seen from Table 1, the students had very different responses as to the purpose of the field trip. The first theme “fulfilling the purposes of the course” was characterized by the following student responses: Seeing the plant layers we learned about in our Biogeography class; examining the areas where these plants
Table 1. Themes and sub-themes related to the aim of the field trip to Kazdagi.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulfilling the purposes of the course</td>
<td>Seeing the plants and plant layers taught in Biogeography.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Seeing the subjects and plants taught in Systematic Botany.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Seeing the flora and vegetation of Kazdagi.</td>
<td>2</td>
</tr>
<tr>
<td>Seeing the endemic plants of Kazdagi</td>
<td>Seeing the endemic plants of Kazdagi.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>The Kazdagi fir (Abies).</td>
<td>2</td>
</tr>
</tbody>
</table>

were spread out ... (S1)

To see the subjects we learned in our Systematic Botany courses first-hand, to better understand the subjects ... (S6)

The trip was done to recognize the vegetation of Kazdagi. Since I knew Kazdagi had rich vegetation, we went to see this richness. (S5)

The students said particularly that the field trip was organized for them to see the plant vegetation that they had learned about in Biogeography classes and for them to see the vegetation of Kazdagi first-hand in its own environment. In addition, some of the students expressed the thought that the trip aimed to let them recall what they had learned in Systematic Botany courses they had taken before and to see the plants first-hand in their natural environment.

The responses of the students centering on the second theme of "seeing the endemic plants of Kazdagi" are found below:

Seeing the endemic plants. The Kazdagi fir ... (S10)

... We went to see the types of endemic plants peculiar to Kazdagi. The fir tree, first of all ... (S8)

Moreover, with regard to the aims of the field trip, one student (S9) mentioned another aim was to take a trip and have fun; S2 said “to see the national park and find out what national parks were for”; S4 mentioned one of the aims of the trip was to see Mt. Kazdagi; S3 stated that the aim was to learn about the history of Kazdagi and find out about the legend of Sankiz. S9 also highlighted plant blindness stating it could be to raise awareness about plants.

To sum up, their aims in participating in the trip are mostly seeing the plant vegetation learned about in Biogeography, seeing the plants and observing first-hand the subjects studied in Systematic Botany, getting acquainted with the plant vegetation of Kazdagi, seeing the endemic plants of Kazdagi, and the Kazdagi fir. Also, a few students said that their objectives were to raise awareness about plants, see the national park, learn about the history of Kazdagi, take a trip and have fun.

Students’ expectations from the field trip to Kazdagi

The answers the students gave when they were asked about their expectations from the trip to Kazdagi were grouped under five themes. These were: Seeing the endemic plants; having fun and learning; seeing plants in their natural environment; seeing the mountains; extraordinary expectations (Table 2).

According to Table 2, the students had different expectations about the trip. The responses of the students centering on the first theme of “seeing the endemic plants” are found below:

... We knew there were many endemic plants in Kazdagi Mountains. We wanted to see these ... (S7)

... We had seen the endemic species in slides before, but we were curious to see them in real life. (S8)

One student (S11) said that because they had seen big pictures of the endemic plants prior to the trip, the expectation was that these plants would be also even bigger and more attractive in real life. Although the student said that all the endemic plants would be found together in the same area, he made the point the endemic plants were found in different places.

It was seen that these students had the expectation of seeing endemic plants on the trip.

The students’ views on the second theme of “having fun and learning” are found below:

S7 said that one of the aims of the trip was to have fun. S2 said that the trip would be like the scope of the course, but it would be a little bit more entertaining. S2 also mentioned the teacher had made them walk a lot.

The responses of the students centering on the third theme of “seeing plants in their natural environment” are found below:
Table 2. Themes and sub-themes related to the expectations from the field trip to Kazdagi.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeing the endemic plants</td>
<td>Seeing the endemic plants./Seeing the firs (Abies).</td>
<td>4</td>
</tr>
<tr>
<td>Having fun and learning</td>
<td>Having fun./Learning while having fun.</td>
<td>4</td>
</tr>
<tr>
<td>Seeing plants in their natural</td>
<td>Seeing firs (Abies), black pine (Pinus nigra) and etc. in their natural</td>
<td>3</td>
</tr>
<tr>
<td>environment</td>
<td>environment./Thinking about which plants we would see in Kazdagi./Thinking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ahead of seeing those plants in daily life.</td>
<td></td>
</tr>
<tr>
<td>Seeing the mountains</td>
<td>Seeing the mountains rather than the plants./Seeing the height and green</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>of Kazdagi.</td>
<td></td>
</tr>
<tr>
<td>Extraordinary expectations</td>
<td>Expecting to see striking colors and extraordinary things related to</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Sankız.</td>
<td></td>
</tr>
</tbody>
</table>

... I was wondering whether we’d see these in real life, but I couldn’t really identify any of them while I was expecting to be able to identify some of them. (S10) .... We saw a lot of pictures of plants in Biogeography, Systematic Botany and in Plant Anatomy ... to see the fir, black pine, etc. in their natural environment. (S6)

The students said that they saw many plants in their lessons but wondered which ones they would see in the natural environment of Kazdagi.

The responses of the students centering on the fourth theme of “seeing the mountains” are found below:

This was the first time I went up to the mountains. I was wondering about it. It was very high up. To go up the mountain, to see it ... (S4)

It was seen that the students’ expectations had mostly to do with seeing the Kazdagi Mountains.

One of the students’ views on the fifth theme of “extraordinary expectations” is given below:

I thought I had bigger expectations before I went on the field trip. We had to go a long way to go up to Sankız in Kazdagi. I was expecting more striking colors there, more extraordinary things at Sankız ... We didn’t really see too many plant species there. Maybe it was because of the season. I had thought we would see different things with every step we took. (S9)

We can see here before the trip to Kazdagi, the student was expecting to see a lot of things but those expectations were not met.

To summarize, it was noted that the students expected mostly the trip to be fun, to learn while they were having fun, to see the endemic plants, especially the firs on the trip, and they were hoping to see the firs, black pines, etc. in their natural environment.

Students’ observations of the field trip to Kazdagi

When the students were asked to describe the trip and what they had seen in Kazdagi related to their courses, their responses fell under four themes: Making connection with courses; endemic plants; Sankız Hill; forest layers (Table 3).

A review of Table 3 shows the students remembered different things about what they saw on the trip. Also, there were also differences in the way the students making connection between the trip and their courses.

The first theme of “making connection with courses” was treated in some students view as:

We took Systematic Botany in the second year. We reviewed pines and spruces [in the field trip]. Examples of the flora and fauna we learned last year were shown to us ... (S4)

Teachers made connection with Biogeography and so we did too. Kazdagi is mentioned in Biogeography courses ... (S7)

Biogeography courses were more about history ... To tell the truth, this field trip didn’t have much to do with Biogeography. We formed a connection with Systematic Botany and Plant Physiology. I made connection with Plant Morphology. (S5)

On the other hand, 2 students said that they could not make the connection between the courses and the trip. S3 said that looking at the environment was not helpful in forming the connection between the courses and the trip. S12 said that a lot had been learned about endemic plants, particularly in Botany class. The student said that this trip would have been more useful if it had been carried out when the knowledge was still fresh in the mind. We were not able to learn anything much when the trip was taken this year instead of last.

Ultimately, 10 students stated that they could make the
Table 3. Themes and sub-themes related to the observations of the field trip to Kazdagi

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making connection with courses</td>
<td>Plant samples were shown in Systematic Botany.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>We saw Mt. Kazdagi and the endemic plants mentioned in Biogeography.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Connection was made with the field trip and Plant Physiology, Plant</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Morphology, Plant Anatomy, and General Biology.</td>
<td></td>
</tr>
<tr>
<td>Endemic plants</td>
<td>We saw endemic plants, the Kazdagi fir (Abies).</td>
<td>6</td>
</tr>
<tr>
<td>Sarıkız Hill</td>
<td>We went to Sarıkız Hill. We listened to the Legend of Sarıkız.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>We saw the plants in the structure of a forest in the Kazdagi Mountains.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>There were fruit trees in the lower layers, then fir (Abies), red pine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Pinus brutia), black pine (Pinus nigra), etc. Then there were Juniperus,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and later, herbaceous plants.</td>
<td></td>
</tr>
<tr>
<td>Forest layers</td>
<td>After the plant vegetation on the slopes, we went up to the second level</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>and saw how the layers of forest vegetation were distributed. We then</td>
<td></td>
</tr>
<tr>
<td></td>
<td>walked to the Alpine meadows.</td>
<td></td>
</tr>
</tbody>
</table>

connection between the trip and what they had learned in courses, especially Systematic Botany and Biogeography.

The responses of the students centering on the second theme of “endemic plants” are found below:

We saw endemic plants. We walked to look for the Kazdagi fir; we walked for kilometers. It appeared there were many other kinds of endemic plants of Kazdagi. We saw those too. (S10)

The students said that they had seen the endemic plants on the trip, and particularly the Kazdagi fir. S3 made the following comment that fell into the third theme of “Sarıkız Hill”:

We first stood at the start of the mountain range. We saw the endemic plants. When we climbed the mountain, I saw a vast piece of land. It didn’t look very meaningful to me. However, when the teacher related to us the Legend of Sarıkız, it did become meaningful ... (S3)

The student thus stated that after hearing the Legend of Sarıkız, the area of Sarıkız Hill became more meaningful.

Below are views of the some students on the fourth theme of “Forest layers”:

Mt. Kazdagi range is an area of forest so we saw trees, firs, red pine, black and the rest. As the bus neared the summit, we learned which plants grew at which altitude. (S6)

We started at the slope firstly. The teacher spoke to us about plant vegetation on the slopes. He told us about the plants there, their Latin names and characteristics ... Later, we climbed to the second level and he showed us the distribution of the trees in forest vegetation ... After that, we climbed to the top, the Alpines. We visited the tomb of Sarıkız ... We walked for some time in the Alpine meadows. (S2)

In summary, it can be seen that many students were unable to provide details of the trip and could make a limited description. Some students remembered the endemic plants, the firs and Sarıkız Hill.

Also, when the students were asked during the interviews what stuck in their minds the most, they responded by mentioning Sarıkız Hill and the Legend of Sarıkız (6 students), the Kazdagi fir (2 students), the fact that the trip was enjoyable and they ate and had fun (2 students).

When I hear Sarıkız Hill or Kazdagi, that’s the place I remember. I was very impressed. Going up there, I felt as if I were in a very different place. Not just anywhere in Turkey, but in a secret place somewhere in the world. I saw some plants never seen before; there were many unfamiliar plants growing in between the rocks. That place, the path going up, the little road, the road leading to Sarıkız. (S7)

Following these responses were also statements about how they noticed Kazdagi itself, the climate at Kazdagi and it was a protected area (2 students), the tall trees (1 student), about learning (1 student), and getting the opportunity to see Akçay (1 student). On the other hand, it was only S9 who said that he had not seen anything very striking on the trip:

... I didn’t find anything very striking. Sarıkız is interested from a mythological perspective. It was a nice place. It
Table 4. Themes and sub-themes related to the realization levels of students’ expectations from the field trip to Kazdagi.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses</td>
<td>Seeing plants related to Systematic Botany.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Seeing plants related to Biogeography.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Making connection among the field trip and Plant Morphology, Plant Anatomy and Evolution.</td>
<td>3</td>
</tr>
<tr>
<td>Kazdagi national park</td>
<td>Seeing national park./Seeing a place would not be seen in the future.</td>
<td>4</td>
</tr>
<tr>
<td>Endemic plants</td>
<td>Seeing the endemic plants of Kazdagi.</td>
<td>2</td>
</tr>
<tr>
<td>Natural environment</td>
<td>Seeing plants in their natural environment.</td>
<td>2</td>
</tr>
<tr>
<td>Having fun and learning</td>
<td>Having fun and learning something.</td>
<td>2</td>
</tr>
</tbody>
</table>

was pleasant to do something together. But was that the Kazdagi National Park, I'm not sure ... (S9)

In terms of negative comments, the students complained the most about having to walk for kilometers (6 students). Following in the negative comment category were complaints about lack of toilet (1 student), fear of ticks (1 student), and how boring the bus ride was (1 student).

... We went up to a certain point in the forest, we arrived somewhere. They said this was the last stop. We walked a lot. We had already seen the Kazdagi firs. We saw them again at this point and then we went back. We trekked up all that way for nothing. (S7)

Realization levels of the students’ expectations from the field trip to Kazdagi

When the students were asked their realization levels about their expectations and what they had got out of the trip, the responses of the students were categorized under five themes: Courses; Kazdagi National Park; endemic plants; natural environment; having fun and learning (Table 4).

It can be seen in Table 4 that the realization levels of the students’ expectations from the trip were at different levels.

The first theme of “courses” centered on the following examples of the student views:

... I made connection among the courses of Systematic Botany, Plant Morphology and Plant Anatomy. We had learned to classify how to identify different types of pine in Systematic Botany. We had learned about yellow pine, black pine and so on. I thought I could easily tell the difference between the types of pines. (S5).

On the other hand, 1 student (S11) said he had made connection on the trip with Systematic courses, but he thought it would have been better if the trip had been organized in previous years. S1 said that seeing what was taught in Biogeography on site ensured permanent learning and that she had formed a connection with the course on Evolution. S8 said that the trip had been organized within the scope of the Biogeography course, but that the trip served to make a connection with not only Biogeography but with the other courses too because all of the courses were connected with each other.

In brief, the students expressed their expectations had been fulfilled on the trip because they were able to make the connection between the courses of Systematic Botany, Biogeography, Plant Morphology, Plant Anatomy, and Evolution.

The responses of the students centering on the second theme of “Kazdagi National Park” are found below:

We’ve been living in Balıkesir for five years. We’ve been hearing about the Kazdagi Mountains. If we’d gone without seeing the area, it would have been a shame. It’s an important park. We saw a lot of plant species ... (S8)

It can be seen that these students were very happy to have the opportunity to go to the natural park. Also, S8 stressed that the concept of plant blindness was remediated during the trip through the park.

Below are some student views on the third theme of “endemic plants of Kazdagi”:

... In the courses, they told us that there were several endemic plants of Kazdagi. We saw them in the natural park ... (S4)

It can be seen that these students realized their expectations about seeing Kazdagi National Park and the plants there, observing the endemic plants of Kazdagi and also seeing the sights. In addition, S6 and S7 said that it had been very enjoyable to both take the trip and to learn something from it. S5 highlighted the contribution to
Table 5. Themes and sub-themes related to the suggestions made concerning the field trip to Kazdagi.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>Students should be given preliminary information about plants, endemic</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>plants and what was observed in Kazdagi.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Field trips should be well-planned or be organized in parallel to the courses.</td>
<td>3</td>
</tr>
<tr>
<td>Student</td>
<td>Students should search information about Mt. Kazdagi and endemic plants.</td>
<td>2</td>
</tr>
</tbody>
</table>

Teaching profession:

... I saw an area I would never see again. Since it was a scientific site, I thought it would contribute to my career. I could organize a field trip for my students to a place like this. I saw what I had to do as a teacher. I saw how a plant could be introduced ... (S5)

On the other hand, S12 said that the trip was good but that there were too many participants and because there was only one teacher who could differentiate the plants, students were distracted when the teacher was explaining the topics. S9 explained that the trip made only a medium level of contribution to her knowledge by saying:

... If we went out on a trip like this again I would take a photograph of everything. It was our fault if we could not make sense of it in other courses. Teachers explained them to us but it didn’t settle in my mind. (S9)

All in all, some students said that they had gone on the trip without expecting very much but that it had gone much better than they thought. One of the students said that although it was a pleasant trip, there were some problems, while another said that it would have been much better if they had taken photographs of the trip.

