COMPILACIÓN SOBRE ACTITUD EN GENERAL Y SOBRE ACTITUD CIENTÍFICA EN PARTICULAR

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ACTITUD EN GENERAL Y ACTITUD CIENTÍFICA

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Attitude (psychology)

This article is about the psychological construct. For other uses of attitude, see Attitude. In psychology, attitude is a psychological construct, a mental and emotional entity that inheres in, or characterizes a person. They are complex and an acquired state through experiences. It is an individual's predisposed state of mind regarding a value and it is precipitated through a responsive expression toward a person, place, thing, or event (the attitude object) which in turn influences the individual's thought and action. Prominent psychologist Gordon Allport described this latent psychological construct as "the most distinctive and indispensable concept in contemporary social psychology." Attitude can be formed from a person's past and present. Key topics in the study of attitudes include attitude strength, attitude change, consumer behavior, and attitude-behavior relationships.

Definitions

Social psychology

An attitude is an evaluation of an attitude object, ranging from extremely negative to extremely positive. Most contemporary perspectives on attitudes also permit that people can also be conflicted or ambivalent toward an object by simultaneously holding both positive and negative attitudes toward the same object. This has led to some discussion of whether individual can hold multiple attitudes toward the same object.

An attitude can be as a positive or negative evaluation of people, objects, events, activities, and ideas. It could be concrete, abstract or just about anything in your environment, but there is a debate about precise definitions. Eagly and Chaiken, for example, define an attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor." Though it is sometimes common to define an attitude as affect toward an object, affect (i.e., discrete emotions or overall arousal) is generally understood as an evaluative structure used to form attitude object. Attitude may influence the attention to attitude objects, the use of categories for encoding information and the interpretation, judgement and recall of attitude-relevant information. These influences tend to be more powerful for strong attitudes which are accessible and based on elaborate supportive knowledge structure. The durability and impactfulness of influence depend upon the strength formed from consistency of heuristics. Attitudes can guide encoding information, attention and behaviors, even if the individual is pursuing unrelated goals.

Jung's definition

Attitude is one of Jung's 57 definitions in Chapter XI of Psychological Types. Jung's definition of attitude is a "readiness of the psyche to act or react in a certain way." Attitudes very often
come in pairs, one conscious and the other unconscious. Within this broad definition Jung defines several attitudes.

The main (but not only) attitude dualities that Jung defines are the following.

- **Consciousness** and the unconscious. The "presence of two attitudes is extremely frequent, one conscious and the other unconscious. This means that consciousness has a constellation of contents different from that of the unconscious, a duality particularly evident in neurosis".[12]
- Extraversion and introversion. This pair is so elementary to Jung's theory of types that he labeled them the "attitude-types".
- Rational and irrational attitudes. "I conceive reason as an attitude".[13]
- The rational attitude subdivides into the thinking and feeling psychological functions, each with its attitude.
- The irrational attitude subdivides into the sensing and intuition psychological functions, each with its attitude. "There is thus a typical thinking, feeling, sensation, and intuitive attitude".[14]
- Individual and social attitudes. Many of the latter are "isms".

In addition, Jung discusses the abstract attitude. “When I take an abstract attitude...”[15] Abstraction is contrasted with creationism “CREATIONISM. By this I mean a peculiarity of thinking and feeling which is the antithesis of abstraction”.[16]

### Factors

#### Psychological

The attitude of a person is determined by psychological factors like ideas, values, beliefs, perception, etc. All these have a complex role in determining a person's attitude. Values are ideals, guiding principles in one's life, or overarching goals that people strive to obtain (Maio & Olson, 1998). Beliefs are cognitions about the world—subjective probabilities that an object has a particular attribute or that an action will lead to a particular outcome (Fishbein & Ajzen, 1975). Beliefs can be patently and unequivocally false. For example, surveys show that a third of U.S. adults think that vaccines cause autism, despite the preponderance of scientific research to the contrary (Dixon et al., 2015).[17][18] It was found that beliefs like these are tenaciously held and highly resistant to change. Another important factor that affects attitude is symbolic interactionism, these are rife with powerful symbols and charged with affect which can lead to a selective perception. Persuasion theories says that in politics, successful persuaders convince its message recipients into a selective perception or attitude polarization for turning against the opposite candidate through a repetitive process that they are in a noncommittal state and it is unacceptable and doesn't have any moral basis for it and for this they only require to chain the persuading message into a realm of plausibility (Gopnik, 2015 & O'Keefe, 2016).
Family

Family plays a significant role in the primary stage of attitudes held by individuals. Initially, a person develops certain attitudes from his parents, brothers, sister, and elders in the family. There is a high degree of relationship between parent and children in attitudes found in them.

Society

Societies play an important role in formatting the attitudes of an individual. The culture, the tradition, the language, etc., influence a person’s attitudes. Society, tradition, and the culture teach individuals what is and what is not acceptable.

Economic

A person’s attitude also depends on issues such as his salary, status, work as such, etc.

Structure

This section needs expansion. You can help by adding to it. (September 2012)

The classic, tripartite view offered by Rosenberg and Hovland is that an attitude contains cognitive, affective, and behavioral components. Empirical research, however, fails to support clear distinctions between thoughts, emotions, and behavioral intentions associated with a particular attitude. A criticism of the tripartite view of attitudes is that it requires cognitive, affective, and behavioral associations of an attitude to be consistent, but this may be implausible. Thus some views of attitude structure see the cognitive and behavioral components as derivative of affect or affect and behavior as derivative of underlying beliefs.

Despite debate about the particular structure of attitudes, there is considerable evidence that attitudes reflect more than evaluations of a particular object that vary from positive to negative. Among numerous attitudes, one example is people’s money attitudes which may help people understand their affective love of money motive, stewardship behavior, and money cognition. These ABC components of attitudes formulate, define, and contribute to an overall construct of monetary intelligence which, in turn, may be related to many theoretical work-related constructs.

There is also a considerable interest in intra-attitudinal and inter-attitudinal structure, which is how an attitude is made (expectancy and value) and how different attitudes relate to one another. Which connects different attitudes to one another and to more underlying psychological structures, such as values or ideology.

Attitude component models

Multicomponent model is the most influential model of attitude. Where attitudes are evaluations of an object that have cognitive, affective, and behavioural components. These components are also known as taxi CAB, that will get you where you want to go.
- **Cognitive component** The cognitive component of attitudes refer to the beliefs, thoughts, and attributes that we would associate with an object. Many times a person's attitude might be based on the negative and positive attributes they associate with an object.

- **Affective component** The affective component of attitudes refer to your feelings or emotions linked to an attitude object. Affective responses influence attitudes in a number of ways. For example, many people are afraid/scared of spiders. So this negative affective response is likely to cause you to have a negative attitude towards spiders.

- **Behavioural component** The behavioural component of attitudes refer to past behaviours or experiences regarding an attitude object. The idea that people might infer their attitudes from their previous actions. This idea was best articulated by Bem.\(^{[28]}\)

**MODE model**

This is the theory of attitude evaluation (motivation and opportunity as determinants of the attitude - behavior relation). When both are present, behavior will be deliberate. When one is absent, impact on behavior will be spontaneous. The MODE model was developed by Fazio. A person's attitude can be measured in two different ways:

- Explicit measure
- Implicit measure

Explicit measure are attitudes at the conscious level, that are deliberately formed and easy to self-report. Implicit measures are attitudes that are at an unconscious level, that are involuntarily formed and are typically unknown to us.\(^{[29]}\) Both explicit and implicit attitudes can shape an individual's behavior. Implicit attitudes, however, are most likely to affect behavior when the demands are steep and an individual feels stressed or distracted.\(^{[30]}\)

**Function**

Another classic view of attitudes is that attitudes serve particular functions for individuals. That is, researchers have tried to understand why individuals hold particular attitudes or why they hold attitudes in general by considering how attitudes affect the individuals who hold them.\(^{[31]}\) Daniel Katz, for example, writes that attitudes can serve "instrumental, adjustive or utilitarian," "ego-defensive," "value-expressive," or "knowledge" functions.\(^{[32]}\) This functional attitude theory suggests that in order for attitudes to change (e.g., via persuasion), appeals must be made to the function(s) that a particular attitude serves for the individual. As an example, the "ego-defensive" function might be used to influence the racially prejudicial attitudes of an individual who sees themselves as open-minded and tolerant. By appealing to that individual's image of themselves as tolerant and open-minded, it may be possible to change their prejudicial attitudes to be more consistent with their self-concept. Similarly, a persuasive message that threatens self-image is much more likely to be rejected.\(^{[33]}\)

Daniel Katz classified attitudes into four different groups based on their functions.
1. **Utilitarian**: provides us with general approach or avoidance tendencies
2. **Knowledge**: help people organize and interpret new information
3. **Ego-defensive**: attitudes can help people protect their self-esteem
4. **Value-expressive**: used to express central values or beliefs

**Utilitarian** People adopt attitudes that are rewarding and that help them avoid punishment. In other words, any attitude that is adopted in a person’s own self-interest is considered to serve a utilitarian function. Consider you have a condo, people with condos pay property taxes, and as a result you don't want to pay more taxes. If those factors lead to your attitude that "increases in property taxes are bad" your attitude is serving a utilitarian function.

**Knowledge** People need to maintain an organized, meaningful, and stable view of the world. That being said important values and general principles can provide a framework for our knowledge. Attitudes achieve this goal by making things fit together and make sense.

Example:

- I believe that I am a good person.
- I believe that good things happen to good people.
- Something bad happens to Bob.
- So I believe Bob must not be a good person.

**Ego-Defensive** This function involves psychoanalytic principles where people use defense mechanisms to protect themselves from psychological harm. Mechanisms include:

The ego-defensive notion correlates nicely with Downward Comparison Theory which holds the view that derogating a less fortunate other increases our own subjective well-being. We are more likely to use the ego-defensive function when we suffer a frustration or misfortune.

**Value-Expressive**

- Serves to express one's central values and self-concept.
- Central values tend to establish our identity and gain us social approval thereby showing us who we are, and what we stand for.

An example would concern attitudes toward a controversial political issue.

**Formation**

According to Doob (1947), learning can account for most of the attitudes we hold. The study of attitude formation is the study of how people form evaluations of persons, places or things. Theories of classical conditioning, instrumental conditioning and social learning are mainly responsible for formation of attitude. Unlike personality, attitudes are expected to change as a function of experience. In addition, exposure to the 'attitude' objects may have an effect on how a person forms his or her attitude. This concept was seen as the "Mere-Exposure Effect". Robert Zajonc showed that people were more likely to have a positive attitude on 'attitude objects' when they were exposed to it frequently than if they were not. Mere repeated
exposure of the individual to a stimulus is a sufficient condition for the enhancement of his attitude toward it.[34] Tesser (1993) has argued that hereditary variables may affect attitudes - but believes that they may do so indirectly. For example, consistency theories, which imply that we must be consistent in our beliefs and values. As with any type of heritability, to determine if a particular trait has a basis in our genes, twin studies are used.[35] The most famous example of such a theory is Dissonance-reduction theory, associated with Leon Festinger, which explains that when the components of an attitude (including belief and behavior) are at odds an individual may adjust one to match the other (for example, adjusting a belief to match a behavior).[36] Other theories include balance theory, originally proposed by Heider (1958), and the self-perception theory, originally proposed by Daryl Bem.[37]

Change

Main article: Attitude change

Attitudes can be changed through persuasion and an important domain of research on attitude change focuses on responses to communication. Experimental research into the factors that can affect the persuasiveness of a message include:

- **Target characteristics:** These are characteristics that refer to the person who receives and processes a message. One such trait is intelligence - it seems that more intelligent people are less easily persuaded by one-sided messages. Another variable that has been studied in this category is self-esteem. Although it is sometimes thought that those higher in self-esteem are less easily persuaded, there is some evidence that the relationship between self-esteem and persuasibility is actually curvilinear, with people of moderate self-esteem being more easily persuaded than both those of high and low self-esteem levels (Rhodes & Woods, 1992). The mind frame and mood of the target also plays a role in this process.

- **Source characteristics:** The major source characteristics are expertise, trustworthiness and interpersonal attraction or attractiveness. The credibility of a perceived message has been found to be a key variable here; if one reads a report about health and believes it came from a professional medical journal, one may be more easily persuaded than if one believes it is from a popular newspaper. Some psychologists have debated whether this is a long-lasting effect and Hovland and Weiss (1951) found the effect of telling people that a message came from a credible source disappeared after several weeks (the so-called "sleeper effect"). Whether there is a sleeper effect is controversial. Perceived wisdom is that if people are informed of the source of a message before hearing it, there is less likelihood of a sleeper effect than if they are told a message and then told its source.

1. **Message Characteristics:** The nature of the message plays a role in persuasion. Sometimes presenting both sides of a story is useful to help change attitudes. When people are not motivated to process the message, simply the number of arguments presented in a persuasive message will influence attitude change, such that a greater number of arguments will produce greater attitude change.[38]
• Cognitive routes: A message can appeal to an individual’s cognitive evaluation to help change an attitude. In the central route to persuasion the individual is presented with the data and motivated to evaluate the data and arrive at an attitude changing conclusion. In the peripheral route to attitude change, the individual is encouraged to not look at the content but at the source. This is commonly seen in modern advertisements that feature celebrities. In some cases, physician, doctors or experts are used. In other cases film stars are used for their attractiveness.

Emotion and attitude change

Emotion is a common component in persuasion, social influence, and attitude change. Much of attitude research emphasized the importance of affective or emotion components. Emotion works hand-in-hand with the cognitive process, or the way we think, about an issue or situation. Emotional appeals are commonly found in advertising, health campaigns and political messages. Recent examples include no-smoking health campaigns and political campaign advertising emphasizing the fear of terrorism. Attitudes and attitude objects are functions of cognitive, affective and conative components. Attitudes are part of the brain’s associative networks, the spider-like structures residing in long term memory that consist of affective and cognitive nodes.

By activating an affective or emotion node, attitude change may be possible, though affective and cognitive components tend to be intertwined. In primarily affective networks, it is more difficult to produce cognitive counterarguments in the resistance to persuasion and attitude change.

Affective forecasting, otherwise known as intuition or the prediction of emotion, also impacts attitude change. Research suggests that predicting emotions is an important component of decision making, in addition to the cognitive processes. How we feel about an outcome may override purely cognitive rationales.

In terms of research methodology, the challenge for researchers is measuring emotion and subsequent impacts on attitude. Since we cannot see into the brain, various models and measurement tools have been constructed to obtain emotion and attitude information. Measures may include the use of physiological cues like facial expressions, vocal changes, and other body rate measures. For instance, fear is associated with raised eyebrows, increased heart rate and increase body tension (Dillard, 1994). Other methods include concept or network mapping, and using primes or word cues in the era.

Components of emotion appeals

Any discrete emotion can be used in a persuasive appeal; this may include jealousy, disgust, indignation, fear, blue, disturbed, haunted, and anger. Fear is one of the most studied emotional appeals in communication and social influence research.

Important consequences of fear appeals and other emotion appeals include the possibility of reactance which may lead to either message rejections or source rejection and the absence of
attitude change. As the EPPM suggests, there is an optimal emotion level in motivating attitude change. If there is not enough motivation, an attitude will not change; if the emotional appeal is overdone, the motivation can be paralyzed thereby preventing attitude change.

Emotions perceived as negative or containing threat are often studied more than perceived positive emotions like humor. Though the inner-workings of humor are not agreed upon, humor appeals may work by creating incongruities in the mind. Recent research has looked at the impact of humor on the processing of political messages. While evidence is inconclusive, there appears to be potential for targeted attitude change is receivers with low political message involvement.

Important factors that influence the impact of emotion appeals include self efficacy, attitude accessibility, issue involvement, and message/source features. Self efficacy is a perception of one's own human agency; in other words, it is the perception of our own ability to deal with a situation. It is an important variable in emotion appeal messages because it dictates a person's ability to deal with both the emotion and the situation. For example, if a person is not self-efficacious about their ability to impact the global environment, they are not likely to change their attitude or behavior about global warming.

Dillard (1994) suggests that message features such as source non-verbal communication, message content, and receiver differences can impact the emotion impact of fear appeals. The characteristics of a message are important because one message can elicit different levels of emotion for different people. Thus, in terms of emotion appeals messages, one size does not fit all.

Attitude accessibility refers to the activation of an attitude from memory in other words, how readily available is an attitude about an object, issue, or situation. Issue involvement is the relevance and salience of an issue or situation to an individual. Issue involvement has been correlated with both attitude access and attitude strength. Past studies conclude accessible attitudes are more resistant to change.

**Attitude-behavior relationship**

The effects of attitudes on behaviors is a growing research enterprise within psychology. Icek Ajzen has led research and helped develop two prominent theoretical approaches within this field: the **theory of reasoned action**[39] and, its theoretical descendant, the **theory of planned behavior**[40]. Both theories help explain the link between attitude and behavior as a controlled and deliberative process.

**Theory of reasoned action**

The theory of reasoned action (TRA) is a model for the prediction of behavioral intention, spanning predictions of attitude and predictions of behavior. The subsequent separation of behavioral intention from behavior allows for explanation of limiting factors on attitudinal influence (Ajzen, 1980). The theory of reasoned action was developed by Martin Fishbein and
Icek Ajzen (1975, 1980), derived from previous research that started out as the theory of attitude, which led to the study of attitude and behavior. The theory was "born largely out of frustration with traditional attitude–behavior research, much of which found weak correlations between attitude measures and performance of volitional behaviors" (Hale, Householder & Greene, 2003, p. 259).

Theory of planned behavior

The theory of planned behavior was proposed by Icek Ajzen in 1985 through his article "From intentions to actions: A theory of planned behavior." The theory was developed from the theory of reasoned action, which was proposed by Martin Fishbein together with Icek Ajzen in 1975. The theory of reasoned action was in turn grounded in various theories of attitude such as learning theories, expectancy-value theories, consistency theories, and attribution theory. According to the theory of reasoned action, if people evaluate the suggested behavior as positive (attitude), and if they think their significant others want them to perform the behavior (subjective norm), this results in a higher intention (motivation) and they are more likely to do so. A high correlation of attitudes and subjective norms to behavioral intention, and subsequently to behavior, has been confirmed in many studies. The theory of planned behavior contains the same component as the theory of reasoned action, but adds the component of perceived behavioral control to account for barriers outside one's own control.[41]

Motivation and Opportunity as Determinants (MODE)

Russell H. Fazio proposed an alternative theory called "Motivation and Opportunity as Determinants" or MODE. Fazio believes that because there is deliberative process happening, individuals must be motivated to reflect on their attitudes and subsequent behaviors.[42] Simply put, when an attitude is automatically activated, the individual must be motivated to avoid making an invalid judgement as well as have the opportunity to reflect on their attitude and behavior.

A counter-argument against the high relationship between behavioral intention and actual behavior has also been proposed, as the results of some studies show that, because of circumstantial limitations, behavioral intention does not always lead to actual behavior. Namely, since behavioral intention cannot be the exclusive determinant of behavior where an individual's control over the behavior is incomplete, Ajzen introduced the theory of planned behavior by adding a new component, "perceived behavioral control." By this, he extended the theory of reasoned action to cover non-volitional behaviors for predicting behavioral intention and actual behavior.

Measurement

In 1928 Louis Leon Thurstone published an article titled "Attitudes Can Be Measured" in it he proposed an elaborate procedure to assess people’s views on social issues. Attitudes can be difficult to measure because measurement is arbitrary, because attitudes are ultimately a hypothetical construct that cannot be observed directly.
But many measurements and evidence proofed scales are used to examine attitudes. A Likert scale taps agreement or disagreement with a series of belief statements. The Guttman scale focuses on items that vary in their degree of psychological difficulty. The semantic differential uses bipolar adjectives to measure the meaning associated with attitude objects. Supplementing these are several indirect techniques such as unobtrusive, standard physiological, and neuroscientific measures. Following the explicit-implicit dichotomy, attitudes can be examined through direct and indirect measures.

Whether attitudes are explicit (i.e., deliberately formed) versus implicit (i.e., subconscious) has been a topic of considerable research. Research on implicit attitudes, which are generally unacknowledged or outside of awareness, uses sophisticated methods involving people's response times to stimuli to show that implicit attitudes exist (perhaps in tandem with explicit attitudes of the same object). Implicit and explicit attitudes seem to affect people's behavior, though in different ways. They tend not to be strongly associated with each other, although in some cases they are. The relationship between them is poorly understood.

Explicit

Explicit measures tend to rely on self-reports or easily observed behaviors. These tend to involve bipolar scales (e.g., good-bad, favorable-unfavorable, support-oppose, etc.) Explicit measures can also be used by measuring the straightforward attribution of characteristics to nominate groups. Explicit attitudes that develop in response to recent information, automatic evaluation were thought to reflect mental associations through early socialisation experiences. Once formed, these associations are highly robust and resistant to change, as well as stable across both context and time. Hence the impact of contextual influences was assumed to be obfuscate assessment of a person's "true" and enduring evaluative disposition as well as limit the capacity to predict subsequent behavior. Likert scales and other self-reports are also commonly used.

Implicit

Implicit measures are not consciously directed and are assumed to be automatic, which may make implicit measures more valid and reliable than explicit measures (such as self-reports). For example, people can be motivated such that they find it socially desirable to appear to have certain attitudes. An example of this is that people can hold implicit prejudicial attitudes, but express explicit attitudes that report little prejudice. Implicit measures help account for these situations and look at attitudes that a person may not be aware of or want to show. Implicit measures therefore usually rely on an indirect measure of attitude. For example, the Implicit Association Test (IAT) examines the strength between the target concept and an attribute element by considering the latency in which a person can examine two response keys when each has two meanings. With little time to carefully examine what the participant is doing they respond according to internal keys. This priming can show attitudes the person has about a particular object. People are often unwilling to provide responses perceived as socially undesirable and therefore tend to report what they think their attitudes should be rather than what they know them to be. More complicated still, people may not even be consciously aware
that they hold biased attitudes. Over the past few decades, scientists have developed new measures to identify these unconscious biases.[48]

See also

References

Jump up ^ The Power of a Picture


22. **Jump up ^** http://www3.psych.purdue.edu/~willia55/392F-'06/Wood-Influence


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Further reading

Find more about Attitude at Wikipedia's sister projects

Definición de actitud

La Real Academia Española menciona tres definiciones de la palabra actitud, un término que proviene del latín actitudo. De acuerdo a la RAE, la actitud es el estado del ánimo que se expresa de una cierta manera (como una actitud conciliadora). Las otras dos definiciones hacen referencia a la postura: del cuerpo de una persona (cuando transmite algo de manera eficaz o cuando la postura se halla asociada a la disposición anímica) o de un animal (cuando logra concertar atención por alguna cuestión).

Tres ejemplos con este término: “No me gusta la actitud que está teniendo Manuel con los empleados”, “Si sigues con esa actitud, quedarás afuera del equipo”, “La actitud del leopardo demostraba que el animal no estaba dispuesto a dejarse atrapar con facilidad”.

La actitud también ha sido definida como un estado de la disposición nerviosa y mental, que se organiza a partir de las vivencias y que orienta o dirige la respuesta de un sujeto ante determinados acontecimientos.

Por lo tanto, la actitud es más bien una motivación social antes que una motivación biológica. A partir de la experiencia, las personas adquieren una cierta predisposición que les permite responder ante los estímulos.

Una actitud es la forma en la que un individuo se adapta de forma activa a su entorno y es la consecuencia de un proceso cognitivo, afectivo y conductual.

Por eso, la psicología social se encarga de estudiar las actitudes de los seres humanos para predecir posibles conductas. Cuando se observan las actitudes de un individuo, es factible prever su modo de accionar.

Las actitudes cumplen con diversas funciones en la vida social. Puede darse el caso de alguien que adopta una actitud defensiva y, de esta manera, se predisponga de una forma particular ante las interacciones. La actitud también puede orientarse a la adaptación, en un intento por minimizar los conflictos.

Existen varios tipos de actitudes:

Una actitud desinteresada es la que lleva a una persona tener presente a otra no como un medio para conseguir algo, sino como un fin para alcanzar un beneficio propio. Para conseguirla hacen falta cuatro cualidades: disponibilidad, apertura, aceptación y solicitud.
La **actitud manipuladora** es la que ejerce una persona para alcanzar un fin personal y tiene en cuenta al otro como un medio, otorgándole la atención suficiente para conseguir su objetivo.

**Actitud interesada**: es causada por una situación de indigencia. Una persona se ve privada de algo que necesita y busca por todos los medios recuperar o conseguir satisfacer sus necesidades. Los demás, son también un recurso que puede ayudarla a salir de esa situación de desamparo.

Una **actitud integradora** es la que tiene una persona que busca no sólo su beneficio sino también el de quienes la rodean. Se basa en una estrecha comunicación entre dos personas cuyo objetivo es la unificación y la integración.

A lo largo de la historia se han realizado muchas teorías en torno a la actitud, aquí presentamos algunas de ellas.

En las **teorías del aprendizaje** las actitudes se aprenden al igual que todo en la vida. Captamos nueva información y aprendemos los sentimientos, acciones y pensamientos que se encuentran relacionados con ellos. En esta línea de pensamiento se concibe a las personas como seres sujetos pasivos donde el aprendizaje es el detonador de la actitud que puedan tomar. La misma depende íntimamente de la cantidad de elementos positivos y negativos que haya aprendido el sujeto.

Las **teorías de la consistencia cognitiva** afirman que las personas buscan la coherencia en su vida y que en base a conseguirla es que varían sus actitudes y pensamientos para sentir una unicidad en su ser interno pues la presencia de dos estados de consciencia (incoherencia) les incomoda. En este caso la actitud tendría que ver con la sucesión de acciones que aseguren un equilibrio para el individuo.

En las **teorías de la disonancia cognitiva** se sostiene que, al igual que lo explicado en la teoría anterior, los sujetos se sienten incómodos cuando poseen ideas o actitudes que se contradicen (disonancia) y como consecuencia de ello buscan disminuir dicha disonancia. Lo mismo ocurre cuando se realiza una **acción** que va en contra de lo que el sujeto cree o no se relaciona con la vida que desea llevar, con quién es.
Desde la perspectiva de la psicología, las actitudes pueden hacerse tangibles de tres formas: a nivel ideativo, conductual o emocional. Lo explicaremos con un ejemplo:

La cajera de un supermercado se comporta amablemente con un cliente (la actitud se expresa de forma conductual) pero a su vez tiene un pensamiento que no se ve “debo ser amable con esta persona” (expresión a nivel ideativo); a su vez la cajera no sólo lo está haciendo y pensando, sino que está sientiéndolo (expresión a nivel emocional). Tener en cuenta estas tres partes es fundamental para conseguir modificar una actitud que no va de acuerdo a lo que deseamos.

Es importante establecer también la diferencia entre actitudes positivas y negativas. Las positivas son aquellas que colaboran con el individuo para conseguir enfrentar la realidad de una forma sana y efectiva, las negativas son las que entorpecen esta relación del individuo con su entorno. La libertad del individuo reside en poder elegir entre una actitud y otra a cada momento.