Only one student (S10) said that trip contributed nothing to the courses and it would have been better if the trip had been taken in the years before. This student emphasized the following:

... This was more of a touristic tour ... The plants weren’t like the pictures we saw in the books, like the dried flowers in herbarium ... This trip should have been organized before, when we were taking Systematic Botany, it should have been when we were taking Anatomy. (S10)

In short, it can be said the realization levels of the students’ expectations were high. It was emphasized that the trip contributed more to the courses such as Systematic Botany and Biogeography. The students were happier to have seen the national park, and plants in their natural environments or the place that will not be seen in the future.

Students’ suggestions regarding the Field Trip to Kazdagi

When the students were asked about their suggestions concerning the trip to Kazdagi, only one student said he was happy with the trip while the others submitted various suggestions. The students’ suggestions were grouped under two themes: Teacher; student (Table 5).

Thoughts of the student (S8) who was satisfied with the trip:

... As we were studying Biology, we went to see these. It was hard walking from there. We walked, looked around, and came back. It was good for me. It could like it was today. I’m satisfied with it. (S8)

As can be seen in Table 5, the students made various suggestions about the field trip.

... There could be some written information to give to the students at first-thing about what we’re going to do here, what we’re going to see … (S7)

... We should have been given more information before which plants we would see, which ones were endemic, and about the plants of Kazdagi ... (S10)

This trip should have been organized before, when we were taking Systematic Botany and Plant Anatomy. I thought it should be taken at the same time as the course [Systematic Botany] ... (S10)

Ours was a little poorly planned. Whatever we saw, we stopped to look … (S2)

S12 also said that there should have been a brochure in their hands about the trip and the brochure should have contained information about the plants, which family they belong to, their types, etc. S9’ offer was related that the students should be asked for carrying out preliminary research:

The students can be asked to do some research beforehand. It could have a list. Everybody could look and took notes on it. It could also have pictures of
important ones ... It could be in the form of field trip observation underneath the pictures. I did not remember anything much about the trip ... (S9)

One student (S9) suggested that the students brought pens and paper along with them on the trip. One student (S1) offered this idea: The field trip should be organized for only the fourth grade students who were taking Biology indicating:

I did not really think two groups [fourth and fifth graders] should go together. If they were in the fourth year, they should go as a fourth year class. The students in the fourth year knew the topics, the others did not. The teacher explained everything twice. You lose time ... (S1)

General speaking, the students suggested that the teachers should give preliminary information about plants and endemic plants of Kazdagi, the field trip should be well-planned, the students also carry out preliminary information, it should be organized in the year the course is taken and encompass only a single class.

Some student views on the second theme “students” were the following:

If you looked these things up before, without the teacher, and you were curious, the field trip becomes more meaningful. (S3)

Moreover, one student (S9) suggested that the students wear appropriate clothing to ward off thorns.

To summarize, the students’ suggestions about the trip were that students should be given preliminary information, the field trip itself should be well-planned, should research about the trip to Kazdagi beforehand.

**DISCUSSION AND CONCLUSION**

This article has provided an overview of the views of the prospective Biology teachers on the field trip that was organized to Kazdagi National Park as part of Biogeography course. The findings from the study have been summarized below, and some recommendations have been offered in this context.

The aims of the students to participate to the trip were mostly to see the plant vegetation learnt in Biogeography, and to see the plants, and the endemic plants of Kazdagi, especially the Kazdagi fir. Few students also aimed to travel around, have fun, see the national park, learn about the history of Kazdagi, and raise awareness about plant. The students’ expectations from the trip were mostly to see the endemic plants, especially the Kazdagi firs, to have fun or learn while having fun, to see plants in their natural environment, and to see the mountains. In short, the field trip organized for the prospective Biology teachers fulfilled its goals and expectations. Similar to the present study results, Güler (2009) indicated that some teachers’ goals were having fun in the ecology-based environmental training.

Seeing and getting acquainted with a national park firsthand was a useful experience for students (Ari and Soykan, 2009; Kisiel, 2005). It was observed that some students provided detailed information about the forest layers in Kazdagi, the endemic plants of Kazdagi on the trip, the national park, and the plants in their natural environment. It would be useful to give a brochure or field trip observation form to students beforehand (Hung et al., 2010; Hung et al., 2012). Thus, they could fill at least some parts of the form during the trip. This could make students remember and learn what they observe in nature and what they learnt in courses. On the other hand, almost all of the students were observed to make connection between the trip and their courses, particularly with Systematic Botany and Biogeography (Kisiel, 2005; Krakowka, 2012; Weeden et al., 2011). Many of the students were most impressed by Sarıkız Hill, the fact that the trip was fun and by the Kazdagi firs, although they were not happy with having to walk long distances. As a result, it was seen that the students’ thoughts about the purpose of the trip and their expectations were to a large extent fulfilled by what they saw on the trip and by the realization of their expectations. In the study by Güler (2009), it was seen that some teachers had contributed to their knowledge in that they had learned about endemic species, trees and plants. In the present study there were also some students who professed actually enjoying learning something from the trip and having fun at the same time.

It was striking to observe that one student put an emphasized about plant awareness and the trip made the student more attentive to and selective in his perception of plants. One of the most interesting findings was that one participant believed that the participant could organize such a trip for her students in the future and she had learned how to teach the students about plants. The finding in the present study that the students were inspired to organize a similar trip when they would become teachers was the consistent with the findings of Güler (2009). Similar outcomes have been described in Palmberg and Kuru (2000). Their study results were the role that outdoor activities like field trips, hiking and camps can play when biology teachers organize them should be emphasized to prospective teachers and teachers in order to increase students’ environmental awareness and positive attitude towards nature (Güler, 2009; Keleş et al., 2010). Science teachers can use field trip technique in their courses with some purposes such as to connect with the classroom curriculum, to encourage lifelong learning, to enhance interest and motivation, to provide exposure to new experiences, and to have fun (Kisiel, 2005).
In conclusion, the prospective Biology teachers had an opportunity with this trip to see first-hand and get acquainted with what they had learned about the nature of a national park. Therefore, field trips provide experiential learning to curriculum. The students were able to learn in practice what they had learned in theory in their coursework and most of them made the point that the trip had contributed to their Biogeography and Systematic Botany courses. The field trip served to enhance the students’ environmental awareness. Social activities such as trips also gave the students the opportunity to be entertained while having fun, letting off stress and doing things together.

Finally, almost all of the participants made various suggestions about the field trip. The most striking of the suggestions given by the participants were preliminary information prior to the field trip should be given, field trip should be well-planned for a course curriculum by teachers (Munday, 2008), there should be delivered a brochure to students about the trip, it should have contained information about the plants which family they belong to, their types, and etc. For this reason, there is a need for more systematically organized field trips. The students should perhaps be more informed and coached orally about the trip prior to starting off. This information could be given to the students in the form of a brochure/field trip-observation sheet. In fact, students could be asked to do some preliminary research and fill out a field trip-observation sheet before starting off. It would also be useful to bring along informative books and reading materials on the trip, to take notes during the trip, collect plant samples, and take photographs. Discussing what was seen on the trip immediately following the event will help to retain what was learned.

Although there are various observation forms for field trip on the internet, there was not come across any study suggesting well-organized field trip-observation form in the literature except of some research such as Hung et al. (2010) and Hung et al. (2012).

Here it is proposed a well-organized field trip-observation form to be used in this kind of field trips. A field trip-observation form for the Kazdagi trip could be drawn up in a variety of ways. The field trip-observation form could be filled out before, during or after the trip. This form could be used before, during or after the trip. If the form is to be used before the trip, it should contain parts to be filled out by students after they do some preliminary research. For example, some information about Kazdagi could be given, along with the names and/or photographs of the plants growing there, with boxes besides this information. The students can be asked to mark the boxes with an X to indicate which of the mentioned items they actually observed during the trip. The students can also be asked to add to the form interesting and different plants from what is described on the form. On the other hand, the form can also consist of only open-ended questions. The form can be drawn up on a piece of A4 paper or folded like a brochure, printed on both sides. The form should not be too long so the students do not feel bored reading it; it should be no longer that 2 or 3 pages. It is important that observations notes are jotted down immediately. Otherwise, forgetting and a lack of retention or a distorted interpretation may ensue as a result of poor memory recall. To make the field trip more effective, the emphasis should be on the theoretical and practical aspects of whichever course is forming the basis of the trip. Students might be asked to summarize their observations in the form later on. For example, in the case of the Kazdagi field trip, more emphasis can be placed on the Biogeography courses and the other relevant courses. Lastly, it would be useful to have the students fill out the forms before the end of the trip if possible and they might be asked to bring them with them to class the next time.

The next class should be centered on the field trip-observation forms that the students brought with them; this will make the knowledge gained more permanent. A general assessment of the field trip and a self-evaluation can be made. Lastly, it should be noted that when a field trip is conducted in a national park such as Kazdagi National Park, the participants should be warn to walk through the park without causing damage to the environment (Satil, 2009).

Since no studies have been encountered about prospective biology teachers in Turkey going on a field trip to Kazdagi, this research add to the literature. For future studies field trips can be held in other national parks in Turkey too (Oğurlu et al., 2010; Yaşar and Şeremet, 2008). On the other hand, since only the semi-structured interview technique was used in this study and it was a limitation of the study, a case study for field trips can be conducted using several techniques such as surveys, interviews, student work, drawings, photographs of land, or observations during camps for future studies (Davidson et al., 2009; Palmberg and Kuru, 2000). In addition to interview technique, courses that are conducive to the organization of field trips such as Biogeography and Systematic Botany could benefit from asking students to participate in a survey before and after the field trip.

Conflict of Interests

The author has not declared any conflict of interests.

ACKNOWLEDGMENTS

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REFERENCES


Full Length Research Paper

Child lifestyles predictors

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The purpose of this study is to explain the effectiveness of parental attitudes, socio-economic status and gender in determining the predictors of child lifestyles. The study group consists of three hundred and fifty (350) eighth grade students studying in the province of Erzincan during the 2012-2013 academic year; the students are selected by stratified sampling method. The scale of child lifestyles developed by Stiles (1992), adapted to Turkish by Özpolat et al (2012) is used in the study; in addition to this, the scale of parental attitudes, developed by Kuzgun (1972) and revised by Eldeleklüoğlu (1996) is used and data collection form is applied. Data are analyzed by using SPSS package program.

Key words: Lifestyle, child development, child experiences.

INTRODUCTION

Lifestyles are rooted in and emerge from a child’s power of creation, how he/she sees the world and what is perceived as success (Adler, 1993). Newborns make use of their experiences while building concepts about the world they are born into and learn from their environment. This learning process results from a child’s trial and error experiences whereby he learns from his environment. These experiences cause him to develop rules about the world by which the child creates a point of view and gives meaning to his world. As a result, these set of rules become original life principals and define the lifestyles for the individual. In individual psychology, this process is called individual’s lifestyle (Shulman and Mosak, 1988). Based on the concepts of individual psychology, Stiles (1992) grouped child lifestyles under six different headings: 1) Socially useful: these individuals are defined as social individuals, 2) Pleasing: these individuals need the opinions and approval of others for everything in their lives and they act accordingly, 3) Controlling: these individuals try to control everything in their lives and everything around them and they exert a dominant influence on the people with whom they communicate, 4) Getting: these individuals are dependent on others, tend to be very shy, cannot make decisions on their own and can be taken advantage of by others, 5) Inadequacy: these individuals avoid communicating with others, when faced with problems they tend to step back and accept the situation as it is instead of cooperating with others in an attempt to overcome the problem, 6) Rebell ing: these individuals are rebellious and do not want to obey rules set by others (Arnold, 1996).

The above mentioned lifestyles are formed as a result of the relationship and communication with the environment. Therefore, the relationship and communication style of an individual with his/her parents or caregiver is significant (Baroody and Dobbs-Oates, 2011). When current studies are analyzed, it can be seen that parental attitudes affect a child’s personality structure and development (Yalçın and Türmüklü, 2011). One of the main predictors of school achievement is mother’s educational

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level across many culture and independent from the subject area (Neçsoy et al., 2013). Additionally, the tolerance of parents is found to be very effective in child’s behavior (Wright et al., 2013). On the other hand, it is known that an individual’s childhood experiences and relations affect his/her emotional health (Terne and Avshalom, 2001). Children experiencing hurt during childhood may show aggressive behaviors (Assis et al., 2013), and parental expectations are also shown to affect a child’s future expectations and success (Wigfield et al., 2006). Based on these studies, it can be said that each parental attitude toward their child affect his/her paradigm about the world but literature on the subject defines parental attitudes in many different ways (Whirter and Acar, 2000). For the purposes of this study parental attitudes are defined as follows: 1) Democratic: parental attitudes with limits when necessary but generally free (Yavuzer, 1997); 2) Authoritarian: parental attitudes whereby all the wishes of the child are denied and limited and the suggestion is that the child behaves according to the preferences of the parents (Yörükoğlu, 1996); and, 3) Protective: parental attitudes that include excessive care and continuous control of the child (Yavuzer, 1997).

Another significant variable that shapes a child’s life is socio-economic status. Analyzing recent studies on this issue, we observe that the psychological development process of children from low socio-economic level is not healthy (Holtz and Fox, 2012). It has also been noted that children from low socio-economic level families report academic problems (Dye and Johnson, 2007, Baroody and Dobbs-Oates, 2011).

Nutritional habits come to mind when talking about teenagers' life styles. Most of the research effort is spent especially on well-being of teenagers in relation to obesity and nutritional habits (Strien et al., 2009, Brown et al., 2010). Another well-studied area about youngster’s life styles is minors with special needs. There are some articles discussing children with ADHD, their lifestyles and recommendations for their well-being (Ptacek et al., 2013). As it can be seen from the literature review, there is no significant and influential research on whether and how some major variables such as parental attitudes, SES and gender affect youngsters' life style. Society’s disposition of how to raise a child surely forms child’s behavior and well-being and in turn, shapes their life style. Turkey’s mainly collectivist approach is not represented in body knowledge on factors affecting life styles. There seems to be a gap in the literature to dispose the main elements influencing the emergence of life style concept in children especially in a culture where child raising is viewed as a collective effort. This study fills the gap by investigating the causal relationship between child’s lifestyle preference and some important factors as predictors. Results of this study provide valuable information that can be used to foster our understanding of how some factors can be used as predictors of a child’s emerging life style preference.