Por último, sólo resta decir que las actitudes no sólo modifican el comportamiento individual, sino también grupal. Una persona con una actitud positiva frente a los problemas, puede conseguir incentivar al grupo a salir adelante y a mejorar; mientras que una con una actitud negativa, consigue “infectarlo” pero para guiarlo en una conducta que lo llevará al fracaso.
What are scientific attitudes?

Science
Q:
A:

Quick Answer

Scientific attitudes refer to the behavioral dispositions expected in individuals who intend to become successful scientists. Scientific attitudes include respect for evidence, honesty, creativity, flexibility, curiosity, objectivity and skepticism.

Keep Learning

Full Answer

Although not necessary to embark on a field in science, having these attitudes can assist scientists in achieving more.

- Respect for evidence
  Scientists collect as much evidence as possible and search for interpretations that fit in line with the evidence.

- Honesty
  Scientists should deliver accurate reports of all that is observed, even if it contradicts what they expect or what is assumed to be true.

- Creativity
  Being open-minded and able to think outside the box is a key element of successful scientists. Scientists must be willing to consider different ideas.

- Flexibility
  Scientists must avoid being rigid on a single idea. Good scientists alter their hypothesis to fit with new evidence.

- Curiosity
  Good scientists have a questioning attitude. They look for inconsistencies and challenge
everything, particularly unsupported theories and statements.

- **Objective attitude**
  Scientists not only consider their tentative hypothesis and theories but those of others. They are not put off by the constructive criticism of their peers.

- **Restraint**
  Successful scientists delay making conclusions or judgments beyond that which is supported by the available evidence.

- **Skepticism**
  Good scientists showcase strong tolerance for uncertainty. They give room for possible contradictions to their theories, while striving harder to ensure certainty.
What is scientific attitude?

The question and answer are locked and cannot be edited.

Answer by Princessxhandra
Confidence votes 97

The scientific attitude is an approach to investigations that benefits from certain traits:

1. Curiosity or inquisitiveness
2. Objectivity
3. Open-mindedness
4. Perseverance
5. Humility
6. Ability to accept failure
7. Skepticism

Bhaskara Rao (1989) stated that the most useful scientific attitudes are open mindedness, critical mindedness, respect for evidence, suspended judgment, intellectual honesty, willingness to change opinion, search for truth, curiosity, rational thinking, etc.

Scientific attitude is really a composite of a number of mental habits, or of tendencies to react consistently in certain ways to a novel or problematic situation. These habits or tendencies include accuracy, intellectual honesty, open-mindedness, suspended judgment, criticalness, and a habit of looking for true cause and effect relationships. It is a cognitive concept; scientific attitudes are normally associated with the mental processes of scientists. These habits are important in the everyday life and thinking, not only of the scientist, but of everyone. Scientific attitudes possess attributes thought to be either true or false and do not express an evaluative quality. To lessen the semantic confusion, scientific attitudes may be better labeled as "scientific attributes." The attributes of a scientific attitude are:

- rationality
- curiosity
- open mindedness
- aversion to superstitions
- objectivity and intellectual honesty
- suspended judgment.

23 people found this useful

Was this answer useful?
5 Qualities of a Good Researcher

Can anyone be a good researcher? Do researchers possess specific qualities that make them succeed in the field of scientific inquiry? Find out in the article below if indeed you have any of the qualities a good researcher must have. If not, then you train and build yourself up on those qualities that you find yourself wanting.

While everyone in college will be given the opportunity to do research, not everyone can do it unless they possess the qualities required of a good researcher. Just like leaders, scientists can also be made, not just born.

But there are innate qualities that researchers must possess to succeed in this challenging task that requires a lot of imagination and perseverance.

What then are the qualities of a good researcher? Here are five notable attributes of people who tread the path towards discovery:

1. **A good researcher manifests thirst for new information.**
   
   A good researcher shows an open mind about things. He does not just take things by themselves but explores new grounds. He adopts the philosophy of “thinking beyond the box”, leaving out the conventional for something innovative. A good researcher treads the unknown frontier.

   Pieces of evidence of this thirst for new information manifest in people who do not stop learning. Those persons who maintain an open mind for new possibilities to happen, even when everything appears to have been discovered or studied, or options exhausted.

   Two hundred years ago, has anyone ever thought that man could go to the moon, or explore the depths of the sea? Or tap on the keys of the cell phone to communicate with another person so far away?

2. **A good researcher has a keen sense of things around him.**

   Keenness is a quality developed through an observant attitude. A good researcher sees something more out of a common occurrence around him. And he sees this quickly.

   He can see a wiggling worm inside a flower, or the beautiful color combinations of a wild plant,
or simply, notices the small fly in the burger.

Do you know which part of the vertically-oriented traffic light is green?

Image Source

3. A good researcher likes to reflect or think about the things he encounters.

Researchers who pause and reflect on the knowledge that they gained, either formally in school or through their experience, gain insights. Insights are creative thoughts that make one nod his head and say, “Aha, this is something I have been looking for!” An original idea was born.

4. A good researcher must be intelligent enough to express his ideas.

How can you express your thoughts if you cannot write? The point here is that a good researcher must be adept in the written language.

How can people understand your point when you are the only one who can understand what you have written?

Intelligence to express ideas is a quality that appears to reside in gifted individuals. But if you recognize your weakness in this realm, why not seek someone who can? After all, ideas are more important; but of course, better if you present them in such a way that others understand well what you want to say.

5. A good researcher applies a systematic approach in assessing situations.

Research requires systematic and objective thinking to arrive at something. Logical reasoning, therefore, is applied by a good researcher.

He can analyze things, meaning, he can break down a complex situation into manageable bits that he can focus his attention into (see article on conceptual framework).

Do you have these qualities? If not, then it’s time for you to harness the hidden talents in you through training and continuous learning.
SCIENTIFIC ATTITUDE

By

Nugent, Pam M.S.

April 28, 2013

Mental outlook distinguished by an impartial and unbiased method and the application of empirical approaches in the quest for understanding.

SCIENTIFIC ATTITUDE: "It is essential for researchers to employ scientific attitudes."

Related Psychology Terms

1. CONTENTUAL OBJECTIVISM VERSUS CONTENTUAL SUB
2. UTILITARIAN FUNCTION OF AN ATTITUDE
3. CONVICTION
4. SELF AS KNOWN
5. NONJUDGMENTAL APPROACH
6. SCIENTIFIC PSYCHOLOGY
7. VERIFICATION
8. PERSPECTIVE
9. BUSINESS GAME
10. THOUGHT STOPPING
The methods and skills used by scientists are intimately connected to a set of attitudes common in the practice of science. A scientific attitude is a disposition to act in a certain way or a demonstration of feelings and/or thoughts. Studies of the actions of scientists have led to lists of scientific attitudes such as displayed below. Some attitudes such as honesty would be expected in any human endeavour, but other attitudes such as tolerance of uncertainty are more characteristic of scientists. Note that scientific attitudes are different from attitudes about/towards science. Also note the exercises available in the top of the left frame on this webpage.

<table>
<thead>
<tr>
<th>Scientific Attitude*</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>critical-mindedness</td>
<td>· looks for inconsistencies</td>
</tr>
<tr>
<td></td>
<td>· consults a number of authorities</td>
</tr>
<tr>
<td></td>
<td>· challenges the validity of statements</td>
</tr>
<tr>
<td>suspended judgment (restraint)</td>
<td>· recognizes the restrictions in generalizations and theories</td>
</tr>
<tr>
<td></td>
<td>· generalizes only to the degree justified by available evidence</td>
</tr>
<tr>
<td>respect for evidence</td>
<td>· looks for evidence (empirical approach) to support or contradict statements</td>
</tr>
<tr>
<td></td>
<td>· demands interpretations that fit the evidence</td>
</tr>
<tr>
<td></td>
<td>· collects as much evidence as possible</td>
</tr>
<tr>
<td>honesty</td>
<td>· reports all evidence even when it contradicts hypothesis or expectations</td>
</tr>
<tr>
<td></td>
<td>· acknowledges the work of others</td>
</tr>
<tr>
<td>objectivity</td>
<td>· considers all pros and cons</td>
</tr>
<tr>
<td></td>
<td>· considers all evidence available</td>
</tr>
<tr>
<td></td>
<td>· considers and evaluates statements by others</td>
</tr>
<tr>
<td>Attitude</td>
<td>Characteristics</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>willingness to change opinions</td>
<td>· recognizes all hypotheses, generalizations and theories as being tentative</td>
</tr>
<tr>
<td></td>
<td>· evaluates evidence which contradicts prediction</td>
</tr>
<tr>
<td></td>
<td>· alters hypotheses when necessary to accommodate empirical evidence</td>
</tr>
<tr>
<td>open-mindedness</td>
<td>· considers several possible options when investigating a problem</td>
</tr>
<tr>
<td></td>
<td>· considers and evaluates ideas presented by others</td>
</tr>
<tr>
<td>questioning attitude</td>
<td>· looks for inconsistencies</td>
</tr>
<tr>
<td></td>
<td>· challenges the validity of unsupported statements</td>
</tr>
<tr>
<td></td>
<td>· asks many questions starting with who, where, when and how</td>
</tr>
<tr>
<td>tolerance of uncertainty</td>
<td>· accepts that there is always some uncertainty</td>
</tr>
<tr>
<td></td>
<td>· strives for greater and greater certainty</td>
</tr>
</tbody>
</table>


- Scientific Attitudes--a description
- Scientific Attitudes--a description
Related Articles

The scientific mindset is one that harnesses and directs the power of the human brain, turning it to the investigation of the observable world. Scientists learn to think in specific ways, deducing patterns and principles from observations of the way things work. Over time, the collective effort of scientists in a given field produces a body of reliable knowledge that can be used as a stepping stone to new discoveries. This progress begins with a few simple attitudes and behaviors.

Curiosity

Curiosity is a fundamental characteristic of a good scientist. An urge to know and understand the natural world is part of the makeup of every healthy baby, and it's how humans learn to adapt to the world. Over time, most people come to understand that things act in a specific way, and are satisfied with that. Scientists are not. Their curiosity leads them to study how things in the natural world behave, why, and what factors might affect them. This requires a certain degree of creativity.

Creativity

Scientists must have fertile mind because creating a plausible reason for things to work as they do is a crucial step in scientific investigation. Creating a hypothesis that can explain a phenomenon, and then constructing an experiment to test that hypothesis and establish its accuracy, lies at the heart of the scientific method. This creativity, or mental agility, must also extend to recognizing unanticipated factors when they intrude on the experiment. Alexander Fleming provides a famous example of this attribute. When his bacterial cultures were contaminated by mold spores, he noticed that the mold killed bacteria in his samples. This observation led to the discovery of penicillin.

Accuracy of Observation
Fleming's discovery also points to skill in observation, another important characteristic of good scientists. Much scientific progress has been fueled by observing and recording natural phenomena, even when those observations seem unimportant to the subject at hand. Often their importance becomes clear only after new discoveries, technological advances or statistical analysis. For example, neurological researchers regularly use magnetic resonance imaging to monitor the activity of subjects' brains as they carry out specific tasks. A 2010 article in Scientific American details how MRI records of the subjects' resting brain activity, before testing, has provided new insights into human intelligence.

Skepticism

The results of a scientific experiment are only as good as the hypothesis and experiment that gave rise to them. That's why skepticism is also an essential part of a good scientist's mental makeup. When reviewing the results of an experiment, a scientist must always consider it critically. There might be a flaw in the experimental process, or the way the observations were conducted. The results might conflict with those of similar experiments performed by other scientists, or there might be a hypothesis that better explains the experiment's results. This is why good scientists publish their work in peer-reviewed journals, to benefit from the collective skepticism of their peers.

References (5)

About the Author

Fred Decker is a trained chef and certified food-safety trainer. Decker wrote for the Saint John, New Brunswick Telegraph-Journal, and has been published in Canada's Hospitality and Foodservice magazine. He's held positions selling computers, insurance and mutual funds, and was educated at Memorial University of Newfoundland and the Northern Alberta Institute of Technology.

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Suggest an Article Correction
FACTOR STRUCTURE OF THE “ATTITUDES TOWARD RESEARCH” SCALE

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SUMMARY

Students at the undergraduate level usually tend to view research methods courses negatively. However, an understanding of these attitudes is necessary to help instructors facilitate the learning of research for their students, by enabling them to create more positive attitudes toward such courses. The aim of this study is to describe the development of an “attitudes toward research” scale and verify the dimensions of attitudes toward research among undergraduate students enrolled in introductory research courses. The basic hypothesis of this research study is that the concept of attitudes is multidimensional in nature. The sample of the study consisted of 226 students who had completed a research methods course. Based on a factor analysis, five factors of student attitudes toward research were identified. These were the factors of usefulness of research, anxiety, affect indicating positive feelings about research, life relevancy of research to the students’ daily lives, and difficulty of research.

Keywords: Statistics education research; Research methods; Quantitative research attitudes; Scale development; Factor structure; Attitudes toward research; Psychometrics

1. THEORETICAL FRAMEWORK

Students at the undergraduate university level, typically tend to view research-related courses with negative attitudes and feelings. These negative attitudes have been documented in numerous studies for a number of years in relation to courses in research, statistics and mathematics (Adams & Holcomb, 1986; Elmore & Vasu, 1980; Wise, 1985). One of the main problems of these negative attitudes is that they have been found to serve as obstacles to learning (Wise, 1985; Waters, Martelli, Zakrjaček, & Popovich, 1988). In turn, these negative attitudes have been found to be associated with poor performance in such courses (Elmore, & Lewis, 1991; Woelke, 1991; Zeidner, 1991). Causal models, however, suggest that attitudes are actually mediators between past performance and future achievement (Meece, Wigfield, & Eccles, 1990).

Prior research studies have found that negative attitudes toward a course (e.g., mathematics) have been found to explain a significant portion of the variance in student learning (Ma, 1995). In turn, these attitudes influence the amount of effort one is willing to expend on learning a subject, which also influences the selection of more advanced courses in similar areas (e.g., research and statistics courses) beyond those of minimum requirements. Therefore, assessing students’ attitudes toward a research methods course is important in order to enable instructors to develop instructional techniques leading to more positive attitudes toward the subject (Waters et al., 1988).

In a 1980 study, Roberts and Bilderback (1980) found that most students who take statistics are quite anxious. Once this preponderance of negative attitudes was revealed, many more survey instruments designed to measure university students’ attitudes toward statistics were developed (Dauphinee, Schau, & Stevens, 1997; Zeidner, 1991). One such instrument is the Survey of ‘Attitudes Towards Statistics’ (Schau et al., 1995), which is comprised of four dimensions, those of affect, cognitive competence, value, and attitudes about the difficulty of statistics. Another instrument...
created for the same purpose was that of Attitudes Toward Statistics (Wise, 1985), which was designed to measure two separate domains, student attitudes toward the course they were enrolled in, and student attitudes toward the usefulness of statistics in their field of study. The Statistical Anxiety Rating Scale (Cruise et al., 1985) was designed to measure the value of statistics, the interpretation of statistical information, test anxiety, cognitive skills in statistics, fear of approaching the instructor and fear of statistics. Other similar instruments included the Statistics Attitude Survey (Roberts & Bilderback, 1980), and the Statistics Anxiety Inventory (Zeidner, 1991).

However, although a number of instruments that measure attitudes toward statistics already exist, they all differ in content and configuration (Dauphinee, 1993). For example, although some instruments represent attitudes as a construct with six factors, others regard it as a unidimensional construct which hypothesizes that no meaningful domains exist within attitudes (Roberts & Bilderback, 1980). The identification of the factors that form the structure of the student attitudes toward a research methods course may bear important theoretical and practical implications, especially due to the fact that this has never been examined before. For example, by identifying these subscales of attitudes, research methods instructors may include themselves in the process of learning research from a different angle. By using these domains, instructors may facilitate the learning of research for their students, by enabling them to create more positive attitudes toward such courses. Therefore, the central aims of this study are to explore the multidimensional factor structure of the “Attitudes Toward Research” scale (ATR) and to examine its psychometric properties. This questionnaire was developed by the author of this paper in the Fall of 2002, and the original version consisted of 56 items that were created on a Likert type scale. Based on the analysis of the psychometric properties of this questionnaire that is presented in this paper, further refinements of the questionnaire have been completed, and are presented in section 3. Although the questionnaire was administered in Greek, a translated version of the questionnaire is presented in English in the Appendix.

2. METHOD

2.1. SAMPLE

The data for this study were collected from students who had completed a compulsory and introductory undergraduate course in ‘Methodology of Educational Research’ at the University of Cyprus. All the students in the sample were enrolled in the elementary or kindergarten education major. This major is considered of very high esteem in Cyprus, and only the highest ability students are accepted into this major. Students from no other majors were obtained from the University since research methods courses are only required for students in the elementary and kindergarten education major. The target population for this study included all students who had completed this course in a period of three years. This population would have consisted of about 450 students. Among the 226 students who took part in the study, 98 (43.4%) completed the questionnaire on the last day of their research methods course, while the remaining 56.6% also answered the questionnaire on the last day of the semester, although they had completed the course one to four semesters earlier. Of the total 226 students in the sample, 15.6% were male and the remaining 84.4% were female. Although there was a disproportionate number of females in the study, this was because there are generally more female than male students that choose to major in elementary or kindergarten education in Cyprus, and the breakdown is not dissimilar to that usually holding in the group majoring in these subjects.

Of the complete sample, 36.9% were sophomores, 34.2% were juniors and 28.9% were seniors. All students who had attended the classes from which the data were collected, responded to the questionnaire, and no non-responses were encountered.

The students were also asked to indicate their self reported level of socioeconomic status (SES), as well as the overall level of their parents’ education. Both questions were closed option questions, where the students had to select among four options (very high, high, average and low). In terms of SES, only one student indicated that their level of SES was very high. There were 84.4% of the students that indicated that their SES level was average, 12.8% who indicated that their SES was high,
and 2.2\% that indicated that their SES was low. In terms of the parents’ level of education, 5.3\% indicated that their parents’ education was very high. About 25\% indicated that their parents’ level of education was high, while 55.8\% considered their parents’ level of education to be average. In terms of the Grade Point Average (GPA) that the students had at the University, the majority of the students (57.1\%) indicated that their grades ranged from 7.01 to 8.00 points, out of a total of 10 points. There were 15.2\% of the students who had grades that ranged between 6.01 to 7.00, while the rest of the students had grades higher than 8.01 points. What is also interesting is that the students were also asked about their high school grade point average (GPA). The results of the study showed that 50\% of the students had grades that ranged from 19.01 to 20, out of a total of 20 points, while 34.8\% had grades ranging from 18.01 to 19.00. The rest of the students had grades lower than 18.01. The lowest grades were obtained by only a single student who responded as having earned a high school GPA between 12.00 -14.00 out of 20. In addition, 5 students had high school GPAs between 14.01-16.00.

The research methods course in which the students were enrolled, was designed to prepare students to undertake a research project related to educational issues. This course covers the fundamental concepts of research methodology, as well as basic statistical terms and techniques required to analyze research data. Primary emphasis is placed on the research stages; those of conceptualizing and defining a research problem, conducting literature reviews, data collection and analysis techniques, as well as writing and interpreting results, discussions and conclusions in research articles. This course also places substantial emphasis on measurement issues such as scales of measurement, and reliability and validity issues. Finally, the students in this course are required to design and execute a research project related to educational issues throughout the semester.

2.2. STATISTICAL PROCEDURES

The Attitudes Toward Research (ATR) scale that was created by the authors of this paper, consisted of items listed on a 7-point Likert scale. The score 1 represented the option “strongly disagree” while option 7 on the scale represented the category “strongly agree”. An initial pool of 56 Likert-type attitudinal items regarding attitudes toward research was constructed. Some items were positively worded and some negatively worded. For the analysis of the data, all negatively worded items were reversed so that a higher numbered response on the Likert scale would represent positive attitudes.

At a preliminary examination, the 56 items of the ATR measure underwent an initial reliability analysis to determine the internal consistency of the items (Andrews & Hatch, 1999). In addition, the product-moment coefficient r between each item and the total score was also calculated. Items which were not significantly related to the total score, or whose coefficient was less than 0.50 were removed from the questionnaire. Forty-one items remained in the pre-final version of the questionnaire. A principal factor analysis with varimax rotation was then used to create the factor structure of the 41 questions included in the scale (SPSS, 1998). This analysis was used to “reduce a set of observed variables into a relatively small number of components that account for most of the observed variance” (Marcoulides & Hershberger, 1997, p 164). In order to give each factor a clear and distinct meaning for both theoretical interpretation and practical implication, the orthogonal varimax method of rotation was used to minimize the number of variables that have high loadings on more than one factor. To determine the optimum factor solution, the following criteria were used: (a) computation of the percentage of variance extracted, and (b) interpretability of the factors (Comrey & Lee, 1992). A factor loading with absolute value greater than 0.50 was considered sufficiently high to assume a strong relationship between a variable and a factor. Factor loadings less than 0.50 in absolute value were regarded as insignificant, and the items containing such loadings were removed from the scale. In addition, it was decided that factors with only one or two items, even with loadings greater that 0.50, would be excluded from the final version of the scale. Furthermore, with respect to determining the number of factors, only factors with eigenvalues greater than 1.1 were considered as significant (Rummel, 1970). Finally, the factors that were developed from this study were analyzed further with the use of multidimensional scaling. This was done in order to create a map of the locations of the factors in reference to each other, based on their similarities and dissimilarities.
3. RESULTS

For the purpose of examining the reliability of the ATR measure, Cronbach’s alpha coefficient was used to measure the internal consistency of the items in the scale. An initial examination of the entire first version of the questionnaire (all 56 items) produced a reliability coefficient of 0.947 which is very satisfactory. Eleven factors were originally extracted, accounting for 66.4% of the variance. However, based on the restrictions included in the methodology section of this paper, several of the items of the original version of the questionnaire were removed because they were considered as inappropriate. Once the inappropriate items were removed, 32 items remained in the scale. Once the factor analysis was re-run with those items, a five-factor solution remained, which included a robust set of constructs that were relatively easily interpreted. These five factors accounted for 66.25% of the total variance. Details of the items included in the final version of the scale are presented in the Appendix.

The results of the factor analysis have produced a five factor solution. The first factor was clearly the most important one since it accounted for 18.92% of the total ATR scale variance. All items in this factor with loadings greater than 0.50 had to do with the students’ opinions about the usefulness of research in their careers. This factor consisted of 9 items, while the two items with the highest loadings on this factor were those of ‘research is useful for my career’ and ‘research is connected to my field of study’. This factor therefore was named ‘research usefulness in profession’. This usefulness is interpreted as the perception that students have in terms of how research will be useful and help them in their professional lives.

The second factor accounted for 17.94% of the variance and included items describing tension, stress, fear, difficulties in understanding research, and was called ‘research anxiety’. This factor consisted of eight items. The two questions with the highest loadings on this factor were those of ‘research makes me nervous’ and ‘research is stressful.’ The third factor which was composed of eight items accounted for 15.42% of the variance and was labeled as ‘positive attitudes toward research’. The two questions with the highest loadings on this factor were those of ‘I love research’ and ‘I enjoy research’. The fourth factor accounted for 8.30% of the variance, and consisted of four items referring to the use of research in a student’s personal life, and was therefore called ‘relevance to life’. The two items with the highest loadings on this factor were those of ‘I use research in my daily life’ and ‘Research oriented thinking plays an important role in everyday life.’ The last factor, ‘research difficulty’, accounted for 5.67% of the total variance. This factor that consisted of only three items included items related to ‘having trouble with arithmetic’ and ‘finding it difficult to understand the concepts of research’. The results of the factor analysis with the loadings of the five factors are presented in Table 1. The items labeled as “Recoded” are listed this way so that all of the items with high values on the Likert scale represent high agreement levels in terms of the respondents’ positive attitudes.

The responses on the remaining 32 items on the ATR scale indicated a high reliability for the test, \( r=0.948 \). The coefficient alpha reliabilities for the responses to items on each of the five subscales were relatively high. Coefficient alpha reliability for the research usefulness in the profession factor was 0.919 (9 items); for the research anxiety factor it equaled 0.918 (8 items); the reliability for the positive attitudes toward research factor equaled 0.929 (8 items). The reliability of the life relevancy factor equaled 0.767 (4 items), while the reliability for the research difficulty factor equaled 0.711 (3 items).

After the factor analysis was performed, a score was calculated for each student on each factor by obtaining the mean for all items comprising each factor. The mean score of the students on the research usefulness for the profession factor was \( F1=5.20 \); for the research anxiety factor the mean was 3.17; the mean of the positive attitudes toward research factor was 3.90; for the relevance to life factor the mean score was 5.04, while the mean score of the research difficulty factor was 4.84.
Table 1. Rotated factor loadings of the ATR scale