The basic goal of this study is to analyze the relation of children’s lifestyles summarized above with parental attitudes, socio-economic status and gender variables. To this aim, we attempt to answer the following research question: Do democratic, authoritarian and protective parental attitudes predict a child’s lifestyles?

METHODS

Study group

The study group consists of a total of 350 eighth grade students studying during the 2012-2013 academic year. These students were chosen from a city in Eastern Anatolia region, Erzincan. The population of Erzincan is 100,000. Stratified sampling method is used in this process. One hundred and sixty seven (167) of the research participants are females while one hundred and eighty three (183) are males; a major part of the sampling (94%) is between the ages of 14 and 16, the average age being 15 years. The income level of 137 students is between 360-$715 of 182 students between 762-$1190 and income level of 81 students is over $1238. One hundred and twenty two (122) of the students think that their mother are democratic, 72 think that their fathers are democratic, 32 think their mothers are authoritarian, 34 think their fathers are authoritarian, 48 think that their mothers are protective, 39 think that their fathers are protective.

Stratified sampling is used in a study where there are sub-unit groups in a population whose limits are determined. The significant point here is to study the population on the basis of sub-layers in the environment (Yildirim and Şimşek, 2005; Karasar, 2005; Kaptan, 1983).

Study population is stratified according to the information provided by the Local Board of Education along with the data obtained from parent-teacher associations showing the socio-economic status of the families. Sampling is then carried out from each group conveniently. The three groups are: 1) schools that have a low socio-economic background, 2) schools that have middle socio-economic background, and 3) schools that have high socio-economic background. Four (4) schools were chosen from each of these three units resulting in a total of 12 schools chosen. The study group consists of the eighth grade students of the schools chosen using stratified sampling method.

Data collection tools

Child Lifestyles Scale

There are seventy-three (73) items on the Turkish form of Child Lifestyles scale. This inventory is designed in 5-point Likert type: 1= definitely not like me and 5 = entirely like me. There are 14 items in Pleasing subscale, 9 items in Rebellious subscale, 11 in Getting subscale, 14 in Controlling subscale, 10 in Inadequacy subscale, 15 in Socially Useful subscale. In Child Lifestyles inventory, a child’s lifestyle is determined according to the level of scores in each subscale. As inventory items do not equally distribute to sub-inventories, a formula is used \( [(100 \times \text{highest score}) \times \text{life style score}] \) and a child’s inventory point is calculated equally on the scale of 100. According to this, in Socially Useful subscale \( 100 \div 75 = 1.33 \text{ coefficient} \), in Pleasing subscale \( 100 \div 70 = 1.42 \text{ coefficient} \), in Controlling subscale \( 100 \div 70 = 1.42 \text{ coefficient} \), in Getting subscale \( 100 \div 55 = 1.81 \text{ coefficient} \), in Inadequacy subscale \( 100 \div \)
50 = 2 coefficient, in Rebell ing subscale 100 ÷ 45 = 2.22 coefficient is obtained. For instance, a child scoring 60 points on the Socially Useful subscale has 60 x 1.33 = 80 points in Lifestyles scale. The level of the score in sub inventory determined the child's lifestyle. It takes approximately 20-30 min to conduct the inventory. It can be conducted individually or as a group. Total internal consistency reliability coefficient of child lifestyles inventory is .94 for the entire inventory. At the end of CFA, it is found that χ² (938.94) df (290) (χ²/df= 3.23); and RMSEA (.07) RMR (.08) SRMR (.07) GFI (.95) AGFI (.93) CFI (.96) (Özpolat et al., 2013).

Parental attitudes scale
The scale has three (3) sub-factors as democratic parents, authoritarian parents, and protective parents. It is a 5-point Likert type scale made of 40 items; with 15 items for democratic parents, 15 items for authoritarian parents and 10 items for protective parents. A child’s parental attitude is determined according to the level of scores in each inventory. There are separate boxes besides the questions for a child’s mother and for the father. If child thinks that the statement is proper for his/her mother, he grades it between 1 and 5 and writes it in the related box; If he/she thinks that the statement is proper for his/her father, he grades it between 1 and 5 and again writes it in the related box. If the statement is proper for both parents, the student fills both boxes with the same grading style. As inventory items do not equally distribute to sub inventories, the formula is used [(100 ÷ highest score] x parental score) and a child’s inventory point is calculated equally on the scale of 100. It is accepted that the sub-factor that has the highest point indicates the attitudes of parents. Parental attitudes scale’s reliability coefficient is .89 for democratic attitudes, .82 for authoritarian attitudes and .78 for protective attitudes (Eldelekögli, 1996).

Data collection form
Personal data form consisting of 10 questions is prepared by researchers in order to report the gender of the students, income of their parents and the number of family members.

Procedures
Firstly, researchers of the study went to the schools chosen by stratified sampling method whereby they met with school administration and obtained the necessary permissions. Next, the students in these schools were informed about the intent of the study and the ones willing to participate in the study were chosen. Parents of these were also informed regarding the study and process by telephone. Three hundred and fifty (350) students, with parental approval, participated in the study. The study was carried out in two sessions. Prior to starting the interviews, students were told that it was not an exam and there is no correct or incorrect answer. They were required to read instructions carefully and they were told that personal information obtained through the study will remain confidential. Then researchers conducted personal data form consisting of 10 questions and the child lifestyles inventory consisting of 73 questions. The second session was conducted after a 30 min break, whereby they continued with the parental attitudes scale, consisting of 40 questions. Three hundred forty seven (347) scales were chosen as valid; as 3 scales were not fully completed, they consequently were not included in the study. Data obtained from the scales were input into the computer and linear regression analysis was done with SPSS 17.0 package program.

RESULT
The results of one-way ANOVA test show the significance of regression model regarding the predictive power of parental attitudes, socio-economic level and gender about the PLEASING sub dimension of child lifestyles scale. It is seen that the model is generally meaningful according to test results (F (8-339) = 6.753 p < .001) (Table 1).

According to regression equality (mathematical model), the predictive power of parental attitudes, socio-economic status and gender regarding the PLEASING lifestyle sub dimension is presented below.

PLEASING lifestyle = Father Protective .355 + Father Democratic .307 + Mother Democratic .251 + Income .195 + Constant 58.759

It is seen that protective father attitudes, democratic father attitudes, democratic mother attitudes and socio-economic status predict PLEASING lifestyle sub dimension of child lifestyles. It is determined that protective father attitudes predict 35.5%, democratic father attitudes predict 30.7%, democratic mother attitudes predict 25.1% and socio-economic status predict 19.5% (R² : 137).

The results of one-way ANOVA test show the significance of regression model about the predictive power of parental attitudes, socio-economic level and gender about the GETTING sub dimension of child lifestyles scale. According to the test results, it is seen that the model is generally meaningful (F (8-339)= 14.755 p < .001) (Table 2).

According to regression equality (mathematical model), predictive power of parental attitudes, socio-economic status and gender about the GETTING lifestyle sub dimension is presented below.

GETTING lifestyle = Father Authoritarian .528 + Father Democratic .233 + Mother Protective .330 + Constant 22.206

It is seen that authoritarian father attitudes, democratic father attitudes and protective mother attitudes predict the GETTING lifestyle sub dimension of child lifestyles. It is determined that authoritarian father attitudes predict and explain 52.8%, democratic father attitudes predict and explain 23.3% and protective mother attitude predict and explain 33.0% (R² : 258).

The results of one-way ANOVA test show the significance of regression model about the predictive power of parental attitudes, socio-economic level and gender about the INADEQUICY sub dimension of child lifestyles scale. According to the test results, it is seen that the model is generally meaningful (F(8-339) = 11.836 p < .001) (Table 3).

According to regression equality (mathematical model), the predictive power of parental attitudes, socio-economic
status and gender about the INADEQUACY lifestyle sub dimension is presented below.

**INADEQUACY lifestyle = Mother Democratic \(\beta\) -239 + Constant 23.626**

It is seen that only a democratic mother attitude negatively predicts INADEQUACY lifestyle subscale of child lifestyles. It is determined that a democratic mother attitude explains and predicts 23.9% of this lifestyle subscale \((R^2 : .218)\).

The results of one-way ANOVA test show the significance of regression model about the predictive power of parental attitudes, socio-economic level and gender
Table 4. Multiple linear regression analysis results of REBELLING sub dimension of child lifestyles.

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
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<th>p</th>
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<td>Father democratic</td>
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<td>.596</td>
<td>.552</td>
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<tr>
<td>Father protective</td>
<td>.171</td>
<td>.056</td>
<td>.456</td>
<td>3.085</td>
<td>.002*</td>
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</table>

R: .534

R² : .286

* p < .001

Table 5. Multiple linear regression analysis results of SOCIALLY USEFUL sub dimension of child lifestyles.

<table>
<thead>
<tr>
<th>Variables</th>
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<td>.034*</td>
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<td>Father democratic</td>
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<td>.077</td>
<td>.087</td>
<td>1.042</td>
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<tr>
<td>Mother authoritarian</td>
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<td>.108</td>
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<tr>
<td>Father authoritarian</td>
<td>.091</td>
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<td>.855</td>
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<td>Mother protective</td>
<td>.117</td>
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<td>.202</td>
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<td>Father protective</td>
<td>-.337</td>
<td>.093</td>
<td>-.567</td>
<td>-3.642</td>
<td>.001*</td>
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</table>

R: .456

R² : .208

* p < .001

about the REBELLING sub dimension of child lifestyles scale. According to the test results, it is seen that the model is generally meaningful (F (8-339) = 16,937 p < .001) (Table 4).

According to regression equality (mathematical model), predictive power of parental attitudes, socio-economic status and gender about the REBELLING lifestyle sub dimension is presented below.

REBELLING lifestyle = Father Protective .456 + Socio-economic status .119 + Constant 8.044

It is seen that protective father attitudes and socio-economic status predict REBELLING lifestyle subscale. It is determined that protective father attitudes explain and predict 45.6 % and socio-economic status predict and explain 11.9% (R² : .286).

The results of one-way ANOVA test show the significance of regression model about the predictive power of parental attitudes, socio-economic level and gender about the SOCIALLY USEFUL sub dimension of child lifestyles scale. According to the test results, it is seen that the model is generally meaningful (F(8-339) = 16,937 p < .001) (Table 5).

According to regression equality (mathematical model), predictive power of parental attitudes, socio-economic status and gender about SOCIALLY USEFUL lifestyle sub dimension is presented below.

SOCIALLY USEFUL lifestyle = Father Protective - .567 + Mother Authoritarian - .397 + Mother Democratic. .175 + Gender .124 + Constant 54.867

It is seen that protective fathers’ attitudes, authoritarian mothers’ attitudes, democratic mothers’ attitudes and gender predict the SOCIALLY USEFUL lifestyle sub dimension. Protective father attitudes explain and predict 56.7%, democratic mother attitudes explain and predict 17.5%, authoritarian mother attitudes explain and predict 39.7% and gender explains and predicts 12.4% (R² : 208).
The results of one-way ANOVA test show the significance of regression model about the predictive power of parental attitudes, socio-economic level and gender about CONTROLLING sub dimension of child lifestyles scale. According to the test results, it is seen that the model is generally meaningful (F(8,339)= 10,386 p < .001) (Table 6).

According to regression equality (mathematical model), predictive power of parental attitudes, socio-economic status and gender about CONTROLLING lifestyle sub dimension is presented below.

\[
\text{CONTROLLING lifestyle} = \text{Father Protective} \times 0.604 + \text{Mother Authoritarian} \times 0.416 + \text{Constant} 36.506
\]

It is seen that protective fathers’ attitudes and authoritarian mothers’ attitudes predict CONTROLLING lifestyle sub dimension. Protective fathers’ attitudes explain and predict 60.4% and authoritarian mothers’ attitudes explain and predict 41.6% (R² : 197).

**DISCUSSION**

This study investigates the factors affecting child’s life style preference such as parenting approach, SES and gender. The results identify gender as a significant predictor for child’s socially useful lifestyle. Gender has a significant effect on other life styles albeit fairly low. It is initially predicted that especially in patriarchal Turkish society gender is very effective in youngsters’ life style preferences, discriminating in favor of males; but the results evidence otherwise. Gender displays a weaker influence on life style preference than mentioned in the literature.

The main predictor for life style choice is mother’s parenting approach. Maternal attitude, either democratic, authoritarian or protective, is a significant predictor for all life style preferences except rebellion subscale. This finding indicates a child’s life style preference is more influenced by the mother’s parenting approach than father’s. Development of teenagers’ life style preference depends heavily on mothers’ parenting. Similarly, youngsters’ hostile behavior is accounted by mother’s parental approach (Lansford et al., 2014). Another important variable socio-economic status predicts only pleasing and rebelling life styles. The relationship between SES and rebelling life style can be expected based on literature review (Offer et al., 1991). It is notable, however, SES has limited effect on other life styles and this finding suggests further investigation.

It has been determined that democratic parental attitudes also affect PLEASING lifestyle which indicates that a child may have the tendency to ask for the opinion of others when making decisions as a manifestation of democratic tendencies. In order to determine the reason why a child may have the tendency to look to the opinions of others (whether a result of democratic tendencies or from a lack of self-confidence), qualitative data can be collected through interview protocols with open ended questions conducted on children with this lifestyle and through the content analysis of these data, more detailed information can be obtained about the predictors of this lifestyle. In the light of these findings, it can be said that, protective parental attitudes prevent children from making decisions on their own.

GETTING lifestyle shows that these individuals depend on others. These individuals are very shy, and they can be easily taken advantage of by others. It is seen that this lifestyle is mostly influenced by authoritarian fathers and protective mothers’ attitudes. In order to realize oneself without being used by others, one needs to communicate with democratic and libertarian parents (Kesici et al., 2008). A child who is not raised in a libertarian and democratic environment will not be aware of his/her wishes and needs and will adopt the values of others. A study by

<table>
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<td>.079</td>
<td>.604</td>
<td>3.852</td>
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</table>

R: .444
R² : .197
*p < .001

Table 6. Multiple linear regression analysis results of CONTROLLING sub dimension of child lifestyles.
Çoşkun (2012) determined that individuals are also affected by parents in terms of cultural and ethical values. On the other hand, it is understood that democratic fathers' attitudes negatively predict this lifestyle. This finding confirms that a child's personal potential is permitted to surface and pressures that are made to protect and lead remove him/her from his/her essence and potential.

INADEQUACY lifestyle avoids communicating with others; instead of cooperating with others where there are problems, they retreat and accept the situation as it is. It is noted that a democratic mother’s attitude negatively predicts this lifestyle. So, it can be said that children who do not perceive their mother as democratic tend to withdraw and accept the problems in their life instead of trying to cope with them. Thus, the environment of a child should be democratic in order to ensure a child's awareness of his/her potential. This democratic atmosphere enables the child to gain self-confidence (Özyürek and Şahin, 2005). But as is seen, the fact that children who perceive their parents as protective and authoritarian (in contrast to democratic) have this lifestyle and the fact that protective and authoritarian parental attitudes do not significantly predict this lifestyle, causes us to think that this finding should be studied with different variables.