<table>
<thead>
<tr>
<th>Component</th>
<th>F1 Research usefulness for profession</th>
<th>F2 Research Anxiety</th>
<th>F3 Positive attitudes toward research</th>
<th>F4 Relevance to life</th>
<th>F5 Research difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research is useful for my career</td>
<td>.822</td>
<td>.067</td>
<td>.209</td>
<td>.171</td>
<td>.022</td>
</tr>
<tr>
<td>Research is connected to my field of study</td>
<td>.783</td>
<td>.107</td>
<td>.282</td>
<td>.037</td>
<td>-.006</td>
</tr>
<tr>
<td>Research should be indispensable in my professional training</td>
<td>.768</td>
<td>.087</td>
<td>.264</td>
<td>.272</td>
<td>.132</td>
</tr>
<tr>
<td>Research should be taught to all students</td>
<td>.738</td>
<td>.133</td>
<td>.259</td>
<td>.017</td>
<td>.112</td>
</tr>
<tr>
<td>Research is useful to every professional</td>
<td>.667</td>
<td>.036</td>
<td>.174</td>
<td>.377</td>
<td>.112</td>
</tr>
<tr>
<td>Research is very valuable</td>
<td>.658</td>
<td>.127</td>
<td>.086</td>
<td>.160</td>
<td>.124</td>
</tr>
<tr>
<td>I will employ research approaches in my profession</td>
<td>.649</td>
<td>.130</td>
<td>.148</td>
<td>.330</td>
<td>-.029</td>
</tr>
<tr>
<td>The skills I have acquired in research will be helpful to me in the future</td>
<td>.608</td>
<td>.164</td>
<td>.296</td>
<td>.418</td>
<td>.051</td>
</tr>
<tr>
<td>Knowledge from research is as useful as writing</td>
<td>.601</td>
<td>.087</td>
<td>.285</td>
<td>.377</td>
<td>-.165</td>
</tr>
<tr>
<td>Research makes me nervous-RECODED</td>
<td>.156</td>
<td>.857</td>
<td>.189</td>
<td>.080</td>
<td>.077</td>
</tr>
<tr>
<td>Research is stressful-RECODED</td>
<td>.197</td>
<td>.807</td>
<td>.239</td>
<td>.054</td>
<td>-.019</td>
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<tr>
<td>Research makes me anxious-RECODED</td>
<td>.220</td>
<td>.798</td>
<td>.217</td>
<td>.010</td>
<td>-.085</td>
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<tr>
<td>Research scares me-RECODED</td>
<td>.160</td>
<td>.794</td>
<td>.155</td>
<td>.024</td>
<td>.161</td>
</tr>
<tr>
<td>Research is a complex subject-RECODED</td>
<td>.048</td>
<td>.766</td>
<td>.242</td>
<td>.016</td>
<td>.090</td>
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<tr>
<td>Research is complicated-RECODED</td>
<td>.079</td>
<td>.700</td>
<td>.265</td>
<td>.157</td>
<td>.172</td>
</tr>
<tr>
<td>Research is difficult-RECODED</td>
<td>.137</td>
<td>.678</td>
<td>.284</td>
<td>.123</td>
<td>.102</td>
</tr>
<tr>
<td>I feel insecure concerning the analysis of research data - RECODED</td>
<td>-.089</td>
<td>.590</td>
<td>.017</td>
<td>.108</td>
<td>.197</td>
</tr>
<tr>
<td>I love research</td>
<td>.207</td>
<td>.318</td>
<td>.812</td>
<td>.125</td>
<td>.039</td>
</tr>
<tr>
<td>I enjoy research</td>
<td>.222</td>
<td>.268</td>
<td>.789</td>
<td>.077</td>
<td>.034</td>
</tr>
<tr>
<td>I like research</td>
<td>.232</td>
<td>.345</td>
<td>.775</td>
<td>.109</td>
<td>.074</td>
</tr>
<tr>
<td>I am interested in research</td>
<td>.338</td>
<td>.254</td>
<td>.736</td>
<td>.111</td>
<td>.176</td>
</tr>
<tr>
<td>Research acquired knowledge is as useful as arithmetic</td>
<td>.186</td>
<td>.352</td>
<td>.723</td>
<td>.233</td>
<td>.049</td>
</tr>
<tr>
<td>Research is interesting</td>
<td>.383</td>
<td>.115</td>
<td>.655</td>
<td>.101</td>
<td>.181</td>
</tr>
<tr>
<td>Most students benefit from research</td>
<td>.499</td>
<td>.177</td>
<td>.517</td>
<td>.142</td>
<td>.154</td>
</tr>
<tr>
<td>I am inclined to study the details of research</td>
<td>.446</td>
<td>.199</td>
<td>.511</td>
<td>.073</td>
<td>.032</td>
</tr>
<tr>
<td>I use research in my daily life</td>
<td>.163</td>
<td>.043</td>
<td>.235</td>
<td>.752</td>
<td>-.008</td>
</tr>
<tr>
<td>Research-orientated thinking plays an important role in everyday life</td>
<td>.391</td>
<td>.040</td>
<td>.086</td>
<td>.688</td>
<td>.060</td>
</tr>
<tr>
<td>Research thinking does not apply to my personal life-RECODED</td>
<td>.398</td>
<td>.210</td>
<td>-.046</td>
<td>.598</td>
<td>.144</td>
</tr>
<tr>
<td>Research is irrelevant to my life-RECODED</td>
<td>.408</td>
<td>.163</td>
<td>.200</td>
<td>.569</td>
<td>.081</td>
</tr>
<tr>
<td>I have trouble with arithmetic-RECODED</td>
<td>.074</td>
<td>.060</td>
<td>.137</td>
<td>.012</td>
<td>.792</td>
</tr>
<tr>
<td>I find it difficult to understand the concepts of research-RECODED</td>
<td>.146</td>
<td>.427</td>
<td>.062</td>
<td>.204</td>
<td>.686</td>
</tr>
<tr>
<td>I make many mistakes in research-RECODED</td>
<td>.096</td>
<td>.518</td>
<td>.203</td>
<td>.005</td>
<td>.610</td>
</tr>
</tbody>
</table>

A test developed by Hotelling, called Hotelling’s $T^2$, was then applied to the data. This test allows for the comparison of several observed means, five in our case, to a set of constants, which was the median of the seven point Likert scale that was used in the ATR measure. The results of the
MANOVA indicated statistical significance (Hotelling’s $T^2 = 30.967$, $p<0.01$). Since the hypothesis of no differences was rejected, the univariate test was used to get an idea of where the difference among each of the five subscales compared to the median of 4 may lie. The results are summarized in Table 2. Thus, as a group, students consider research to be useful in their professional lives, and in their personal lives (relevance to life). However, the students tended to have quite negative attitudes toward research as well as anxiety toward the subject, although they responded that they did not have a lot of difficulty in understanding this subject. The factor that deviated the most from the median was research usefulness, indicating that the students truly understood and appreciated the usefulness of research in their professional lives. The next highest factor was that of relevancy of research in the student’s personal lives. The factor that deviated the least from the median was that of positive attitudes toward research. This indicated that although the students indicated that they had some negative attitudes toward this subject, they did not deviate a lot from the median indicating that their responses were actually quite neutral in terms of attitudes. The overall students’ attitudes toward research, when taking into account all seven dimensions is 4.43 which is positive although it is actually closer to the median of the seven point Likert scale.

Correlation coefficients between the Attitudes Toward Research sub-scales were also calculated. As presented in Table 3, the intercorrelations of the Attitudes Toward Research factors suggested the following pattern of interrelationships. The research usefulness factor was most highly correlated with the factors of relevancy to life ($r=0.69$) and with the factor of positive attitudes toward research ($r=0.67$). The anxiety subscale was most highly correlated with the positive attitudes ($r=0.58$) and the difficulty ($r=0.52$) factors. Finally, the research difficulty factor was most highly correlated with the research anxiety factor ($r=0.52$).

<table>
<thead>
<tr>
<th>Factors</th>
<th>X</th>
<th>s</th>
<th>Hypoth. SS</th>
<th>Error MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 research usefulness</td>
<td>5.19</td>
<td>1.13</td>
<td>5870.017</td>
<td>1.28</td>
<td>4582.07</td>
<td>0.000</td>
</tr>
<tr>
<td>F2 research anxiety</td>
<td>3.19</td>
<td>1.27</td>
<td>2222.091</td>
<td>1.62</td>
<td>1368.89</td>
<td>0.000</td>
</tr>
<tr>
<td>F3 positive attitudes</td>
<td>3.91</td>
<td>1.23</td>
<td>3337.655</td>
<td>1.50</td>
<td>2223.60</td>
<td>0.000</td>
</tr>
<tr>
<td>F4 relevance to life</td>
<td>5.04</td>
<td>1.10</td>
<td>5530.293</td>
<td>1.21</td>
<td>4559.43</td>
<td>0.000</td>
</tr>
<tr>
<td>F5 difficulty of research</td>
<td>4.84</td>
<td>1.21</td>
<td>5102.393</td>
<td>1.63</td>
<td>3129.25</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 3. Inter-correlations between the five factors**

<table>
<thead>
<tr>
<th>Research usefulness for profession</th>
<th>Research anxiety</th>
<th>Positive attitudes toward research</th>
<th>Relevance to life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research anxiety</td>
<td>0.363(**)</td>
<td>0.587(**)</td>
<td></td>
</tr>
<tr>
<td>Positive attitudes toward research</td>
<td>0.671(**)</td>
<td>0.324(**)</td>
<td>0.485(**)</td>
</tr>
<tr>
<td>Relevance to life</td>
<td>0.697(**)</td>
<td>0.527(**)</td>
<td>0.424(**)</td>
</tr>
</tbody>
</table>

**p<0.01 for all correlations**

There are many different measures for quantifying similarity, and the Pearson correlation coefficient is one of those most frequently used (Norusis, 1990). However, similarity measures can also estimate the degree of closeness between objects. For this study, a multidimensional scaling analysis was performed with the statistical package SPSS. Multidimensional scaling was used in order to be able to display multivariate data (the five factors in this case) on a lower two-dimensional space. This is done by mapping the distances between points in a high dimensional space into a lower dimensional space (Johnson, 1998). Four clusters have resulted from the use of these measures (see Figure 1). Projecting the points of each of the factors on Dimension 1 of the axis reveals two different groups of factors: the first group is comprised of the factors dealing with the usefulness of research in
the student’s professional and personal lives and goes along with the factor of research difficulty. The second group in the same dimension contains factors that deal with attitudinal issues related to the subject of research methods (positive attitudes and research anxiety). However, by projecting the points on Dimension 2, two different groups are created. Group 1 includes the factors of research anxiety, and research difficulty, while group 2 includes the factors of research usefulness (in the students’ personal and professional lives) and positive attitudes toward research. This distinction again shows that on the one hand research anxiety and difficulty seem to interrelate, while the positive attitudes toward research appear to group together with the usefulness of research. Overall however, by looking at the two dimensions it is clear that the usefulness of research factors are constantly grouped together, and are never grouped together with the research anxiety factor. This is to show that research anxiety could possibly stem from other factors that have nothing to do with whether the students consider research to be useful in their lives or not. In addition, positive attitudes toward research are never grouped together with the factor of positive attitudes toward research. This again shows that there are different factors that can possibly influence the student’s attitudes toward this subject, that have nothing to do with whether they consider a research methods course to be difficult or not.

**Figure 1. Two dimensional configuration of the five factor model based on Euclidian distances**

4. DISCUSSION

The major objective of this study was to verify the domains of attitudes related to research among education undergraduate students. The majority of the instruments designed to measure attitudes, have been focused on statistics, and have produced configurations of attitudes ranging from one to six dimensions. Although there may be some degree of similarity in the attitudes between statistics courses and research methods courses, none of the instruments related specifically to attitudes toward research. One definition representing a configuration of attitudes toward research was created by the
Attitudes Toward Research (ATR) measure. The current study based on the ATR measure indicated that students’ attitudes toward research are comprised of seven areas.

More specifically, an exploratory factor analysis using undergraduate students indicated that the ATR measure consists of five meaningful factors. The first factor is that of the usefulness of research in the student’s professional life. The second factor is that of research anxiety. The third factor is that of positive attitudes toward research. The fourth factor is that of relevancy to the student’s non-academic and non-professional lives, which is comprised of attitudes about the use of research in the student’s life, while the fifth factor is that of the difficulty of research.

This study has also examined the relationships that existed between the five factors that were produced in this study. Overall, the strongest relationship existed between the usefulness factor and the relevancy to life factors. This confirms a common observation about human attitudes: people feel favorably toward activities, or objects that are useful in their lives. Another strong relationship that was found in the data had to do with affective factors, including those of research anxiety, research difficulty and positive attitudes toward research. These results indicate that there are basically two main groups of factors that are influencing the study’s results. On the one hand students tend to form some affective views toward research, that may or may not be influenced by whether they consider research to be a useful subject or not. More specifically, although the usefulness of research for the profession and in daily life is highly correlated with the positive attitudes factor, this is not the case with the factors of research difficulty and anxiety. This indicates that students who can see the usefulness of research also tend to have more positive attitudes toward the subject. However, issues of whether research is difficult, or if it causes anxiety to the students do not appear to be highly correlated with the usefulness factors.

By identifying the five factors that comprise students’ attitudes toward research, instructors may begin discussions about the importance of learning research and its importance on making academic and professional career choices. In addition, by using information from these domain areas, instructors may be able to identify specific modifications to attitudes, skills and behaviors to facilitate the learning of research and foster a deeper appreciation of this subject. The availability of an instrument such as the ATR scale which has been designed for students, may provide information concerning motivational aspects associated with learning research, and might also have potential for identifying distinctive attitude profiles of students who find research problematic. Overall however, this study’s results validate the utility of the ATR scale in measuring student attitudes toward research.

The results of this study also need to be re-examined to determine if they can be replicated with other samples of students, as well as with different populations. In addition, the future exploration of the relationships between attitudes and student achievement in research is an important area that still needs to be examined further. Finally, it would also be useful to examine the process of attitude change of students, and what it is based on, by collecting student data at various points in the semester. With the use of structural equation modeling, these variables could all be integrated in a single analysis to determine how these variables all influence each other.

REFERENCES


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1055 Nicosia
Cyprus
APPENDIX

STUDENTS’ “ATTITUDES TOWARD RESEARCH” SCALE **

The following statements refer to some aspects of educational research. Please answer all the questions sincerely. DO NOT DISCLOSE YOUR IDENTITY ANYWHERE.

Circle one of the numbers opposite each of the statements that follow.
By selecting number 1 you indicate that you strongly disagree.
By selecting number 7 you indicate that you strongly agree.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Research makes me anxious *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Research should be taught to all students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I enjoy research</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Research is interesting</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. I like research</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. I feel insecure concerning the analysis of research data *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Research scares me *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Research is useful for my career</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I find it difficult to understand the concepts of research *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. I make many mistakes in research *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. I have trouble with arithmetic *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I love research</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. I am interested in research</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. Research is connected to my field of study</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. Most students benefit from research</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. Research is stressful *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. Research is very valuable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. Research makes me nervous *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. I use research in my daily life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. The skills I have acquired in research will be helpful to me in the future</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. Research is useful to every professional</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. Knowledge from research is as useful as writing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. Research is irrelevant to my life *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. Research should be indispensable in my professional training</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. Research is complicated *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. Research thinking does not apply to my personal life *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. I will employ research approaches in my profession</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. Research is difficult *</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29. I am inclined to study the details of research procedures carefully</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
30. Research is pleasant

31. Research-orientated thinking plays an important role in my daily life

32. Research is a complex subject *

* The items with an asterisk are items whose direction has been changed in the analysis.

** This version of the questionnaire has been translated to English from Greek.
Scientific attitude – some psychometric considerations

Dr. Rajib Mukhopadhyay
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Abstract: In the present context of the revolution of the science and technology, importance of science education is being recognised more and more. In fact, achievement in science has become one of the major quality parameters of students. Among several determinants of achievement in science, scientific attitude is an important one. Students’ scientific attitude should be a major concern of science teacher. In particular, the knowledge of different operational dimensions of scientific attitude and its measurement might enable a science teacher to identify inclination of science learners towards different endeavours in science. This psychometric consideration of scientific attitude is focal area of the present study. The study has explained the term ‘attitude’ in general, and ‘scientific attitude’, in particular. Various operational dimensions of the construct have also been discussed with reference to a detailed review of related literature. Emphasis has been given to the scientific attitude of secondary school learners. Different available tools have also been reviewed. A tool having sound psychometric basis and suitable for the present purpose has also been identified in light of this review, which may be used by a science teacher in secondary science classroom.

Key words: scientific attitude, secondary learners, operational dimensions, review of related tools.

I. Introduction

In the context of revolution of science and technology, importance of science education is being recognized more and more. It should be considered as an integral part of school education, as recommended by N.P.E(1986). Science strengthens commitments of man to free enquiry and search for truth as its highest beauty and obligation (Celeniti, 1988). Therefore the study of science imparts training in scientific method developing scientific attitude of learners. This is the quality which ensures sustainable development of an individual as well as the nation which is becoming more and more scientifically gradually (Rao, 1996).

Development of scientific attitude is one among the most important outcomes of science education (Carin, 1997). Even it is important equally as cognitive aspects of science education. Scientific attitude encourages questioning mind and a spirit of enquiry. Therefore without this, studies of science will only mean acceptance of dogma and will never lead to development of proper orientation towards various scientific endeavors (Lacrose & Wisconsin, 2007). Whereas in case of lacking of it, any amount of knowledge in science will also contribute little to national development and to the process of social change, as well.

Not only this, scientific attitude is one among the major determinants of students’ achievement in science – which has become a major quality parameter of a student living in the present scientific society (Abell & Lederman, 2007). Now-a-days rate of admission of students in science courses is increasing at a rapid rate. Even parents are also driven strongly by the urge of admitting their children in science courses. But a mere enrollment in science courses will not result any ultimate benefit of learners unless students’ science learning is made effective by developing adequate scientific attitude through effective science teaching (Moore & Foy, 1997). Therefore scientific attitude is one among the major areas of concern of a teacher in the classroom situation in general. Particularly teachers’ clear understanding of the conceptual framework of scientific attitude, way of measuring students’ scientific attitude in view of various associated criterion and taking suitable measures to nurture the quality subsequently are very essential to ensure a quality science education.

This also necessitates extensive research work in science education, specifically in the area of scientific attitude of school learners. Few studies are available in this area. But studies are very much scattered, as well as isolated (Peters & Stout, 2006). A comprehensive and systematic review of the existing works are extremely inadequate. This also leads to selection of the present study. Following questions arise in the mind of present researcher in this regard.

- How is scientific attitude is explained and defined by researchers?
- What are various psychometric dimensions of it?
- Whether available tools on scientific attitude are adequate and are constructed in view of all the essential psychometric considerations?

Present study is an attempt of finding answer of all these questions. It aims at particularly to explain the conceptual framework of attitude in general, and scientific attitude in particular; to discuss various operational dimension of scientific attitude as suggested by different researchers, and also to review the related tools in...
details. These are discussed step by step in following section with special reference to secondary school learners.

II. Conceptual Framework – Attitude, Scientific Attitude

An attitude is a general and enduring positive or negative feeling about some person, object or issue (Jones and Batts, 1983). “Scientific attitudes are attributes of an individual who not only behave outwardly in desirable way towards any scientific endeavor but also understand why they act as they do”, defined by Rao (1996).

Scientific attitude has three basic components: belief, feeling and action. Belief is the cognitive basis of scientific attitude, which provides a learner several scientific information of scientific phenomenon, eminent scientists, scientific inventions etc.

Central component of scientific attitude is the feeling towards the belief. Effective science teaching, personality of science teacher, teaching- learning environment etc. plays a major role through which the belief of a learner is converted into his/her feeling towards it. Feeling is associated with emotion, on the basis of which a science learner develops his/her opinion.

Third component of scientific attitude is action or behavioral component which is mostly conative. It is the tendency of a science learner to act towards his/her scientific belief in accordance with feeling or opinion. For one reason or another, a people do not or cannot always act the way they feel, but tendency is there.

Scientific attitude, according to Rao (1996), represents the tendency of a science learner develops his/her opinion.

III. Scientific Attitude: Various Psychometric Considerations

Sood and Sanadhyay (1978, in Rao : 1996) measured scientific attitude in relation to rationality, open-mindedness, curiosity, aversion to superstition, objectivity of intellectual belief, and suspended judgment. Cilenti (1988) considered – curiosity, modesty, skepticism, truthfulness, open-mindedness, and determination. Rao, et. al (1989) state the most important scientific attitudes are open-mindedness, critical-mindedness, respect for evidence, suspended judgement, intellectual honesty, willingness to change opinion, search for truth, curiosity, rational thinking etc. Simpson (1994, in Osborne & Collins:2003) grouped scientific attitude into the categories – willingness of knowing and learning, enquiry and desire for everything, correcting and searching data, willingness to prove truthfulness, respect to logic, and, thinking for pre and post results.Carim (1997) considered curiosity, dependence on proof, skepticism, cooperation of others, respect for different approaches etc.Karasar (1999, in Aktamis & Ergin: 2008) considered open-mindedness, being modest for making mistakes, giving chance to different probabilities in judgment etc. Peter and Stout (2006) considered five groups presenting scientific attitude viz. curiosity, persistence, accepting uncertainty, inventiveness, and critical thinking. The last two dimensions seem to be novel, for not being considered by other researchers in this relation. Lacrose and Wisconsin (2007) considered – conviction of universal bias and preference towards cause and relation, sensitivity and curiosity, habit of delayed response holding views tentatively for suitable reflection, habit of weighing evidence, respect for another point of view, and willingness to be convinced by evidence etc.

Studies so far discussed, have considered scientific attitude in relation with different attributes, which are the characteristics of a scientist. Another trend is also found in this connection. Aktamis and Ergin (2008) considered various ‘actions performed by’ or ‘behavior of a person’ towards different aspects of science as attitude towards scientific knowledge, scientific method, activity of scientist and science career. Scientific attitude have three basic components i.e. belief, feeling and action. Belief of a person and his feeling towards science, scientists on scientific invention etc. leads him/her to act accordingly. Aktamis and Ergin (2008) emphasized to the third component of scientific attitude. This ‘action’ or ‘behaviour’ components have also been emphasized by Mandilla(1988), Gohit and Sreedevi (2009) etc. in relation to scientific attitude.

Studies so far discussed, have considered scientific attitude having a single, uni-dimensional construct in relation to several attributes or behaviors and add the individual scores on each attribute or behaviour to find out the total score on ‘scientific attitude’. Gardner (1975), Jones and Batts (1983) considered multidimensional construct of scientific attitude. Gardner (1975) referred to ‘attitude towards science’ and ‘scientific attitude’ as two separate dimensions and considered scoring on each dimension separately, without considering a single common score for measuring a unique scientific attitude. Jones and Batts(1983) proposed a four dimensional construct of scientific attitude, considering the dimensions as independent measures. Though multidimensional
construct is recognized, but most of the available instruments consider 'scientific attitude' having a unidimensional construct, emphasizing on several scientific attributes as the measures.

### IV. Review On Related Tools

Major features of few available tools widely used by researchers are shown in the following table.

**TABLE1: Major Features of Few Available Tools on Scientific Attitude**

<table>
<thead>
<tr>
<th>Test</th>
<th>Sample</th>
<th>Sub-dimensions</th>
<th>Reliability</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scientific Attitude Scale (SAS: Sood and Sanadhya, 1978), adopted by Rao (1996)</td>
<td>Secondary students</td>
<td>Rationality, Open mindedness, Curiosity, Aversion to superstition, Objectivity of intellectual belief, Suspended judgment</td>
<td>Split-Half (r=0.88, p&lt;0.01)</td>
<td>1. Intrinsic validity (test-subtest) (r=0.62 to 0.82, p&lt;0.01)</td>
</tr>
<tr>
<td>3. Scientific Attitude Scale (SAS: Gohit and Sredevi, 2008)</td>
<td>Secondary students</td>
<td>Curiosity, Rationality, Open mindedness, Objectivity, Suspended, Judgment, Freedom, Superstition, Perseverance</td>
<td>Test-retest (r=0.66, p&lt;0.01)</td>
<td>2. Intrinsic validity (item-total) (significant)</td>
</tr>
<tr>
<td>4. Attitude towards Scientific Scale (Gohit and Sredevi, 2008)</td>
<td>Secondary level</td>
<td>Attitude towards-1. Using scientific materials, 2. Perceived comfort and discomfort related to science classroom, 3. Learning science content, 4. Reading or talking about science related topic, 5. Viewing science programme on TV/Film</td>
<td>Test-retest (r=0.65, p&lt;0.01)</td>
<td>Content validity (Satisfactory)</td>
</tr>
<tr>
<td>5. Scientific Attitude Inventory (SAL: Lichtenstien, 2008) – the revised version SAL, standardized by Moore and Sutman (1981)</td>
<td>Secondary students</td>
<td>Attitude-1. For considering science as a subject for understanding and explaining, 2. For considering science as dynamic in nature, 3. Towards scientists</td>
<td>Internal consistency (a = 0.59 to 0.85 for individual sub-dimensions)</td>
<td>Construct validity – using confirmatory factor analysis (Necessity for further investigation of validity – as reported)</td>
</tr>
<tr>
<td>6. Scientific Attitude Scale: Yasar, et. al., 2009)</td>
<td>Lower secondary (Related to sense, thoughts and behaviours devoted to science and technology course)</td>
<td>Curiosity, Critical thinking, Proof dependence, Persistence, Co-operation, Objectivism, Acceptance of uncertainties</td>
<td>Internal consistency (alpha = 0.83)</td>
<td>1. Content validity (Satisfactory)</td>
</tr>
</tbody>
</table>

Study reveals the following points:

1. Poor psychometric property is found in Scale no.-5.
2. Scale no. 2 and 6 are valid for lower secondary group.
3. Content validity were only estimated in scale no.3 and 4.

Results of review reveal that scale no. 1 is appropriate for the present sample. Sound psychometric property, availability along with detailed manual, easy and readable items using gender and culture fair language, adaptation of the same by other researcher (Rao, 1996) etc. lead to its selection by many researchers.

Brief description of the scale is as follows, though some of its main features have already been shown in the table (Table 1) mentioned earlier.

Scientific Attitude Scale standardized by Sood and Sanadhya (1978) consists of 36 items (statements) together, having been constructed from six different dimensions (6 statements for each dimension), as mentioned in the table. It is a Likert-type scale. Five options (strongly agree, agree, neutral, disagree, strongly disagree) are there for each of the statements. Among these, 18 statements are of positive polarity (score 4 for strongly agree, score 3 for agree, 2 for neutral, 1 for disagree, 0 for strongly disagree), and remaining 18 are of negative polarity (reverse scoring). Scores for each individual statement are to be added to obtain the total score on scientific attitude. Rao (1996) adopted the scale in his study, estimated its reliabilities and validities over a group of 200 Indian sample (secondary students). Split-half method was used for estimating coefficient of reliability of the entire test, as well as for its each individual dimension. For the entire test, coefficients was found to be 0.86; and 0.76, 0.86, 0.84, 0.80, 0.73, 0.82 - respectively for the dimensions-rationality, curiosity, open-mindedness, aversion to suspension, objectivity of intellectual belief, and suspended judgment. Coefficient of intrinsic validity was also estimated by Rao (1996), considering sub-scale-sub-scale, and sub-scale-total correlation. Coefficients of intrinsic validity (sub-scale-total correlation) estimated were 0.62, 0.76, 0.80, 0.81,
0.85 and 0.82 respectively for different dimensions. Validity coefficients, in case of sub-scale-sub-scale correlation were found to vary from 0.31 to 0.63 (Rao, 1996)

V. Conclusion

The review therefore reveals that Scientific Attitude Scale (SAS: Sood and Sanadhya :1978) may be used by a teacher in science classroom for measuring secondary students’ scientific attitude. Following measures may be taken for its qualitative improvement.

The test may be standardised on the basis of response of a larger sample group. More number of relevant sub dimensions may be incorporated reducing the number of items under each dimension proportionately. Internal consistency reliability of the test (in terms of cron back alpha coefficient) may also estimated. Factor analysis may also be conducted to estimate its factorial validity. A norm (percentile, stanine etc.) may also be established to ensure better interpretability of the scores.

Reference

Scientific Research Competencies of Prospective Teachers and their Attitudes toward Scientific Research

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ABSTRACT
Present study has been constructed to determine scientific research competencies of prospective teachers and identify the extent of effect of prospective teachers’ attitudes toward scientific research and scientific research methods course on their research skills and attitudes towards research. This study has two dimensions: it is a descriptive study by virtue of identifying prospective teachers’ research skills and attitudes toward research, also an experimental study by virtue of determining the effect of scientific research methods course on prospective teachers’ skills and their attitudes toward research. In order to obtain the data related to identified sub-problems “Scale for Identifying Scientific Research Competencies” and “Scale for Identifying the Attitude toward Research” have been utilized. Data collection tools were applied to 445 prospective teachers. It has thus been concluded in this study that scientific research methods course had no significant effect in gaining scientific research competencies to prospective teachers and that this effect demonstrated no differentiation with respect to departments. On the other hand it has been explored that scientific research methods course had a negative effect on the attitudes of prospective teachers toward research and that there was a differentiation to the disadvantage of prospective teachers studying at Primary Education Mathematics Teaching Department.

Keywords:
Prospective teachers, scientific research competencies, attitudes toward scientific research.