REBELLING lifestyle does not obey rules and tends to be rebellious. We report that individuals who believe that their father is protective feel restricted by the rules set by the father in childhood. Therefore when these individuals have the chance to express themselves, they may rebel against every kind of rule in order to overcome this feeling of being restricted or limited (Katsurada and Sugawara, 1998). On the other hand, we note that in the case of low socio-economic status, these children express a rebellious attitude against social norms. It is known that authoritarian parental attitudes are more oppressive (Peterson et al., 1961). Noted also is that authoritarian parental attitudes, which should cause more rebellious attitudes, do not significantly predict this lifestyle. In this context, we can say that children whose parents are authoritarian do not think about the situation they are in and obey the rules. Whereas protective parental attitudes cause less oppression on children when compared to authoritarian parental attitudes, but in this respect, when a child grows up, he/she may be rebellious. But authoritarian attitudes continue to affect a child even when he/she grows up and he/she struggles to express himself.

SOCIALLY USEFUL lifestyle is adapted by individuals who maintain relationships with others and have social lives. These individuals are defined as sociable. Protective fathers’ attitudes and authoritarian mothers’ attitudes negatively predict this lifestyle. This finding shows that in order to be sociable, an individual needs a democratic environment. Democratic mothers’ attitudes support this viewpoint; these attitudes positively predict this lifestyle. Thus socialization and making positive contributions by presenting personal potential depend on the relationship with parents (Ooi et al., 2006). On the other hand, it is seen that gender also predicts this lifestyle. As is known, social opportunities given to males are not often presented to females whereby males are raised to be more outgoing. It is therefore believed that these facts are also effective in this finding.

CONTROLLING lifestyle tries to control everything in their lives. They display dominance in their relationships with others. We conclude that the protective fathers’ and authoritarian mothers’ attitudes result in children with the tendency to control everything in their lives. Furthermore, research indicates that the tendency to a controlling lifestyle also forms the basis for obsessive compulsive disorder (OCD) (Taylor et al., 2010). So, it can be said that this lifestyle may cause obsessive compulsive disorder in adulthood.

In general, when the study is analyzed, we conclude that the sub dimensions of child lifestyles (socially useful, pleasing, controlling, getting, inadequacy and rebelling) are predicted by parental attitudes, socio-economic level and gender. However, with regard to child lifestyles, further studies and analysis of different variables in early childhood experience, traumatic experiences, etc. are recommended to deeply understand some other factors remaining outside the scope of this study. Qualitative analyses including interviews can be used to uncover the dynamics of the emergence of childhood life style preferences.

Conflict of Interests

The author has not declared any conflict of interests.

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Çoşkun MK (2012). The effect of high school students' levels of secure attachment to parents on their levels of attitude towards religion course. Int. J. Acad. Res. 4(6). DOI: 10.7813/2075-4124.2012/4-6/8.18
Dye JD, Johnson T (2007). A child’s day: 2003 (selected indicators of
The relationship between the parental attitudes and decision-making strategies and the occurrence of childhood obesity is well-documented in the scientific literature. For instance, Ptacek and colleagues (2013) conducted a comprehensive review of the literature on parent-child interactions and obesity development. They found that parental controlling practices, such as limiting screen time and encouraging physical activity, were negatively associated with childhood obesity. Similarly, Lansford et al. (2014) reported that corporal punishment and controlling practices were related to obesogenic or leptogenic child life style behaviors.

In a study conducted by Wilborn and Schaefer (2013), it was found that children from low-income families were more likely to engage in obesogenic behaviors if their parents used controlling and authoritative parenting styles. This finding highlights the importance of addressing the socio-economic factors that contribute to childhood obesity.

Moreover, research by Wilborn and Schaefer (2013) also indicated that children who experienced high levels of stress at home were more likely to engage in obesogenic behaviors. This suggests that interventions aimed at reducing stress and promoting healthy behaviors among children from low-income families may be effective in preventing childhood obesity.

In conclusion, the relationship between parental attitudes and decision-making strategies and childhood obesity is a complex one. Further research is needed to better understand the specific mechanisms through which these factors influence child health outcomes.
Full Length Research Paper

Environmental education: A holistic approach using Wall Chart with Manual

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Human activities such as inequitable and unsustainable production and consumption of earth resources cause environmental problems. There is need to develop research and innovative techniques towards public understanding of these environmental problems and sustainable development. This paper contains the first edition of Environmental and Sustainability Wall Chart with manual for explanation. This chart will be displayed at public places such as schools, libraries, hospitals, airports, rail stations and offices, as a holistic approach to environmental education. How to use this wall chart and manual for teaching environmental education at all levels (K-16 or P-16) is contained in the manual. All types of degradation threatening natural landscape, resources, existence and the ability of planet earth to serve future generations are contained in this manual. This wall chart and manual model presents environmental education as early education, accessible education, and education for all and for sustainable development.

**Key words:** Environmental degradation, education, ESS 200, Sustainability study, Wall chart.

INTRODUCTION

The goal of environmental education is to develop a world population that is aware of and concerned about the state of earth environments; the atmosphere, the water and the land (Figure 1), including plants, animals and all classes of organisms therein. All types of degradation threatening natural landscape, resources, existence and the ability of planet earth to serve future generations are contained in this paper. This paper is about awareness creation concerning regional and global environmental problems threatening the planet earth. A total destruction of the earth surface similar to the biblical great flood (Genesis 7) is imminent if people are left in ignorance of the earth continuous environmental degradation. A general knowledge of earth environmental problems, their consequences, how they relate and applicable solutions summarized in this paper is vital to all people across nations. Global awareness about conservation and preservation of earth natural resources, its biodiversity and natural landscape is needed to protect interest of future generations. It is in doubt if the earth environment will continue to be livable at the end of this 21st century if total awareness of the problems identified in this manual is not created with control measures justified. The primary target audiences of this paper are the developing countries. Stockholm Declaration of the United Nations Conference (1972) on the Human Environment described Environmental education as organized efforts to teach about how natural environments function.
Particularly, how human beings can manage their behavior and ecosystems in order to live sustainably.

The terms "sustainability" burst into the environmental literature in the 1980s as people became aware of the global problem of overpopulation. Since then, sustainability issues are largely concerned with how to preserve the earth environments and conserve its resources for future generations. Destruction of the earth like the time of Noah and the Biblical great flood is neither a portion of present generation nor the future generations. Sustainable living and development therefore has emerged as a global watch word, and the goal of every generation. To achieve this goal in the 21st century motivated the structure of this paper. In his recent systematic studies of the environmental movement in Ghana, Osuteye (2013) revealed an apparent disconnection between environmentally focused civil society organizations and local academia. This disconnection has implications on both the study of the social dimension of environmental issues and sustainability, and the lack of academic literature on the subjects. He maintained that the bridging of this gap has potential benefits for both civil society and the development of environmental study that could bring sustainable development.

In a study conducted by Howe et al., (2013), there is an urgent need for empirical research interdisciplinary, including developing a commonaly understood set of definitions, in order to begin to elucidate pathways that will significantly affect the abilities of people to appreciate and adapt to our rapidly changing climate. According to Bell (2004), major environmental problems can only be solved by radical transformation of the attitudes, preferences and lifestyles of the citizens of contemporary liberal democracies. This implies the use of a more holistic approach to educate the public on issues of global change and their responses. It is on this note that this wall chart and its manual presented in this paper have become very significant to the desired goal. The goal is to provide environmental education which will transform children, and through them society, in the direction of sustainability. Schinkel (2009) thus sketched a form of compulsory environmental education that realizes at least some of the objectives commonly stated in Education for Sustainability and Education for Sustainable Development.

Cough and Scott (2007) stated that environmental education and sustainable development examines the possibility to monitor and evaluate products of higher institutions. It assesses the ability of universities to produce educated, innovative, and independent individuals, while achieving wider policy goals at the same time. Their lecture examines this question in the context of environmental change and sustainability issues that threaten the integrity of the biosphere and human well-being. They challenged universities to try to produce graduates who are well-informed about sustainability.

World Association of University Presidents' report and declaration at an international conference in Talloires, France, (1990) associate university leaders with sustainable future. Therefore, universities bear great responsibilities to increase the awareness, knowledge, technologies, and tools to create an environmentally sustainable future. This is the first official statement made by university presidents, chancellors, and rectors, for a commitment to environmental sustainability in higher education. The Talloires Declaration (TD) is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach in colleges and universities. It has been signed by over 400 university leaders in over 50 countries.

Shevgaonkar (2011) could not hesitate to respond to the decision reached by India Government that environmental science will be a mandatory subject at graduation level in all Indian universities. He stated that there was an immediate need to spread awareness about environmental conservation. He continued "there is a clear lack of awareness among students about the issues that we are facing today; issues like depletion of natural resources and its effects on the human life are important. According to El-Ahraf (1981) universities can contribute to environmental education by addressing theoretical considerations and by developing practical applications. The wall chart product of this study is a considerable practical model for the teaching of environmental education in line with El-Ahraf's philosophy. Bevins and Wilkinson (2009) reported the 1997 council of Deans at Florida Gulf Coast University as saying "we have made a commitment as a university to make environmental education an integral part of our identity"; to this end, all undergraduates must complete a course on sustainable development, called "the university colloquium: A Sustainable Future". From 1997 to date, all students who have received an undergraduate degree
from the university have taken this class.

Further review of environmental education surveys in Nigeria such as that conducted by Akinnuoye and AbdRahim (2011) and Akomolafe (2011) revealed that more than 70% of the schools in Nigeria do not have environmental education books, newspaper and magazines. Neither of the schools have any form of environmental education wall chart or posters particularly the government schools. Most government schools visited lacked basic environmental education display room. In Nigeria facilities and resource-persons to teach environmental education are respectively inadequate and not considerably up-to-task. Only about 12% of Nigerian schools investigated have some sort of facilities to teach environmental education. Most teachers and the state education ministries agreed that there are major problems in the implementation of Environmental Education program in Nigeria particularly the lack of qualified teachers. Personal environmental awareness, knowledge and attitude were identified as key factors affecting environmental knowledge and practice between the schools and the civil society. Experience and qualification of teachers affects the opinions of teachers significantly on the infusion of environmental education in the Nigerian Primary School Curriculum.

A recent survey by Wambua (2012) revealed that there are no adequate resources for teaching environmental education in the four Kenya primary teacher colleges from which the sample was drawn; that most of the tutors were not even aware of what environmental education was all about. Consequently, field studies were not being effectively used and hence it could be concluded that environmental education has not properly taken off in Primary Teachers Colleges in Kenya, since this study can be generalized to the other thirteen Teachers Colleges which were not covered. In a survey conducted by Yemisi et al. (2010), out of the 140 respondents, only 43 (31%) are aware that use of firewood and charcoal for domestic cooking are sources of environmental degradation. This suggests that most of the respondents are only aware of environmental problems that directly affect them and their immediate environment such as oil spillage and pipeline vandalism but are ignorant of global environmental problems. It is expected that the wall chart/manual summarized in this paper will bridge this gap. According to Alnewashi (2003), formal educators and awareness program leaders in developing countries require more educational resources and environmental education training programs. This wall chart and manual complies with this requirement of educating the educators, government officials, program leaders and the general public. A recent survey conducted by Turan (2014) on the views of prospective primary school teachers regarding educational education in Turkey revealed greater need of visual teaching aids. According to Turan, these teaching aids could be computer assisted wall charts and posters projected on the wall or printed.

In this study, a survey of the availability of wall charts as environmental education teaching aid in secondary schools in Imo, Abia, Ebony and Anambra states was conducted. Thirty schools were sampled in each state comprising urban, rural, and private and public schools. The result was singular; none of the schools have any environmental education teaching aid in the form of wall chart or poster. In some schools, wall charts on personal hygiene and sanitation were presented as their only environmental education teaching aid. Much as personal hygiene and sanitation come under environmental education, it is only about 5% of environmental subject matter. This survey result and that of those conducted by other scholars mentioned above specifically motivated the making of this wall chart and its manual. Based on these findings, it is important that a holistic approach to environmental education be introduced in tertiary, secondary and primary schools. That its curriculum should not only reflect the immediate needs of the students but a broad view of global environmental issues, with emphasis on sustainability concepts (Figure 2).

METHODOLOGY AND STRUCTURE OF THE WALL CHART

In writing this manual, several publications, websites, university curricula and public opinions on the subject matter worldwide have been considered. Twenty environmental and sustainability issues are listed in the wall chart and briefly discussed in this manual. A wall chart is a type of large poster often displaying information for educational use or entertainment. This chart measuring 100 x 120 cm is the first of its type practical guide to environmental education. It will be displayed at public places such as schools, libraries, hospitals, airports, rail stations and offices. This book will be used for teaching environmental science and sustainability (ESS, 200) in universities and colleges. Its wall chart version is accompanied by a manual, where all the environmental and sustainability issues identified have been explained. Course outline for ESS 200 is designed based on the environmental issues presented. In writing this book, effort was made to use simple and common terms that could be easily understood by the general public. Degradation associated with each environmental issue is briefly discussed. The book explains the benefits, setting and operation of a center for sustainability study in universities.

Some of the environmental problems identified result from natural forces; some are due to man-made forces, while others are as a result of both natural and man-made forces. Out of the eighteen problems labeled in the wall chart and discussed in the book, only earthquake and volcano are of natural forces. Many of the problems identified are related, and as such share the same mode of environmental degradation. The much related environ-
mental issues are linked in the chart with broken line. The wall chart will be printed on heavy-duty paper with a large-format high-resolution color printer. The final output will be fantastic and attractive when displayed in public places. The author has the original copyright to mass produce and distribute the chart. Quality fabric is used to produce this wall chart to allow for durability and its flexibility. Different grades of paper with or without cloth-baking are used in making wall charts used in lecture rooms and in public places. Shade cloth used in this chart is cheaper, lighter, easily folded and displayed, and more durable than paper chart. All environmental and sustainability issues captured in the wall chart are explained under discussion to represent the wall chart manual.

How to use the wall chart

In public places: Hang the wall chart on the wall where it
will be conspicuous with proper illumination. Preserve the manual in a closet as a reference material that can be provided on demand. In the case of offices and public libraries, place the manual on a stool or a table beside the wall chart.

In Primary schools: Environmental education shall be a subject for primary grade five or six. The wall chart shall be displayed at appropriate wall location in each classroom of the concerned grade. Each classroom of the concerned grade shall have a wall chart and a manual preserved by the teacher. The teacher will read the manual and become familiar with the various environmental issues identified. The teacher shall introduce two of the environmental issues each week, projecting the concept of sustainable development. References should be made to global changes such as increasing population and global warming. It is expected that the teacher will explain important keywords such as Environmental degradation, Ecosystem, Biodiversity, and Conservation of natural resources in the context of sustainability. Teachers are encouraged to create songs and poems for the pupils based on environmental issues. Teachers are encouraged to compose recitations or poems based on the environmental issues mentioned in the wall chart to improve perception of earth environmental degradation by the pupils.