1. Introduction
Dating back to as early as the birth of mankind, there has been an unceasing attempt of construe and comprehend the environment and surrounding events, which in effect introduced a demand for producing scientific knowledge and developing research (Demirtaş, 2014). In modern age witnessing an increased demand and significance of scientific knowledge, there emerges a need for individuals generating and construing knowledge via employing the methods applied to reach scientific knowledge. Türkmen and Kandemir (2011) argue that this is only feasible by raising the kind of individuals who investigate, question, and construe knowledge and generate science via employing scientific research steps and principles. Sönmez (2008) defines science as, “the process of establishing a process on the basis of providing evidence with certain portions of fact and the compilation of dynamic knowledge attained at the end of this process”.

Reaching scientific knowledge deemed to be the main determinant of personal and social life quality which can only be secured via implementing the kind of research methods compatible with the key principles of...
research (Ural & Kılıç, 2005). Scientific research itself embodies the systematic and planned set of activities manipulated to obtain scientific knowledge (Karasar, 1994; Demirtaş, 2014; Can, 2013).

A closer inspection to the aforementioned definitions reveals that the focal point of science is mental processes, desire to know and presence of knowledge whilst the key objective of scientific research is to search, identify and construe the origins, causes and formation of the phenomenon observed in the universe and our surrounding (Sharp, Peacock, Johnsey, Simon, Smith, Cross et al., 2009).

As agreed, one of the key objectives of modern educational systems is to raise individuals who not merely consume knowledge but also generate advanced knowledge reflecting their critical, questioning, creative and respectful attitude toward nature and humanity and the kind of individuals endowed with researcher, and scientific attitudes, behaviors and possessing the desire to share their knowledge with the rest of people. These are the kind of qualities that can be listed under scientific attitudes and behaviors (Karasar, 2007). As relevant literature is probed into, it is detected that such attitudes and behaviors are categorized as the most distinct qualities of modern man (Cafoğlu, 1998; Erdoğan, 1998; Genç, 2010). In order to generate scientific knowledge the foremost requirement is acquisition of scientific attitudes and behaviors (Erdem, 2012). Karasar (2007) claims that scientific attitudes and behaviors are investigating the kind of thoughts and behaviors facilitating problem solving, science generating or in a more comprehensive term, practicing of research techniques competencies.

Bökeoğlu and Yılmaz (2005) state that possessing scientific research skills and a positive attitude toward scientific research are inseparable constituents of rising as citizens that exhibit the necessities of modern age. As widely acknowledged, scientific research competencies and positive attitude toward scientific research should not be regarded as qualities of scientists alone and science is not to be generated by scientists only. This competency and attitude must be valued as among the essential features of modern individuals (Köseoğlu, Tümay and Budak, 2008). In that sense one of the most vital tasks of educational institutions is to render contribution in developing scientific perspective, attitude and behaviors of citizens.

There is an urgent need to apply the kind of curricula applicable to developing scientific research skills and positive attitude toward scientific research, but the number of such programs is far below expectations since these programs can be applicable in class only to the extent of perceptions and application skills of teachers, who are the actual implementers of curriculum. Accordingly it is a must to train the kind of prospective teachers, the actual implementers of curriculums aimed at developing scientific research skills of learners and positive attitude toward scientific research, who are personally endowed with scientific attitudes and behaviors (Türkmen and Kandemir, 2011). Irrespective of this agreement a number of relevant literature studies manifested that teacher’s lack adequate knowledge on scientific process skills, which in effect culminated the emergence of students possessing low levels of scientific process skills (Karslı, Şahin and Ayas, 2009; Türkmen and Kandemir, 2011). Türkmen and Kandemir (2011) in their work attested that teachers lack adequate knowledge on scientific process skills hence students are raised as individuals with low levels of scientific process skills. Echoing results can be traced to the studies conducted by Karśli, Şahin and Ayas (2009), Hazır and Türkmen (2008).

As the relevant literature on the requirements of teaching profession and qualities of teachers is explored, there is a certain emphasis on the quality of possessing research knowledge and skills (Kılıç and Acat, 2007; Kınçal, 2004; Şahin, 2011; YÖK, 1999). Based on the results obtained from an abundance of studies revealing the determinant effects of teachers’ attitudes, behaviors and skill levels on students’ performance (Kılıç and Acat, 2007; Oruç and Ulusoy, 2008; Şahin and Altunay, 2009) it is safe to argue that teachers of modern education are undoubtedly required to possess adequate levels of knowledge on scientific researches, skills and positive attitudes. In addition, it is of vital importance to train the teachers, who are the key players in attaining research culture and scientific perspective to society, endowed with a positive attitude toward researches. In an experimental study conducted by Demirbaş and Yaşşavan (2005) it is stated that teachers’ role-modeling is a practical method in gaining scientific attitudes and skills to students.

In line with this framework, the necessity to integrate into teacher-training curricula the kind of courses that develop a research culture has risen as a requirement, since teachers can only transfer effectively the type of knowledge, skills and attitudes they themselves already hold. Accordingly in teacher-training programs, a set of alterations have been made to gain research competencies and positive attitude toward research. To
address this general objective, courses titled as “Research Techniques”, “Research Methods in Education” and “Research Methods” were integrated into teacher-training programs between years 1982-1997, but in 1997 these courses were crossed. During the 2006-2007 academic term however, they were reintegrated into the curriculums to develop research skills of prospective teachers (YOK, 2007a). It is envisaged that prospective teachers having taken this course shall develop an awareness on the structure of scientific research and scientific methods; generate new perspectives on these methods; identify the problem; make a decision on research model; designate the universe and sampling; develop data collection, analysis, and interpretation skills (YOK, 2007b). In terms of raising teachers possessing scientific research competencies and positive attitudes toward scientific research, it is of grave importance to make the most of scientific research methods course.

Studies in relevant literature can be grouped under two categories: studies to identify scientific research competencies of teachers and prospective teachers and analysis of such competencies with respect to several variables (Demircioğlu, 2006; Şahin and Altunay, 2009; Tekbıyık and İpek, 2007; Büyükozttürk, 1999; Yakar, 2014; Akar, 2007; Nartgün, Uluman, Akun, Çelik and Çevik, 2008; Türkmen and Kandemir, 2011) and studies on the quality of scientific research methods (Nartgün, et al., 2008; Kurt et al. 2011; Tay, Demirci-Güler and Taşdemir, 2009). However in relevant literature there are limited numbers of studies aimed at identifying teachers’ or prospective teachers’ attitude toward scientific research (Korkmaz, Şahin and Yeşil, 2011).

For the prospective teachers, possessing scientific research skills and positive attitude toward scientific research bears critical importance in utilizing and transferring such skills during their teaching career (Taşdemir, 2013). In relevant literature no studies have been found which analyze prospective teachers’ scientific research skills and attitudes collectively with the effects of scientific research methods on the particular skills and attitudes. Identifying prospective teachers’ scientific research competencies and attitudes toward scientific research and detecting the effectiveness of scientific research methods can also provide vital contributions to raising researcher-teachers of the future.

In line with this framework the main objective of present study is not only to identify prospective teachers’ scientific research competencies and attitudes toward scientific research, but also the effect of scientific research methods course on the research skills of prospective teachers and their attitudes toward research. To address this objective the study aims to seek answers for below-listed questions:

1) What is the level of prospective teachers’ scientific research competencies and their attitudes toward research?
2) Do prospective teachers’ scientific research competencies change significantly with respect to department variables?
3) Does prospective teachers’ attitude toward research change significantly with respect to department variables?
4) What is the effect of Scientific Research Methods course on the scientific research competencies of prospective teachers?
5) What is the effect of Scientific Research Methods course on prospective teachers’ attitude toward research?
6) Does the effect of Scientific Research Methods course on the scientific research competencies of prospective teachers vary significantly with respect to department variables?
7) Does the effect of Scientific Research Methods course on the attitudes of prospective teachers toward research vary significantly with respect to department variables?

2. Method

2.1. Research model

In present study descriptive and experimental research models have been employed in tandem. This study has two dimensions: it is a descriptive study by virtue of identifying prospective teachers’ research skills and attitudes toward research and it is an experimental study by virtue of determining the effect of scientific research methods course on prospective teachers’ skills and their attitudes toward research. As regards experimental dimension of the study, pre-test final-test pattern with no control group has been adopted.
2.2. Universe of the study and sampling

With respect to descriptive dimension of the study, students in Balıkesir University, Necatibey Faculty of Education and taking “Scientific Research Methods” course have been selected as the universe of this study. Data collection tools have been applied to 445 prospective teachers randomly selected on the principle of reflecting the universe by the sampling. However, the scales completed by 7 prospective teachers were excluded from the analysis due to some missing personal information. Information on the sampling is listed as below:

<table>
<thead>
<tr>
<th>Department</th>
<th>Universe</th>
<th>Sampling</th>
<th>Representation rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. of Teaching Physical Sciences</td>
<td>120</td>
<td>64</td>
<td>53,3</td>
</tr>
<tr>
<td>Dept. of Teaching Turkish</td>
<td>130</td>
<td>53</td>
<td>40,8</td>
</tr>
<tr>
<td>Dept. of Teaching Computer Education and Instructional Technologies</td>
<td>123</td>
<td>56</td>
<td>45,5</td>
</tr>
<tr>
<td>Primary Education Maths Teaching</td>
<td>169</td>
<td>51</td>
<td>30,2</td>
</tr>
<tr>
<td>Classroom Teaching</td>
<td>122</td>
<td>61</td>
<td>50</td>
</tr>
<tr>
<td>Teaching Social Sciences</td>
<td>130</td>
<td>63</td>
<td>48,5</td>
</tr>
<tr>
<td>Teaching English</td>
<td>95</td>
<td>50</td>
<td>52,6</td>
</tr>
<tr>
<td>Preschool Teaching</td>
<td>53</td>
<td>47</td>
<td>88,7</td>
</tr>
<tr>
<td>Total</td>
<td>942</td>
<td>445</td>
<td>47.2</td>
</tr>
</tbody>
</table>

Experimental dimension structured to identify the effect of “Scientific Research Methods” course on prospective teachers’ research competency and their attitudes toward research has been conducted during 2013-2014 Academic Year Fall Term among students in Dept. of Teaching Physical Sciences, Primary Education Mathematics Teaching, Dept. of Teaching Turkish, Teaching Social Sciences and Dept. of Teaching Computer Education and Instructional Technologies(CEIT) having taken “Scientific Research Methods” course.

2.3. Data collection

In order to obtain the data relevant of identified sub-problems, “Scale for Identifying Scientific Research Competencies” and “Scale for Identifying the Attitude toward Research” have been utilized.

Developed by Doğan, Albayrak and Acar (2007), “Scale for Identifying Scientific Research Competencies” consists of 54 items. Scale items are graded in five-point Likert scale as “Always, Mostly, Occasionally, Rarely, Never”. Grading of scale is; Always= 5, Mostly= 4, Occasionally= 3, Rarely= 2, Never= 1. This data collection tool of Cronbach Alpha internal consistency coefficient was measured as .90 (Doğan, Albayrak and Acar, 2007) and revealed .89 Cronbach Alpha internal consistency coefficient in present study. Since this is a value between “0.80<α<1.00” it is identified that the scale is “highly reliable” (Kalaycı, 2006).

In order to designate prospective teachers’ attitudes toward research, “Scale for Identifying the Attitude toward Research” adapted into Turkish by Çetin, İlhan and Kinay (2012) has been employed. In the process of adapting into Turkish the scale originally developed by Papanastaiou (2005), the first step has been to analyze linguistic equivalence of the scale. Between the Turkish and English forms of the scale a positive way, strong and significant relation was detected. Construct validity of the Turkish form of the scale was examined by Exploratory Factor Analysis (EFA). EFA showed that unlike the original form with 5 factors, the scale had a four-factor structure. Cronbach Alpha internal consistency coefficient of the scale was found as.88. Based on these findings it was concluded that the scale was a valid and reliable tool of measurement to designate Turkish college students’ attitudes toward research (Çetin, İlhan and Kinay, 2012). In present
study, Cronbach Alpha internal consistency coefficient of data collection tool was measured as .93. Since this was also a value between “0.80<α<1.00” the scale was identified as a “highly reliable” scale (Kalaycı, 2006).

As regards descriptive dimension data collection tools were applied to identified sampling. As regards experimental dimension on the other hand, it was conducted at the beginning and final of the course-teaching-process. During the application stage, 306 students took the pre-test and 278 students took the final test. However, since 43 students having taken the pretest did not take the final test, and 10 students having taken the final test but not the pretest, they were excluded from the analysis. Additionally 2 scales from the pretest and 7 scales from the final test were excluded from the analysis due to some missing personal information. Numeric data on the study group regarding the experimental dimension of research are as given below.

Table 2. Numeric Data on Study Group

<table>
<thead>
<tr>
<th>Department</th>
<th>Pre-test</th>
<th>Final-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Social Sciences</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Primary Education Maths Teaching</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Teaching CEIT</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Dept. of Teaching Turkish</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Dept. of Teaching Physical Sciences</td>
<td>66</td>
<td>66</td>
</tr>
</tbody>
</table>

2.4. Data analysis

“Scale for Identifying Scientific Research Competencies” consists of 54 items. Scale items are graded in five-point Likert scale as “Always, Mostly, Occasionally, Rarely, Never”. Grading of scale is; Always = 5, Mostly = 4, Occasionally = 3, Rarely = 2, Never= 1. The scores reflecting prospective teachers’ research competencies have been interpreted by comparing the identified values with limit intervals. Since utilized scale was with 5 grades and 4 intervals (4:5=0.8) limit intervals were scored within 0.8 interval from 1 to 5 (1.00-1.80 “Never”, 1.81-2.60 “Rarely”, 2.61-3.40 “Occasionally” 3.41-4.20 “Mostly” and 4.21-5.00 “Always”). In the scale, inverse scoring was conducted in the 25, 29, 30-39 intervals and item 46.