In Secondary schools: Teachers of Environmental Science, Geography and other science teachers can teach this subject as Environmental studies, Environmental education or as Environmental science. This subject shall be taught in junior secondary or middle school and continued in senior secondary as a subject for the West African School Certificate and GCE examinations. At senior secondary, the teacher will endeavor to give simplified notes to the students per topic, based on the content of this manual. The teacher prepares short explanatory notes for each of the eighteen environmental issues presented. Similarly, the teacher will prepare explanatory notes with local examples on vital keywords such as Sustainability and Sustainable Development. Students will be given additional notes with local case examples to explain other vital keywords like Natural Resources, Conservation of natural resources, Ecosystem and Biodiversity. All discussions and notes will be prepared to capture the concept of sustainability and sustainable development. At junior secondary level, emphasis will be on the listed eighteen environmental issues. At senior secondary, greater emphasis will be on the vital keywords.

In Universities and Colleges: Here the wall chart stands out on its own for people to read. Students will purchase the manual for their private reading. This subject will be studied as a university or college course, compulsory to all students. This will be a two hundred level course titled Environmental Science and Sustainability (ESS 200). This course must be taught by a number of faculties who share background in environmental management or Engineering. In universities and college, this manual and its wall chart represents the first handy teaching material readily available to students and faculty. Any other text(s) on the subject matter may be added to widen student’s perception of the course.

Sample poems - recitations of environmental awareness K-6 to K-12

Planet Earth-Planet Earth
The only planet of life
Now under destruction
By unending human activities

We rise against your destruction
For interest of future generations
Who wish to see your beauty and
Enjoy your abundant air of life
Enjoy your abundant water of life
Enjoy your abundant farmland
Enjoy your abundant vegetation
Enjoy your abundant minerals

We must preserve your beautiful environment
We love you Planet Earth.

Planet Earth, you are the greatest
Because you house man and all animals
You are the strongest planet
Because you withstand all human activities
You are the onlylivable and comfortable
Because of your abundant Air, Water and Land

You are the richest
Because of your abundant mineral resources
Diamond, Gold, Silver, Iron, Aluminum, Zinc, Copper, Sand, Uranium, Chromium, Nickel Potassium, Manganese, Magnesium, Calcite, Fluorite; A total of about 2720 different minerals
In addition to fuel minerals; Coal, Oil and Gas

Planet Earth what consumption rate per generation
do you approve of your resources?
I approve < 1%
WOoo! We have exceeded by about 25%
We are sorry Planet Earth
Pardon us, while we amend.

Do you know about Global Change?

Yes, Planet Earth system comprising the land, oceans, climate, poles, life, natural cycles and resources, Earth processes and human society face large-scale changes,
affecting one another.

Do you know earth temperature is changing?
Yes, earth temperature is rising, known as global warming

Do you know about desert encroachments?
Yes, Northern Nigeria stands to be wiped off, due to encroachment of the Sahara desert. It is encroaching with about 20 to 30 kilometers annually.

Does it mean that Sokoto, Kebbi, Jigawa, Katsina, and Zamfara states are most affected?
Yes, these states may be wiped off in no distant time if adequate control measure is not put in place. You don't mean it! Watch out for the next 100 years.

Do you know about Gully Erosion?
Yes, over 65% of soil on earth has displayed degradation phenomena as a result of soil erosion. Most states in Nigeria have one form of erosion or the other. The states in the south and the southeast, especially Imo, Abia and Anambra, are most devastated by gully erosion. 65% of available land in these states may be wiped off in no distant time if adequate control measure is not put in place. Don't tell me this! Watch out for the next 100 years.

Do you know about Sea level rising?
Yes, it is the outcome of ice melt in the polar region due to global warming. Global sea level has risen along our coastline about 7 inches during the 20th century, and recent satellite data show that the rate of sea-level rise is accelerating. If allowed, places like Victoria Island, parts of Bayelsa and River state may be submerged. Woo oh! God forbid

Oscar, what then do we do to save our country and the planet earth?
1. Control all vices of environmental degradation
2. Create environmental awareness to government, lawmakers and the public
3. Teach environmental education in primary, secondary and in tertiary institutions
4. Study environmental management; insist on sustainable development programs/initiatives

DISCUSSION
The wall chart manual

Poverty
The word poverty is not only about economy, but a major player in environmental management. The environmental condition of a nation or state could be assessed by the percentage of its annual budget voted for environmental management. Similarly, the economy of a household affects the level of environmental sanitation maintained. Generally, dirty or degraded environment stands as a symbol of poverty, and sustainability study is inevitable. While other researchers may look at poverty from economic point of view, environmentalists could address poverty from the environmental point of view. This is the new trend for poverty alleviation.

Education
Lack of education has its strongest hold on environmental education in Nigeria. Probably, not up to one percent Nigerians has some sort of environmental education. Lack of Environmental education has been identified as a major cause of poor sanitation leading to degradation of air, soil, water, and public health. Environmental education should be seen as sustainable education and education for a purpose. Universities should intensify sustainability study in environmental education to reduce environmental degradation and their impacts on human and biodiversity existence on earth. Impart the students; to impart the society, for better environment and good living. This is education for a purpose which Dewey (1859-1952) described as vital for society. According to Neilland Richard (2005), a society grows great when old men plant trees whose shade they know they shall never sit in.

Hunger
Global climate change leads to an increased number of weather-related disasters such as floods and droughts, which cause food shortages and famine. However, agriculture not only suffers from environmental problems, it also contributes to them, through pollution, overgrazing, and release of greenhouse gases. Land degradation, low and declining agricultural productivity, and poverty are severe and interrelated environmental issues. Declining soil fertility, which limits crop yields, is a particularly serious and widespread problem. Land management and land use policies and practices can plan an important role in alleviating hunger and poverty, while increasing agricultural productivity and the sustainable use of resources. Effective policies are particularly needed to tackle the land degradation problem, which is one of the greatest challenges to the modernization of agriculture in many African countries.

Population
Human impact on the environment is a function of population size, per capita consumption and the environmental
damage caused by the technology used to produce what is consumed. Changes in population size, rate of growth and distribution have a far-reaching impact on the environment and on development prospects. The largest population increases and the most fragile environmental conditions are usually found in poor countries, which typically have limited financial means and least adequate political and managerial resources to address the challenges. This threatens sustainable development and produces further deterioration in living standards and quality of life. People in developed countries have the greatest impact on the global environment. The first two Laws of Sustainability points out that in any society, population growth cannot be sustained, and that the larger the population, the more difficult it will be for the society to achieve sustainability.

**Global warming**

The earth's average temperature increased by 0.7° Celsius (1.3° Fahrenheit) in the 20th century often attributed to the effects of industrial revolution. Greenhouse gases mainly carbon dioxide (72%), methane (18%), nitrous oxide (9%), and chlorofluorocarbons contribute to this global warming (Spencer, 2011). Gas flaring, burning fossil fuels and wood and human industrial and agricultural practices contribute to this global warming. Emission of CO₂ has been dramatically increased within the last 50 years and is still increasing by almost 3 percent each year. To this effect, effort must be made to reduce smoking vehicles, check automobile emission, and stop gas flaring in Nigeria to mitigate environmental degradation. Sustainability study to control global warming is inevitable.

Sun radiation often erupts in a terrible blast at surface of the sun with increasing ultraviolet B rays on the earth surface. Electromagnetic radiation exists in a range of wavelengths, which are delineated into major divisions for our convenience. Ultraviolet B radiation, harmful to living organisms, represents a small portion of the spectrum, from 290 to 320 nanometer wavelengths (Figure 3).

Increase of ultraviolet radiation and sun blast on the earth surface is most allowed following depletion of the stratospheric ozone layer in the Antarctic region largely by human emission of green house gases into the atmosphere. This has caused notable rise in the earth surface temperature and skin diseases, including cancer (WHO Geneva, 2003).

**Terrorism**

Recent advances on terrorism are not all about politics, war and loss of lives. It borders largely on environmental degradation. There is destruction of structures causing change in urban esthetics, and use of explosives causing emission of green house gases. Shelter displaced citizens are subjected to poor environmental health and sanitation. There is urgent need for greater investments on the control of terrorism in Nigeria and worldwide. Major terrorist groups identified by the U.S. are mainly Religious-Political: Aum Shinrikyo (Japanese); Klu Klux Klan (U.S.); Abu Sayyaf (Philippines); Al Qaeda (Afghanistan); Egyptian Islamic Jihad; Hamas (Palestinian); Boko Haram (Nigeria); Hezbollah (Lebanese).

**Automobile waste**

The unprecedented increase in transfer of old vehicles, junk engines and transmissions from industrialized to developing nations of the world like Nigeria may be reciprocated by more automobile junk markets (AJMs), and mechanic villages (MVs). There is increasing volume of automobile gas emission, discharge of spent engine and transmission oil, spent electrolyte and spills on the ground in MVs and AJMs. Topsoil within and around AJMs and MVs become heavily contaminated by toxic trace metals in many parts of Nigeria (Nwachukwu et al., 2013). This may lead to larger environmental degradation this 21st century, affecting land use planning, soil and water quality, and public health. Storm water from these urban infrastructures gets into the waterways untreated, and there is no protection to both surface and groundwater. The overall outcome is environmental degradation that demands intensive sustainability study.

**Waste electrical and electronic equipment**

Waste electrical and electronic equipment (WEEE), also
known as e-waste has been defined as any electrically powered appliance that has reached the end of its life. Or that no longer satisfies the current owner for its original purpose. Importation of WEEE of all grades into Nigeria for crude recycling and reuse and consequent littering of their scrap casings and other hazardous components is not a sustainable international trade development (Nwachukwu and Feng, 2010). Subsequent to the continuous development and innovation of electronic technology, e-waste will undoubtedly represent one of the most serious environmental issues of the century in many developing countries. A comprehensive waste management strategy should be established and implemented. Sustainability study is necessary to continuously investigate and address the problems of e-waste in Nigeria.

**Industrial and domestic waste dumping**

Improper management of industrial, domestic, medical and agricultural wastes are often seen as indiscriminate waste discharge or dumping in different parts of the world. This is a major cause of environmental degradation leading to poor environmental health and diseases. It causes hazards through physical, micro-biological, or chemical agents of disease. Some domestic wastes that pose environmental issue in Nigeria are human and animal feces, food and market wastes, sewage, and industrial and agricultural wastes. Improper disposal of solid wastes and the absence of engineered sanitary landfill in Nigeria could cause direct health risks to people living around the waste dumped. Human beings need to be protected as much as possible from contact with waste. Specific risks are found in handling hospitals wastes and animal wastes. The most obvious environmental damage caused by municipal solid wastes is poor aesthetic, street littering, and urban degradation.

Stop indiscriminate dumping of wastes, classify wastes. Isolate recyclable waste such as paper, bottles, cans and plastics (Figure 4) from other wastes in homes and offices to make money (Waste to Wealth). Indiscriminate waste dumping pollutes surface water which in turn, pollutes groundwater. Home sorting of wastes is most appropriate to stop scavengers who go to waste dumps to pick recyclable materials thereby endangering their health. Waste littering is a serious offence; polyethylene bags including that of sachet water fall under plastics that hardly decompose. Dispose your domestic wastes weekly by taking them to collection points or bring them outside your home for waste collectors to pick them.

**Incineration:** This is waste destruction in a furnace by controlled burning at high temperatures. However, it is a highly contentious method because incomplete incineration can produce carbon monoxide gas, gaseous dioxins, and other harmful substances.

Incineration is a waste treatment technology, which includes the combustion of waste to produce energy. It is a high temperature waste treatment. During the process, the waste material is converted to gases, particles and heat, used for generation of electricity. The gases, flue gases are first treated for eradication of pollutants before going in to atmosphere. A major problem of incineration is in the disposal of the ash residue. This means that incineration however, does not replace the need for landfill but it reduced the amount to be thrown in it. Among waste-to-energy technologies, incineration is most effective. Other technologies are gasification, anaerobic digestion and Pyrolysis. Sometimes Incineration is conducted without energy production. In the past, incineration was conducted without separating materials thus causing harm to environment (Figure 5).

Usage of incinerators for waste management is divisive. Despite the provision of emission control systems in modern incineration plants, arguments against the use of incinerator outweigh arguments in support of the use.

**Recycling:** This is a process to change waste materials
into new products, thereby changing waste to wealth, and reducing the consumption of fresh raw materials. Recycling reduces air pollution from incinerator and water pollution from landfill. It reduces the need for "conventional" waste disposal, and lower greenhouse gas emissions.

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse and Recycle" (RRR) waste hierarchy. There are some international standard organization (ISO) standards related to recycling such as ISO 15270:2008 for plastic wastes and ISO 14001:2004 for environmental management control of recycling practice. Recyclable materials include used oil, glass, paper, metal, plastic, textiles, automobile and electronics. The composting or other reuse of biodegradable waste such as food or garden waste is also considered recycling. Materials to be recycled are either brought to a collection center or picked up from homes as against picking from waste dumps. These materials are then cleaned thoroughly and reprocessed into new materials. For example, used office paper would be converted into new office paper, and plastics can easily be recycled to produce fuel oil (Figure 6).

**Oil and gas, coal, nuclear wastes**

Coal, oil, and gas consist largely of carbon and hydrogen. The process that we call "burning" actually is chemical reactions with oxygen in the air. For the most part, the carbon combines with oxygen to form carbon dioxide (CO₂), and the hydrogen combines with oxygen to form water vapor (H₂O). In both of these chemical reactions a substantial amount of energy is released as heat. Since heat is what is needed to instigate these chemical reactions, we have a chain reaction: reactions cause heat, which causes reactions, which cause heat, and so on. Once started the process continues until nearly all of the fuel has gone through the process. The carbon dioxide that is released is the cause of the greenhouse effect causing the world largest share of environmental degradation. According to NNPC report (2010), a large proportion (about 63%) of the gas produced in Nigeria is being flared. By 2002 and 2003, gas flared remained as high as 45.4 and 42.7% while gas used was 54.6 and 57.3%, respectively. The economic costs in terms of lost incomes, air pollution, higher ambient temperature and reduction in the standard of living are expected to be excessive.

**Coal**: A large coal-burning plant annually burns 3 million tons of coal to produce 11 million tons of carbon dioxide. The water vapor release presents no problems, since the amount in the atmosphere is determined by evaporation. In addition to combining carbon and hydrogen from the fuel with oxygen from the air to produce carbon dioxide and water vapor, burning fossil fuels involves other processes. Coal and oil contain small amounts of sulfur, typically 0.5 to 3% by weight. In the combustion process, sulfur combines with oxygen in the air to produce sulfur dioxide, which is the most important contributor to acid rain water. The greenhouse effect causes only economic disruption and acid rain kills only fish and trees, whereas air pollution kills people and causes human suffering.
Nuclear wastes: Nuclear energy relies on the fact that some elements can be split (in a process called fission) and will release part of their energy as heat. Because it fissions easily, Uranium-235 (U-235) is one of the elements most commonly used to produce nuclear energy. It is generally used in a mixture with Uranium-238, and produces Plutonium-239 (Pu-239) as waste in the process. All the steps in the complex process of creating nuclear energy entail environmental hazards. The mining of uranium, as well as its refining and enrichment, and the production of plutonium produce radioactive isotopes that contaminate the surrounding area, including the groundwater, air, land, plants, and equipment. As a result, humans and the entire ecosystem are adversely and profoundly affected. Some of these radioactive isotopes are extraordinarily long-lived, remaining toxic for hundreds of thousands of years. Presently, we are only beginning to observe and experience the consequences of producing nuclear energy as unsustainable due to accident risks.

Oil Spill: Oil spill worldwide causes environmental degradation with chain reactions. The Niger-delta region of Nigeria has continued to attract scholarly attention in view of devastation of its environment and people due to failure to manage the negative consequences of oil exploitation and underdevelopment it has spawned in the region. The Niger Delta is one of the world’s most important wetland and coastal marine ecosystems. It is home to some 10 million people by the 1991 census, estimated to over 28 million by 2006. Due to its rich natural resource base, environmental exploitation is rife and pollution affects the people in unprecedented ways. Oil has been extracted in the Niger Delta by the national and multinational oil companies since 1958. Oil pollution caused by oil spills and gas flaring by the oil industry devastates farmland, rivers, villages and the air. Oil pollution kills fish and their food sources; it damages agricultural land causing soil infertility and negatively impacts agricultural productivity (Egberongbe et al., 2006).

Groundwater pollution and Over-exploitation

There is proliferation of shallow substandard private water wells, poor distribution of public water wells, poor planning, and poor management of public wells in Nigeria. About 60% of public water wells are either abortive or not functional. The lack of public water supply notwithstanding, private wells cannot replace public wells in communities. Proliferation of shallow substandard private water wells is neither environmentally friendly nor a sustainable groundwater development practice. Suggested sustainable practices are government-private partnership for public wells, and private-private partnership for private wells. Two major practices supporting failure of public water supply in Nigeria are:

a) Improper or partial distribution of public wells due to lack of easily retrievable information on existing wells in the region, and favoritisms. Often a community may have two or more public wells whereas the next community does not have one.

b) Poor maintenance and often sabotage in the development and operational processes of public wells. Fund budgeted for water well development and maintenance may be diverted, resulting to the use of inferior materials and no proper supervision during the well construction.
Earthquake

Earthquake is the world largest cause of environmental degradation seconded by flood. It is caused by excessive accumulation of seismic waves beyond the elastic limits of rocks in the affecting area. Regions situated between continental plate boundaries are most seismically active to experience earthquakes. Forecasting a probable timing, location, magnitude and other important features of a forthcoming seismic event is called earthquake prediction.

Various attempts have been made by environmental seismologists and others to create effective systems for precise earthquake predictions, including the VAN method. Most seismologists do not believe that a system to provide timely warnings for individual earthquakes has yet been developed, and many believe that such a system would be unlikely to give significant warning of impending seismic events.

However, sustainability study, involving more general forecasts routinely predict seismic hazard. Such sustainability study estimates the probability of an earthquake of a particular size affecting a particular location within a particular time-span. Universities are therefore obliged to intensify efforts in earthquake prediction.

Storm Water and Surface Water Pollution and Drought

Environmental degradation due to no storm water management in Nigeria is significant in soil and surface water degradation. Lack of storm water treatment best management practice facilities in Nigeria indicates poor environmental awareness, because infiltration and detention basins are cheap, with no complex hydrological designs. Storm water or runoff from market square, mechanic villages, industrial layouts, construction sites etc. deserve treatment before it is allowed to join the urban water way. Sustainability study in the area of storm water treatment is inevitable towards improving environmental quality in this 21st century. Safety means sustainability across our value chain worldwide to protect our environment and communities. Protecting our natural environment is critical to the health and prosperity of our communities and country.

Drought: This is an extended period when a region notes a deficiency in its water supply whether surface or underground water. This global phenomenon has a widespread impact on agriculture. Lengthy periods of drought have long been a key trigger for hunger, poverty, mass migration and other humanitarian crises within Africa and the Sahel.

Abandoned Mine Pits

The increasing number of abortive and abandoned quarry pits, and the several associated geo-environmental hazards have given cause for greater concern. Environmentalists, governments, and the general public now seek innovative ideas, and research collaborations that will reduce incidents of abortive and abandoned quarry pits. Quarry operators may be charged with the responsibility to reclaim quarry pits as soon as their operation is over. Indiscriminate roadside excavation of borrow pits for road construction and other civil Engineering works without the intention of restoring or reclaiming the pits have left much to be desired in terms of the potential hazards. Abandoned road sides borrow pits causes landslides, rock falls, gully erosion, road failure, and ground water contamination. Abandoned borrow pits show evidence of unsustainable engineering practices. Firstly, there should be no road side excavation, and operators of borrow pits should get the necessary site approval from government ministries of environment before opening a borrow pit. Secondly, geotechnical assessment must be carried out to certify adequacy of a site, in terms of its soil characteristics to avoid cases of trial pits that leads to abandon borrow pits. There is loss of human life and arable land, ecosystem disorder with poor environmental quality and safety. Stagnant water in the pits supports daily breeding of mosquito and tsetse fly, (Nwachukwu and Osoro, 2013).

Erosion and Flood

Over sixty five percent of soil on earth is said to have displayed degradation due to soil erosion, salinity and desertification (Okin, 2002). Much in the rain forest belt of the world, rain drops on the shallow streams, splash the soil, increase turbulence and sediment carrying capacity. The transition to agriculture from natural vegetation often does not provide protective cover to the soil. Soil erosion is one of the most serious environmental and public health problems facing human society. Humans obtain more than 99.7% of their food (calories) from the land and less than 0.3% from the oceans and other aquatic ecosystems. Each year about 10 million ha of cropland are lost due to soil erosion, thus reducing the cropland available for food production. The loss of cropland is a serious problem because the World Health Organization reports that more than 3.7 billion people are malnourished in the world. Overall soil is being lost from land areas 10 to 40 times faster than the rate of soil renewal imperiling future human food security and environmental quality (Pimentel (2006).

Flood: Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. As much as 90 percent of the damage related to all natural disasters (excluding droughts) is caused by floods and associated debris flows. Melting snow can combine with rain in the winter and early spring; severe thunderstorms can bring heavy rain in the spring and summer; or tropical cyclone scan bring intense rainfall to
the coastal area. Floods are one of the leading causes of death from natural disasters in the United States. Over 200 flood-related fatalities are reported each year with over half being vehicle-related as people try to drive through floodwaters. Floods can damage and devastate homes and farms, displace families as well as pets and livestock, damage crops, and disrupt agriculture processing and business. Heavy rains have in recent time unleashed floods in parts of Nigeria and other tropical rain forest belt of West Africa, testing the countries’ emergency preparedness for flood events. The 2012 floods affected about 7 million people.

**Diseases**

The combination of climate change and environmental degradation has created ideal conditions for the emergence, resurgence and spread of infectious diseases - diseases which kill more than 17 million people annually. Increased climate change has also altered the functional balance among predators and prey, which is important for controlling the proliferation of pests and pathogens. Warmer and sometimes wetter weather may already be extending the range of infectious diseases beyond regions where they are endemic. These were some of the disturbing conclusions of a study by Epstein and Ferber (2011) of the Centre for Health and Global Environment, Massachusetts, USA in a book titled: Changing Planet, Changing Health. Global warming may cause one million additional deaths from malaria each year,” the book warns. The prevalence of human diseases is increasing rapidly worldwide, as is the number of deaths from diseases. The rapid expansion of human populations is a major factor in the rise of human diseases: Humans living in crowded, urban areas are in an ecosystem that is ideal for the resurgence and rapid spread of old diseases as well as for the development and spread of new diseases. Sustainability study this century must emphasize disease surveillance along environmental degradation.

**Biodiversity**

In ecology, the word sustainability describes how biological systems remain diverse and productive over time. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. For humans, sustainability is the potential for long-term maintenance of well-being, which has ecological, economic, political and cultural dimensions. Sustainability requires the reconciliation of environmental, social equity and economic demands. Healthy ecosystems and environments are necessary to the survival and flourishing of humans and other organisms. Human activity is having a significant and escalating impact on the biodiversity of world ecosystems, reducing both their resilience and biodiversity capacity (Walter, 2006). Loss of biodiversity stems largely from the habitat loss and fragmentation produced by the human appropriation of land for development, forestry and agriculture as natural capital is progressively converted to man-made capital. Land use change is fundamental to the operations of the biosphere. This is because alterations in the relative proportions of land dedicated to urbanization, agriculture, forest, woodland, grassland and pasture have negative effects. The extended effects on the global water, carbon and nitrogen biogeochemical cycles can impacts natural and human systems (Kreb, 2001).

**Ecosystem**

A system formed by the interaction of a community of organisms with their environment. It is a complex set of relationships among the living resources, habitats and residents of an area. It includes plants, trees, animals, fish, birds, micro-organisms, water, soil and people, each depending somehow with the other. Ecosystem varies greatly in size and composition and if one part of an ecosystem is destroyed or disappears, the rest will feel the impact. To this effect therefore has ecosystem become the complex of a community of organisms and its environment functioning as an ecological unit. Ecosystems are essential to our well-being and prosperity as they provide us with food, clean air and fresh water. Ecosystem management is a process that aims to conserve major ecological services and restore natural resources while meeting the socioeconomic, political and cultural needs of current and future generations. The ecosystem services concept itself was popularized by the Millennium Ecosystem Assessment (MA) in the early 2005. This grouped ecosystem services into four broad categories: provisioning, such as the production of food and water; regulation, such as the control of flood, climate and disease; environmental supporting services, such as nutrient cycles and crop pollination; and cultural, such as spiritual and recreational ethics as illustrated in Figure 7.

**Deforestation and desertification**

Africa is particularly vulnerable to desertification. About two thirds of the continent consists of desert or dry lands. The obvious causes of desertification and deforestation consist of major ecosystem changes, such as land conversion for various purposes, over-dependence on natural resources and several forms of unsustainable land use. However, the issue of desertification is inseparable from social problems such as poverty and land tenure issues. Politics, war and national disasters affect the movements of people and thus impact on the land. A coalition of non-governmental organizations, Civil Rights
Congress (CRC) and Climate Change West Africa Region Network (CLICWAN), have in 2009 stated that the Northern Nigeria stand to be wiped off, following the persistent desert encroachment of the region. Statistics have shown that desert is encroaching with about 20 to 30 kilometers annually or more than that in contrast to 10 years back when there was a shelterbelt program. The northern states so affected are shown in figure 8, due to their North West geographical locations. The Federal Government says it has set aside N10 billion to halt desert encroachment in the Northern part of the country.

**Sustainability studies**

These are studies related to the interdisciplinary perspectives of the sustainability concept. It is education for sustainable development. Programs include instruction in sustainable development, earth science, environmental policies, ethics, ecology, landscape architecture, city and
Figure 9. Sustainable Development indicators

regional planning, economics, natural resources, sociology, and anthropology. The world is facing greater challenge in the 21st century: we need to redesign and rethink much of our way of life to make it sustainable given the planet's limited and fragile resources. Rigorous science has explained that current consumption trends threaten the planet with several issues such as climate change by placing hardships on vulnerable peoples. Modern systems ranging from transportation networks to community building to food production will need to be significantly changed and adapted to this new reality. The leaders of this critical effort will be the next generation of college-educated students. Sustainability studies prepare students for global citizenship while providing the knowledge and skill sets that are increasingly in demand.

According to the International Institute for Sustainable Development; "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

A). the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and

B). the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs." Few examples of sustainable initiative:

i. The one man one tree planting program
ii. The shallow aquifer decontamination program
iii. The environmentally friendly automobile mechanic village concept
iv. The hybrid automobile technology program
The environmentally friendly alternative energy programs

Sustainability develops indicators that measure progress toward a sustainable economy, society and environment. These three important keywords of sustainability (figure 9) address issues of sustainable development along UN programs. Sustainability study should addresses the integration of cultural, economic, environmental, and energy components and supports projects and perspectives that have positive impacts on future resources, ecosystem health, and human wellbeing. It is essential for all engineers to consider environmental influences caused by their work and products. The issue of sustainability can be summarized into: Sustainable Environment/Health and Safety; Sustainable Science; Sustainable Architecture; Sustainable Engineering; Sustainable Agriculture; Sustainable Urban and Regional Planning; Sustainable Building and Housing and Sustainable Management.

Conclusion

The idea about this wall chart/manual stems from lack of awareness observed among students of primary, secondary and tertiary institutions about the state of earth environment, its resources and development. Awareness creation of global environmental issues and sustainability concept is now a global challenge. This situation is critical to lack of sustainable development programs in many African countries. The 'ultimate' aim of this wall chart/manual is to provide a simplified general environmental education material for all. It is important for each university or college graduate and school leaver in Africa to have formulated a responsible attitude towards the sustainable development of Planet Earth. The need to appreciate its beauty, conserve its resources and preserve its natural landscape. This manual and the analysis on which it rests provide the material base for individuals to acquire a general knowledge and disposition to make decisions on regional, national, and global environmental issues. The goal is for human population to support all United Nations programs to save planet earth. This wall chart and its manual are treasure in homes, classrooms, libraries and offices and material set for teaching environmental science in schools, colleges and universities.
Universities are required to integrate sustainability studies as: sustainability science, sustainable engineering, sustainable agriculture, and sustainable management, in order to achieve sustainable development. The role of universities in the 21st century will include conducting sustainability studies and research reporting directly to the target audience. Universities this century may not base academic output only on journal publications, but include public lectures and direct research reporting via center for sustainability studies. It is necessary that all future graduates of African higher institutions: universities, polytechnics, and colleges take ESS 200 or its equivalent. Environmental issues as contained in this wall chart and its manual will make ESS 200.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

The examination of the correlation between social physique anxiety levels and narcissism levels of the students who studied at the SPES

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The aim of the study was to discover the correlation between social physique anxiety levels and narcissism levels of the students of the school of physical education and sports. A total of 308 students who studied at different academic departments of the school of the physical education and sports of Mustafa Kemal University participated in the study. In the study, Social Physique Anxiety Scale which was designed by Hart et al., adapted into Turkish by Mülazimoğlu and Aşçı (2006) was used to determine the Social Physique Anxiety level of students. The SPAS is a 12-item self-report inventory designed to measure the construct of SPA. It is a 5-point Likert type scale with items such as “I am comfortable with the appearance of my physique/figure.” Hart et al. found adequate construct validity, test-retest reliability (alpha = .82), and internal consistency (alpha = .90). The second instrument used in this study is Narcissistic Personality Inventory NPI which was designed by Dr. Ames et al. and adapted into Turkish by Atay. For the analyses of the data; Portable IBM SPSS Statistics v20 package program was used. “Spearman Correlation” analysis was employed to determine whether or not there was a correlation between social physique anxiety and narcissism. As a result, it was found out that there was significant correlation between Social Physique Anxiety level and Narcissistic Personality Inventory in terms of sub-dimension scores. It was noted that as the level of Social Physique Anxiety level increased their narcissism levels decreased.

Key words: Social Physique Anxiety, Narcissistic Personality Inventory, Physical Education and Sports.

INTRODUCTION

The term narcissism is derived from Narcissus in Greek mythology that falls in love with his own image reflected in a pool of water and wasted his life watching this beautiful face reflected. According to the mythology; a despised lover of Narcissus, whose name was Ameinius, committed suicide with a sword. Ameinius’ evenge prayer was heard by a nymph, Nemesis. Using her power; she made Narcissus to fall in love with himself but on one condition: “Because he never loved anyone, he fell in love with himself”. One day, Narcissus bends down to drink water, sees his own image on water in a pool and falls in love with himself. He spends rest of his life longing
for this beloved. Believing that only death can save him from this pain; Narcissus at last ends his life by stabbing himself with a dagger (Rataj, 2003; cited by Atay, 2010).

Narcissism is a part of psychoanalytic discoveries; as such, it is inevitable phase of early human development. Babies see their self-love in the looking, words, caress of their mothers. It is the first phase of self-acceptance and self-love, later on it provides precursors of loving others and feeling of alterity. These early relations with objects are the psychic growth factors. Children identify themselves with what their mothers give. Narcissism of the children is marked by their parents’ narcissism (Morelli and Couderc, 2011).

In daily use, narcissism does not have positive connotations. According to Crompton (2010), narcissism is neither a concept nor a diagnosis. For Crompton, narcissism is an approach that helps us to recognize dimensions that define our personality. In other words, narcissism depicts a natural character among the people. We all need some amount of narcissism, selfishness and self-regarding so that we can do anything, feel better and make ourselves accepted. However, these characteristics are extremely and inevitably dominant in some people, which indicates a problem. Attractiveness of narcissism uncovers our narcissistic dispositions. People with strong narcissistic characteristics are those who are unhappy and have difficulty leading a family life (Crompton, 2010).

In the study of Pulver and Van der Waals conducted in 1911 and 1960, they took the term narcissism as one that connotes sexual perversion. In later studies, including the early childhood growth in the definition they discussed the term as a libidinal investment in memory, a kind of personal relations and a synonym of self-esteem (Akhtar and Thompson, 1982; cited by Atay, 2010).

The most significant feature of narcissism is that self (which includes the individual wholly as a perceived psychological and physical entity existing outside world: personality) is exceptionally protruded and interest in others reduces. Being examined scientifically, narcissism is seen both as a pathological and normal term. Yet, intensification of self-importance and increased self-interest—as much as to require a psychiatric treatment—result in pathologic narcissism and a personality disorder. Pathologic narcissists cannot love themselves and look down on themselves (Evren, 1997; cited by Timuroğlu, 2005). Someone with a narcissistic character identifies himself as follows:

"I show myself outside as one who has high self-confidence and strength, can do everything, is large-minded and is rather self-confident. Yet, internally, I always feel I behave wrong, I am not self-confident and fear looking into others’ eyes. I am always thinking of what if someone sees inside myself and understands how unconfident I am. I am stuck in the idea that I am naked and a tiny, insignificant piece of me is left if my mask slips. Then, I am very afraid of being abandoned, unimportant and boring person (someone not inspiring any interest) (Wardetzki, 2010).

To Twenge and Campbell (2010), in addition to discipline and education; another factor that incites narcissism is the mass media that presents celebrities as an ideal human model. Mass media programs demonstrate other dimensions of narcissism as materialism, extreme-competitiveness, self-exhibitionism obsession, quest for fame and exploitation of others for one’s own interest (Twenge and Campbell, 2010).

For Lasch (1979), each culture produces different models of child raising and socialization in line with criteria of that culture (cited by Crompton, 2010). Using narcissism for the first time in psychology, Ellis (1988) described it as a condition in which sexual emotions experienced especially by women are orientated towards self-admiration (cited by Atay, 2009).

The German summary of Ellis’ article translated by Nacke in 1899 referred to narcissism, which drew the attention of Freud (Atay 2009). In the article published by Freud in 1910, he mentioned narcissism in the deep note and wrote his article on narcissism four years later. In his article, Freud discussed narcissism as a part of sexual development. In 1931, Freud defined narcissism as a personality type (Timuroğlu and İscan, 2008).

Jones used pathologic narcissism term and defined psychological narcissism with such characteristics as over-appraisal of one’s own power and knowledge, strong fantasies, inability to be open to new knowledge, over-ambitiousness on being loved, praised and awards and not valuing others’ time (cited by Atay, 2009).

Throughout history and today, it has been important for people to have such characteristics as being fit, healthy and having muscular body and to leave good impressions on others. For people, being beautiful is associated with positive values while being ugly by negative values; which is supported by mass media and the imposed ideal body designs change people’s feelings and ideas, and affect their body perceptions (Yaman et al., 2008).

Social physique anxiety –being one of the concepts relating with one’s anxiety over physical appearance- is identified as anxieties and tensions about how one’s physical appearance is evaluated by others (Hart et al., 1989). Those who want to leave positive impressions on others organize their behaviors accordingly (Çepikkurt and Coşkun, 2010).

According to Russel (2002); people’s social physique anxiety increases when they think that others make negative evaluations on their physical images. Women experience social physique anxiety more than men. However, it is seen that men also undergo pressures of social physique anxiety, too (cited by Çepikkurt and Coşkun, 2010).

Social physique anxiety includes two subtitles: one is one’s body image dissatisfaction and the other one is expectation of negative evaluation about physical appearance by others. These two situations lead to social
anxiety among individuals (Doğan et al., 2011; Çepikkurt and Coşkun, 2010).

It is important not only how people perceive their own bodies but also how others perceive them. People want to leave positive impressions on others and accordingly organize their behaviors. Yet, some people are more worried about it than others. The anxiety that emerges when one’s physical appearance is evaluated by others is called social physique anxiety (SPA) (Hart et al., 1989). Russell (2002) argues that SPA occurs among the individuals as a result of the belief that others evaluate their physical appearance negatively. Women experience social physique anxiety more than men and anxiety experienced by them affects their behaviors (Davison and McCabe, 2005).

Today, it is noted that there is an increasing social pressure on men about the fact that they too should have and keep a certain body shape (Olivardia, 2001). When the written resources are examined, it is seen that there is a negative correlation between social physique anxiety and body image. In other words, people’s anxiety about physical appearance reduces as their satisfaction with their bodies increases while their anxiety about physical appearance increases as their satisfaction with their bodies reduces (Frederick and Morrison, 1996; Hausenblas and Mack, 1999; Krane et al., 2001; Mülazımoğlu and Aşçı, 2006).

One of the methods used by people to shape their body and to get the optimal and ideal body structure is physical activity and exercises (Altınbaş and Aşçı, 2005). With participation in physical activities, individuals acquire the chance to achieve both healthier bodies and new images. Besides, people can feel more positive feelings about their bodies. Many studies conducted suggest that those who are engaged in sports are more satisfied with their body images as compared with those who are not (Aşçı, 2004; Aşçı et al., 1993; Çök, 1990; Huddy et al., 1993; Mülazımoğlu and Aşçı, 2006).

Also, in situations where individuals who do sports are evaluated by others in comparison with those who do not sports, it is seen that these individuals who do sports feel less anxiety (Eklund and Crawford, 1994; Hausenblas and Mack, 1999; Mülazımoğlu and Aşçı, 2006). In the study of Davis (1992), eating behaviors of elite female athletes and non-athlete female individuals were compared in terms of whether or not they were satisfied with their body images and weights and it was found out that female athletes had abnormal eating behaviors and were more anxious about their body images and weights.

Davis also emphasized that athletes who are normally thinner than average people want to be much thinner, are not satisfied with their bodies and go on diets more than those who are of normal weight, non-athletes (Çepikkurt and Coşkun, 2010).

In light of the literature information above mentioned, the aim of the study was to explore the correlation between social physique anxiety levels and narcissism levels of the students of the school of the physical education and sports.

METHOD

Population sample

The population of the study was composed of the students who studied at the schools of the Physical Education and Sports of the Turkish universities.

The sample of the study was composed of a total of 308 students who were recruited with random sampling method and who studied at the school of the Physical Education and Sports of Mustafa Kemal University; 124 being female university students (40.3%) and 184 male university students (59.7%).

Data collection tool

Personal information form

The participants were given a personal information form designed by the researcher that addressed information about participants’ age, gender, academic department, number of brothers and sisters, parental status, place of residence, employment status, status of sports- doing and sportive branches.

Social Physique Anxiety Scale (SPAS)

In the study, Social Physique Anxiety Scale (SPAS) which was designed by Hart et al. (1989) and adapted into Turkish by Mülazımoğlu and Aşçı (2006) with 12 items and consisting of two subscales (Body Image Dissatisfaction BID and Expectation of Negative Evaluation ENE) was used. The items are responded with a 5 point likert scale. The lowest score is 12 while the highest score is 60. As the scores obtained from the scale increase, so does one’s anxiety over own appearance. In the two-factor structure, the scale’s test-retest correlation coefficient was 0.80 for factor 1 and factor 2 among the female students while it was 0.76 for factor 1 and 0.77 for factor 2 among the male students. Test-retest correlation coefficient of the total scale was 0.88 among the female students and 0.71 among the male students. In the two-factor structure, internal consistency coefficient was 0.77 for factor 1 and 0.69 for factor 2 among the female students while it was 0.75 for factor 1 and 0.68 for factor 2 among the male students. In the one-factor structure, internal consistency coefficient was 0.81 among the female students while 0.77 among the male students (Mülazımoğlu and Aşçı, 2006).

Narcissistic Personality Inventory (NPI)

Narcissistic Personality Inventory (NPI) was developed in 1979 by Raskin and Hall and was consisted of 220 statements. Later, it was transformed into a scale of 54 items after internal consistency analyses were performed. Raskin and Terry removed some of the items as a result of item and factor analyses and Narcissistic Personality Inventory was designed with 40 items. The inventory was clustered into 7 subscales: exhibitionism, superiority, authority, entitlement, self-sufficiency, exploitativeness and vanity (Atay, 2009).

However, Ames et al. from the University of Columbia designed the final version of Narcissistic Personality Inventory with 16 questions in 2006. The scale was adapted into Turkish by Atay in 2009.
Thus, language and cultural equivalency of the scale was achieved and necessary reliability and validity tests were performed. In the first study done after Atay’s pilot implementation, scale’s Cronbach’s Alpha value was calculated as 0.57. Due to low reliability value, four statements which were detected to be negatively perceived and made no contribution to the scale were revised after correlation of each factor with the scale was examined. In the measurements done after the revision, scale’s Cronbach’s Alpha value increased to 0.652. As in the English form of NPI, questions in the Turkish form were also distributed to 6 factors - exhibitionism, superiority, authority, entitlement, self-sufficiency, exploitativeness (Atay, 2009). Total score of the NPI ranges between 0 and 16; while factor/subscale scores change between 0 and 2 in authority; 0 and 3 in exhibitionism; 0 and 3 in exploitativeness; 0 and 2 in entitlement; 0 and 3 in self-sufficiency; 0 and 3 in superiority. High scores indicate higher level of narcissism (Atay, 2009).

Analyses of the data

For the analyses of the data, Portable IBM SPSS Statistics v20 package program was used. One sample “Kolmogorov-Smirnov” test was employed in order to know whether or not the data followed a normal distribution and it was seen that the data did not follow a normal distribution. Later on, Anova-Homogeneity of variance test was used in order to know whether or not the data were homogenous and it was seen that the data were not homogenous. Following this initial analysis, it was decided to use non-parametric test methods for the statistical analyses of the data and “Spearman Correlation” analysis was employed to determine whether or not there was a correlation between social physique anxiety and narcissism.

FINDINGS

In Table 1, distribution of the participants was given in terms of their socio-demographic characteristics. It was seen that 124 of the participants were female students (40.3%) while 184 of them were male students (59.7%). 55.8% of the group (n=172) were composed of those aged 21-23 years while 30.5% of the group (n=94) were composed of those aged 18-20 years. 105 of the students (34.1%) studied at sports management department, 73 students (23.7%) studied at the teaching department of physical education and sports, 68 students (22.1%) studied at training department and 62 students (20.1%) studied at recreation department. 8 students (2.6%) were the only child in the family, 39 students (12.7%) had one sister or brother, 61 students (19.8%) had two brothers and/or sisters, 86 students (27.9%) had three brothers and/or sisters and 114 students (37%) had ≥ four brothers and/or sisters. 242 of the participant students (78.6%) were not employed while 66 students (21.4%) were employed (part-time jobs, public sector, private sector, other). When the places of residents of the students were investigated, 245 students (79.6%) resided in student homes, dormitories and other places while 63 students resided with their families and relatives. Mothers and fathers of 267 students (86.7%) were alive and stayed together while mothers and fathers of 23 students (8.4%) were separated or divorced and 18 students (5.8%) lost their mothers or fathers. 199 of the participant students (94.6%) participated in sports regularly (jogging-running, basketball, swimming, tennis, volleyball, football, gymnastics, other) whereas 109 (35.4%) students did not participate in sports.

Table 2 demonstrated the distribution of the scores obtained from the subscales of Social Physique Anxiety Scale SPAS and Narcissistic Personality Inventory NPI by the students of the physical education and sports. It was found out that the students’ SPAS-Body Image Dissatisfaction BID score was 10.12±3.63 while SPAS-Expectation of Negative Evaluation ENE score was 19.56±6.81. The participant students’ Social Physique Anxiety Scale-SPAS total score was 29.68±8.06. When the participants were examined in terms of NPI-subscapes, their scores were 1.05±0.75 for authority, 1.07±0.88 for exhibitionism, 1.44±0.88 for exploitativeness, 0.73±0.77 for entitlement, 1.59±1.01 for self-sufficiency, 0.94±0.84 for superiority; respectively. The participant students’ Narcissistic Personality Inventory NPI total score was 6.83±2.62.

In Table 3, students’ test results of Spearman Correlation performed to determine the correlation between Social Physique Anxiety levels and narcissism levels were presented. Although there was no significant correlation between Social Physique Anxiety levels and narcissism levels of the students in terms of total scores, there were significant correlations in terms of subscales.

It was discovered that there was a weak, negative and significant correlation between SPAS-Body Image Dissatisfaction BID and NPI-exploitativeness [r (308) = -0.232; p<0.01]. It was noted that as the level of Body Image Dissatisfaction increased their exploitativeness levels decreased but as the level of Body Image Dissatisfaction decreased their exploitativeness levels increased; which was regarded as a normal outcome for the narcissist individuals.

It was seen that a very weak, positive and significant correlation existed between SPAS-Body Image Dissatisfaction and NPI-entitlement [r (308) = 0.167; p<0.01]. In other words, depending on the increase or decrease in students’ body image dissatisfaction, their entitlement levels increased or decreased in parallel.

It was explored that a very weak, negative and significant correlation was found between SPAS- Expectation of Negative Evaluation ENE and NPI-exploitativeness [r (308) = -0.232; p<0.01]. In this regard, it may be interpreted that exploitativeness level of the students with high of Negative Evaluation was high; on the contrary; exploitativeness level of the students with low Expectation of Negative Evaluation was low.

It was found out that a very weak, positive and significant correlation existed between SPAS- Expectation of Negative Evaluation ENE and NPI-entitlement [r (308) = 0.145; p<0.05]. To put it differently, as the students’ Expectation of Negative Evaluation increased so did their
Table 1. Distribution of the students of the SPES in terms of their socio-demographic characteristics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>124</td>
<td>40.3</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>184</td>
<td>59.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>18-20</td>
<td>94</td>
<td>30.5</td>
</tr>
<tr>
<td></td>
<td>21-23</td>
<td>172</td>
<td>55.8</td>
</tr>
<tr>
<td>Age</td>
<td>24-26</td>
<td>36</td>
<td>11.7</td>
</tr>
<tr>
<td></td>
<td>27 ≥</td>
<td>6</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>Teaching</td>
<td>73</td>
<td>23.7</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>105</td>
<td>34.1</td>
</tr>
<tr>
<td>Academic department</td>
<td>Training</td>
<td>68</td>
<td>22.1</td>
</tr>
<tr>
<td></td>
<td>Recreation</td>
<td>62</td>
<td>20.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>One child</td>
<td>8</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>1 brother/sister</td>
<td>39</td>
<td>12.7</td>
</tr>
<tr>
<td>Number of brothers and sisters</td>
<td>2 brothers and/ or sisters</td>
<td>61</td>
<td>19.8</td>
</tr>
<tr>
<td></td>
<td>3 brothers and/ or sisters</td>
<td>86</td>
<td>27.9</td>
</tr>
<tr>
<td></td>
<td>4 and more brothers and/ or sisters</td>
<td>114</td>
<td>37.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>242</td>
<td>78.6</td>
</tr>
<tr>
<td></td>
<td>Part time</td>
<td>8</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Public sector</td>
<td>3</td>
<td>1.0</td>
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<tr>
<td>Employment status</td>
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<td>42</td>
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</tr>
<tr>
<td></td>
<td>Other</td>
<td>13</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>With family</td>
<td>61</td>
<td>19.8</td>
</tr>
<tr>
<td></td>
<td>Student home</td>
<td>165</td>
<td>53.6</td>
</tr>
<tr>
<td></td>
<td>With relatives</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Place of residence</td>
<td>At the dormitory</td>
<td>65</td>
<td>21.1</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>15</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>Together</td>
<td>267</td>
<td>86.7</td>
</tr>
<tr>
<td></td>
<td>Mother died</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Father died</td>
<td>16</td>
<td>5.2</td>
</tr>
<tr>
<td>Parental status</td>
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<tr>
<td></td>
<td>Divorced</td>
<td>9</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>199</td>
<td>64.6</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>109</td>
<td>35.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>Jogging-running</td>
<td>43</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td>28</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>Swimming</td>
<td>10</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Tennis</td>
<td>22</td>
<td>7.1</td>
</tr>
<tr>
<td>Sportive branch</td>
<td>Volleyball</td>
<td>24</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>Football</td>
<td>50</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>Gymnastics</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>19</td>
<td>6.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>199</td>
<td>64.6</td>
</tr>
</tbody>
</table>
It was found out that Expectation of Negative Evaluation were high. Evaluation were low whereas levels of the students with high were significant.

Thus it might be argued that superiority decreased so did entitlement levels. On the contrary, as the students' Expectation of Negative Evaluation decreased so did their entitlement levels.

It was discovered that a very weak, negative and significant correlation was found between SPAS- Expectation of Negative Evaluation and NPI-superiority (r (308) = 0.145; p<0.05). Thus, it might be argued that superiority levels of the students with high Expectation of Negative Evaluation were low whereas superiority levels of the students with low Expectation of Negative Evaluation were high.

**DISCUSSION AND CONCLUSION**

It was found out that the participant students’ total score of Social Physique Anxiety Scale was 29.67±8.05, mean score of Body Image Dissatisfaction was 10.12±3.63 and mean score of Expectation of Negative Evaluation was 19.56±6.81. When the literature was examined, the study of Çepikkurt and Coşkun (2010) on dancer-students demonstrated that the participant students’ total score of Social Physique Anxiety Scale was 24.44±7.65, mean score of Body Image Dissatisfaction was 9.62±2.72 and mean score of Expectation of Negative Evaluation was 14.82±6.19 (Çepikkurt and Coşkun, 2010). The difference between our study and the study of Çepikkurt and Coşkun may be interpreted that dancer-students worried less about their physical image as compared to the SPES students, had higher level of physical self-confidence and were more satisfied with their physical image.

Again, another study done by Yaşartürk et al. on SPES

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### Table 2. Descriptive statistics relating subscales of Social Physique Anxiety Scale and Narcissistic Personality Inventory

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAS TOTAL</td>
<td>308</td>
<td>29.67</td>
<td>8.05583</td>
<td>12.00</td>
<td>58.00</td>
</tr>
<tr>
<td>BID</td>
<td>308</td>
<td>10.11</td>
<td>3.63380</td>
<td>5.00</td>
<td>23.00</td>
</tr>
<tr>
<td>ENE</td>
<td>308</td>
<td>19.56</td>
<td>6.81296</td>
<td>7.00</td>
<td>35.00</td>
</tr>
<tr>
<td>Authority</td>
<td>308</td>
<td>1.04</td>
<td>.74712</td>
<td>.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Exhibitionism</td>
<td>308</td>
<td>1.07</td>
<td>.88285</td>
<td>.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Exploitativeness</td>
<td>308</td>
<td>1.44</td>
<td>.88038</td>
<td>.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Entitlement</td>
<td>308</td>
<td>.73</td>
<td>.76607</td>
<td>.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Self-sufficiency</td>
<td>308</td>
<td>1.59</td>
<td>1.01498</td>
<td>.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Superiority</td>
<td>308</td>
<td>.94</td>
<td>.84279</td>
<td>.00</td>
<td>3.00</td>
</tr>
<tr>
<td>NARCISSISM TOTAL</td>
<td>308</td>
<td>6.83</td>
<td>2.61825</td>
<td>.00</td>
<td>14.00</td>
</tr>
</tbody>
</table>

SPAS: Social Physique Anxiety; BID: Body Image Dissatisfaction; ENE: Expectation of Negative Evaluation.

### Table 3. Correlation between social physique anxiety level and narcissism levels of the participants.

<table>
<thead>
<tr>
<th></th>
<th>SPAS Total</th>
<th>BID</th>
<th>ENE</th>
<th>Authority</th>
<th>Exhibitionism</th>
<th>Exploitativeness</th>
<th>Entitlement</th>
<th>Self- sufficiency</th>
<th>Superiority</th>
<th>Narcissism Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAS Total</td>
<td>1.000</td>
<td>.490</td>
<td>.906</td>
<td>-.063</td>
<td>-.239</td>
<td>.214</td>
<td>.048</td>
<td>-.133</td>
<td>-.061</td>
<td></td>
</tr>
<tr>
<td>BID</td>
<td>1.000</td>
<td>.114</td>
<td>-.021</td>
<td>.008</td>
<td>-.119</td>
<td>.167</td>
<td>.014</td>
<td>-.077</td>
<td>-.007</td>
<td></td>
</tr>
<tr>
<td>ENE</td>
<td>1.000</td>
<td>-.082</td>
<td>.043</td>
<td>-.232</td>
<td>-.145</td>
<td>.041</td>
<td>-.129</td>
<td>-.097</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authority</td>
<td>1.000</td>
<td>.254</td>
<td>.213</td>
<td>.079</td>
<td>.079</td>
<td>.176</td>
<td>.530</td>
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</tr>
<tr>
<td>Exhibitionism</td>
<td>1.000</td>
<td>.157</td>
<td>.060</td>
<td>.101</td>
<td>.272</td>
<td>.595</td>
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<td></td>
</tr>
<tr>
<td>Exploitativeness</td>
<td>1.000</td>
<td>-.079</td>
<td>-.013</td>
<td>.106</td>
<td>.430</td>
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<tr>
<td>Entitlement</td>
<td>1.000</td>
<td>.195</td>
<td>-.053</td>
<td>.372</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Self-sufficiency</td>
<td>1.000</td>
<td>.118</td>
<td>.524</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superiority</td>
<td>1.000</td>
<td>.523</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NARCISSISM TOTAL</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed), **Correlation is significant at the 0.01 level (2-tailed), SPAS: Social Physique Anxiety, BID: Body Image Dissatisfaction, ENE: Expectation of Negative Evaluation*
students indicated that the participant students’ total score of Social Physique Anxiety Scale was 27.00±7.96. The difference between the SPES students of two different universities may have resulted from the fact that these universities were located in different geographical regions and contained different natural and cultural structures (Yaşartürk et al., 2014).

In another study on Social Physique Anxiety of those who attended fitness centers, the participants’ mean score of Body Image Dissatisfaction was 14.61±3.60; which might mean that the participants were generally dissatisfied with their physical image. The participants' mean score obtained from the second sub-scale was 13.82±5.32, which means that the participants’ expectation to be evaluated by others in terms of their physical image was not true. In general, it was told that the participants’ Social Physique Anxiety was not high (28.44±6.65) (Eren, 2012). It was seen that the findings of the study concurred with ours.

When narcissistic levels of the participants were evaluated in terms of subscales, their scores were 1.05±0.75 for authority, 1.07±0.88 for exhibitionism, 1.44±0.88 for exploitativeness, 0.73±0.77 for entitlement, 1.59±1.01 for self-sufficiency, 0.94±0.84 for superiority; respectively. The SPES students’ Narcissistic Personality Inventory total score was 6.83±2.62.

In a study undertaken by Tazegül on individual athletes, narcissistic levels of the athletes in terms of sportive branches were 7.21±2.58 for Boxing, 6.750±2.777 for greco-roman wrestling, 7.283±2.786 for weight lifting, 6.333±357 for freestyle wrestling, 6.533±2.849 for kickboxing; respectively (Tazegül, 2013a). The fact that our study findings were higher than these individual sports – except weight lifting- was –we thought- because our study group was composed of SPES students of different sportive branches. In another study done by Tazegül on narcissism levels of female badminton players who actively played sports, it was reported that their Narcissistic Personality Inventory total score was 8.543±1.945 (Tazegül, 2013b).

The study of Elman and Mc Kelvie reported that footballers’ narcissism level was 19.4, basketballers’ narcissism level was 17.8 and non-athlete individuals’ narcissism level was 15.2 (Elman and Mc Kelvie, 2003). We were of the opinion that the most important reason that athletes had higher level of narcissistic scores might be that they had aesthetic and nice physics.

When the students’ Spearman Correlation test results were analyzed to determine the correlation between Social Physique Anxiety levels and narcissism levels; although there were no significant correlations between Social Physique Anxiety levels and narcissism levels of the students in terms of total scores, there were significant correlations in terms of subscales.

It was seen that there was a weak, negative and significant correlation between SPAS-Body Image Dissatisfaction and NPI-exploitativeness \( r (308) = -0.232; p < 0.01 \). It was identified that as the level of Body Image Dissatisfaction of the students increased, their exploitativeness levels decreased but as the level of Body Image Dissatisfaction decreased their exploitativeness levels increased; which is regarded as a normal situation for the narcissist individuals. Exploitativeness is considered one of the bad and unhealthy dimensions of narcissism (Atay, 2010). We thought that it was a normal behavior that narcissist individuals were less disturbed with their physical appearance but the increase in exploitativeness subscale was also an expected result.

It was found out that there was a very weak, positive and significant correlation between SPAS-Body Image Dissatisfaction and NPI-entitlement \( r (308) = 0.167; p < 0.001 \). In other words, being in parallel with the increase or decrease in students’ body image dissatisfaction, their entitlement levels increased or decreased in parallel. Narcissist people adopt entitlement as a way to keep deprivation under control and believe that they deserve a special treatment and exaggerate their measures in order to keep inadequacy and insecurity feelings under control.

It was explored that a negative, weak, and significant correlation was found between SPAS-Expectation of Negative Evaluation and NPI-exploitativeness \( r (308) = -0.232; p < 0.01 \). Accordingly, it may be concluded that exploitativeness level of the students with high expectation of negative evaluation was high; on the contrary; exploitativeness level of the students with low expectation of negative evaluation was low. The reason may be that although narcissist individuals seem to be self-confident, charismatic and persuasive, they in fact protect themselves against insecure situations and secure their positions through – so to say- devaluing, manipulating and exploiting others: in other words, it is another way to escaping from realities (Soyer et al., 1999).

It was detected that a very weak, positive and significant correlation existed between SPAS-Expectation of Negative Evaluation and NPI-entitlement \( r (308) = 0.145; p < 0.05 \). In other words, as the students’ expectation of negative evaluation (anxiety) increased so did their entitlement levels; on the contrary; as the students’ expectation of negative evaluation (anxiety) decreased so did their entitlement levels. It may be suggested that students emphasized entitlement as a response to expectation of negative evaluation. Entitlement is a quality that prevents forgiving and with the argument of the scientists (Twenge and Campbell 2003; Hochwarter et al., 2007) who propose that entitlement is primarily associated with unsteady self-esteem, giving aggressive responses against threats and externalization of emotional reactions; it may be concluded that students perceive negative evaluation as a threat/aggression and thus develop a reactionary response.

It was discovered that a very weak, negative and significant correlation existed between students’ SPAS-Expectation of Negative Evaluation and NPI-superiority \( r (308) = 0.145; p < 0.05 \). Accordingly, it might be suggested...
that superiority levels of the students with high expectation of negative evaluation were low whereas superiority levels of the students with low expectation of negative evaluation were high. Superiority is one of the most dangerous dimensions of narcissism (Reidy et al., 2008). For Atay, people continue their superiority feelings so that they can overcome inferiority feeling especially when their glorious ego is threatened (Atay, 2010).

Gençtan argues that in narcissism, individuals’ self-perception weakens and is affected by the feedbacks from their inner status and environments (Gençtan, 1993). We were of the opinion that in our study findings; the fact that there was a correlation between SPAS-Body Image Dissatisfaction and SPAS- Expectation of Negative Evaluation supported the above-mentioned argument. In this sense, it may be thought that the meaning placed by the individuals on their physical image and their beliefs about what others think of their physical image play a key role in their narcissistic structure.

Findings indicating a correlation between SPAS subscales and narcissism are in line with the view arguing that narcissism is a protective shell developed by individuals to protect themselves (Kiraz, 2011).

The limitations of the study were that the findings obtained were relational rather than causal and self-rated and self-perception tools were used.

People generally wish to be evaluated well and positively by others. That is, they wish to have a satisfying and pleasant body image. Social physique anxiety of those without satisfying and pleasant body images increases; which in turn affects their life styles (Leary et al., 1999). Recently, the number of the studies on social physique anxiety has increased but those studies investigating the correlation between social physique anxiety and narcissism are rare. Therefore, it is recommended that conducting more studies with larger and different sample groups will be beneficial (Koparan et al., 2010).

Conflict of Interests

The author has not declared any conflict of interests.

REFERENCES


Educational Research and Reviews

Related Journals Published by Academic Journals

- African Journal of History and Culture
- Journal of Media and Communication Studies
- Journal of African Studies and Development
- Journal of Fine and Studio Art
- Journal of Languages and Culture
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