“Scale for Identifying the Attitude toward Research” was constructed in 7-point Likert type and responses of participants were scored as: 1 “I absolutely disagree”, 2 “I disagree”, 3 “I partially disagree”, 4 “I am undecided”, 5 “I partially agree”, 6 “I agree” and 7 “I absolutely agree”. The scores reflecting prospective teachers’ attitudes toward research have been interpreted by comparing the identified values with limit intervals. Since utilized scale was with 7 grades and 6 intervals (6:7=0.85) limit scores were scored within 0.85 interval from 1 to 7 (1.00-1.85 “I absolutely disagree”, 1.86-2.71 “I disagree”, 2.72-3.57 “I partially disagree”, 3.58-4.43 “I am undecided”, 4.44-5.29 “I partially agree”, 5.30-6.15 “I agree” and 6.16-7.00 “I absolutely agree”). In the scale inverse scoring was conducted in the 1, 6, 7, 9-12 intervals and items 16, 18, 23, 25, 26, 28, and 32.

As a result of Kolmogorov-Smirnov test applied to detect if data obtained for descriptive dimension exhibited a normal distribution, it was deemed appropriate to use parametric tests in the analysis of data revealing prospective teachers’ scientific research competencies (z=1.096; p=.181; p>.05). As regards the attitude toward research, Kolmogorov-Smirnov test indicated that in the analysis of data it is more appropriate to apply nonparametric tests (z=1.594; p=.012; p<.05). In the identification of prospective teachers’ scientific research competencies and attitudes toward research, arithmetic mean and standard deviation scores were employed. In order to designate if research competencies varied significantly with respect to department variable “One-Way ANOVA”; and in order to detect within which groups significant differentiation occurred, “Scheffe” test was employed. To see whether attitudes significantly differentiated, “Kruskall Wallis-H analysis” was conducted. To identify the originating source of groups explaining the different attitudes among prospective teachers, Mann-Whitney U test was performed.
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As a result of Kolmogorov-Smirnov test applied to detect if data obtained for experimental descriptive dimension exhibited a normal distribution, in the analysis of pre-test \((z=4.789; p=.000; p<.05)\) and final-test \((z=6.109; p=.000; p<.05)\) scores of prospective teachers' scientific research competencies non-parametric tests shall be employed. In the analysis of pre-test \((z=1.250; p=.088; p>.05)\) and final-test \((z=6.109; p=.971; p>.05)\) scores obtained from Kolmogorov-Smirnov test to detect their attitudes toward research, parametric tests were applied. To detect the effect of scientific research methods course on the scientific research competency of prospective teachers and to see if a significant differentiation existed between pre-test and final-test scores of each group, "Wilcoxon signed ranks" analysis for dependent groups was performed. To detect their effect on the attitude toward research and see if a significant differentiation existed between pretest and final test scores of each group, "t-test" for dependent groups was conducted. To see if final test scores related to prospective teachers' scientific research competencies varied significantly with respect to department variable "Kruskall Wallis-H analysis" was applied. To identify if final test scores related to prospective teachers' attitudes varied significantly with respect to department variable "One-Way ANOVA" analysis was put into practice. In the interpretation of collected data, a comparison was made between the experimental and descriptive results to reach indirect suggestions on the permanency of skills and attitudes.

3. Results

Results related to Prospective teachers' scientific research competencies and their attitudes toward scientific research are as manifested in Table 3.

Table 3. Prospective Teachers’ Scientific Research Competencies and Their Attitudes toward Scientific Research

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>(\bar{X})</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific research competency</td>
<td>438</td>
<td>2.23</td>
<td>5.00</td>
<td>3.48</td>
<td>.36</td>
</tr>
<tr>
<td>Attitudes toward scientific research</td>
<td>438</td>
<td>2.00</td>
<td>7.00</td>
<td>5.33</td>
<td>.87</td>
</tr>
</tbody>
</table>

As demonstrated in Table 3, with a \(.36\) standard deviation the arithmetic mean of prospective teachers’ views on their scientific research competencies was detected as \(\bar{X}=3.48\). According to the obtained value prospective teachers’ "Mostly" exhibit the kind of behaviors indicating scientific research competency. With a \(.87\) standard deviation the arithmetic mean of prospective teachers’ views on their attitude toward research was detected as \(\bar{X}=5.33\). Based on this score it can be argued that prospective teachers’ perception on their attitude toward research is in "I agree" level.

Table 4. Prospective Teachers’ Scientific Research Competencies With Respect to Department Variable

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Sd</th>
<th>Mean square</th>
<th>p</th>
<th>Significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>3.52</td>
<td>7</td>
<td>.50</td>
<td>.00</td>
<td>e&gt;d; e&gt;h</td>
</tr>
<tr>
<td>Intra-group</td>
<td>54.33</td>
<td>430</td>
<td>.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>57.84</td>
<td>437</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Obtained findings show that prospective teachers' scientific research competencies with respect to department variable can be ordered from the highest to the lowest as: CEIT (e; \(\bar{X}=3.68\)), physical sciences (a; \(\bar{X}=3.52\)) and social sciences (g; \(\bar{X}=3.52\)), preschool (f; \(\bar{X}=3.48\)), primary education mathematics (b; \(\bar{X}=3.45\)), Turkish (c; \(\bar{X}=3.42\)), English (h; \(\bar{X}=3.41\)) and classroom teaching (d; \(\bar{X}=3.37\)). In a different saying it is safe to claim that behaviors indicative of scientific research competencies are occasionally exhibited by
classroom teaching prospective teachers ($\bar{x}=3.37$) while mostly exhibited by prospective teachers from the remaining departments. Table 4 points that there is significant differentiation among departments ($p=.000$, $p<.05$). This difference is in favor of prospective teachers from CEIT department ($e; \bar{x}=3.68$), English ($h; \bar{x}=3.41$) and classroom teaching ($d; \bar{x}=3.37$) department students.

Table 5. Prospective Teachers’ Attitude toward Scientific Research With Respect To Department Variable

<table>
<thead>
<tr>
<th>Department</th>
<th>N</th>
<th>Mean rank</th>
<th>sd</th>
<th>KWH</th>
<th>p</th>
<th>Significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Teaching Physical Sciences</td>
<td>64</td>
<td>274.96</td>
<td>7</td>
<td>37.003</td>
<td>.00</td>
<td>$a&gt;b; a&gt;c; a&gt;d; a&gt;f; a&gt;h;$</td>
</tr>
<tr>
<td>b. Primary Education Mathematics Teaching</td>
<td>50</td>
<td>192.56</td>
<td></td>
<td></td>
<td></td>
<td>$e&gt;b; e&gt;c; e&gt;d; e&gt;f; e&gt;h;$</td>
</tr>
<tr>
<td>c. Teaching Turkish</td>
<td>52</td>
<td>175.34</td>
<td></td>
<td></td>
<td></td>
<td>$g&gt;c; g&gt;d$</td>
</tr>
<tr>
<td>d. Classroom Teaching</td>
<td>61</td>
<td>184.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Teaching Computer Education and Instructional Technologies CEIT</td>
<td>55</td>
<td>268.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Preschool teaching</td>
<td>47</td>
<td>214.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Teaching social sciences</td>
<td>59</td>
<td>237.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Teaching English</td>
<td>50</td>
<td>194.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Findings of Table 5 reveal that as prospective teachers’ attitude toward scientific research with respect to department variables analyzed the highest mean rank belongs to Teaching Physical Sciences students ($a; \bar{x}=274.6$), whilst the lowest mean rank belongs to students in Teaching Turkish department ($c; \bar{x}=175.34$). As manifested prospective teachers’ attitude toward scientific research with respect to “department” variable differs significantly ($KWH=37.003; p=.000; p<.05$). A significant difference was detected among the attitudes of prospective teachers studying in the Dept. of Teaching Physical Sciences, Primary Education Mathematics Teaching, Dept. of Teaching Turkish, Classroom Teaching, Preschool Teaching and Teaching English ($p<.05$). A statistically significant differentiation was measured between prospective teachers in CEIT, Primary Education Mathematics Teaching, Classroom Teaching, Preschool Teaching, Dept. of Teaching Turkish and Teaching English; prospective teachers in Department of Social Sciences and Dept. of Teaching Turkish and Classroom Teaching ($p<.05$). This finding can be interpreted as evidencing the deduction that prospective teachers' attitude toward scientific research varies with respect to their department.

Table 6. Comparison of Pre-Test and Final-Test Scores of Prospective Teachers’ Scientific Research Competencies

<table>
<thead>
<tr>
<th>Final-test Pre-test</th>
<th>N</th>
<th>Mean rank</th>
<th>Rank sum</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative rank</td>
<td>136</td>
<td>110.59</td>
<td>150040.0</td>
<td>1.684*</td>
<td>.09</td>
</tr>
<tr>
<td>Positive rank</td>
<td>125</td>
<td>102.02</td>
<td>19151.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on negative ranks
As can be witnessed in Table 6, between the scores prospective teachers had before scientific research methods course and the score they receive at the end of course there is a difference in favor of final-test scores but this difference is not significant ($z=1.684$; $p=.092$; $p>.05$). According to these results it can be argued that scientific research methods course has no significant effect in gaining scientific research competencies to prospective teachers.

Table 7. Comparison of Pre-Test and Final-Test Scores of Prospective Teachers’ Attitude toward Research

<table>
<thead>
<tr>
<th>Attitudes toward scientific research</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>S</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>261</td>
<td>5.41</td>
<td>.38</td>
<td>260</td>
<td>-38.09</td>
<td>.00</td>
</tr>
<tr>
<td>Final-test</td>
<td>261</td>
<td>3.42</td>
<td>.77</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7 displays that scientific research methods course has a negative effect on prospective teachers’ attitudes toward research ($t=-38.094$, $p=.000$, $p <.05$). Before the application prospective teachers’ previous mean score ($\bar{X}=5.41$) of their attitude toward research significantly regressed ($\bar{X}=3.42$) after taking the course. Correlation between pre-test and final-test scores is .039. However this finding is not indicative that prospective teachers with higher pre-test score does not necessarily receive a high final-test score or prospective teachers’ with low pre-test score does not necessarily receive a low final-test score. Nonetheless it indicates that their attitude toward research is somehow affected.

Table 8. With Respect to Department Variable the Effect of Scientific Research Methods Course on Prospective Teachers’ Scientific Research Competencies

<table>
<thead>
<tr>
<th>Department</th>
<th>N</th>
<th>Mean rank</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Dept. of Teaching Physical Sciences</td>
<td>66</td>
<td>133.50</td>
<td>1.314</td>
<td>.86</td>
</tr>
<tr>
<td>b. Primary Education Mathematics Teaching</td>
<td>72</td>
<td>126.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Dept. of Teaching Turkish</td>
<td>34</td>
<td>123.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. CEIT</td>
<td>45</td>
<td>132.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Teaching Social Sciences</td>
<td>44</td>
<td>139.81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As the mean ranks of groups in Table 8 are examined; the highest mean rank belongs to the final test scores of prospective teachers in department of Teaching Social Sciences ($\bar{X}=139.81$), while the lowest mean rank belongs to the final test scores of prospective teachers in Dept. of Teaching Turkish ($\bar{X}=123.15$). According to these findings no significant differentiation exists among final-test scores related to the effect of scientific research methods course on prospective teachers’ scientific research competencies with respect to department variable ($\chi^2=1.314$; $p=.859$; $p>.05$).

Table 9. With Respect to Department Variable the Effect of Scientific Research Methods Course on the Attitudes of Prospective Teachers toward Scientific Research

<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>Sd</th>
<th>Mean square</th>
<th>F</th>
<th>p</th>
<th>Significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>4.59</td>
<td>4</td>
<td>1.15</td>
<td>8.68</td>
<td>.00</td>
</tr>
<tr>
<td>Intragroup</td>
<td>33.85</td>
<td>256</td>
<td>.13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As obtained findings reveal the highest attitude level pertains to prospective teachers in the department of Teaching Social Sciences ($\bar{X}=3.56$), while the lowest attitude level pertains to prospective teachers in Primary Education Mathematics Teaching department ($\bar{X}=3.21$). Table 9 also shows that there is significant differentiation with respect to departments ($p=.000, p <.05$). This difference can be seen in favor of prospective teachers from department of Teaching Social Sciences ($b; \bar{X}= 3.56$), Dept. of Teaching Turkish ($c; \bar{X}= 3.53$), CEIT ($d; \bar{X}= 3.47$) and Dept. of Teaching Physical Sciences($d; \bar{X}= 3.45$) and Primary Education Mathematics Teaching($a; \bar{X}= 3.21$).

4. Discussion

In present study structured to identify prospective teachers'scientific research competencies and attitudes toward scientific research and the effect of scientific research methods course on their research skills and research attitudes. It has been detected that prospective teachers’ “Mostly” exhibited the kind of behaviors indicative of scientific research competency and their attitude toward research was in “I agree” level. On the other hand a study conducted by Büyüköztürk (1999) revealed that participant teachers lacked adequate level of research competencies and similarly a study by Türkmen and Kandemir (2011) posited that teachers lacked adequate level of theoretical knowledge on scientific process skills. The incongruity between the results obtained from studies with similar motives may be attributed to the sampling and timing incompatibility between studies.

Another finding of current study is that the kind of behaviors indicative of scientific research competencies were, compared to prospective teachers in Teaching English and Classroom Teaching, significantly more widely adopted by CEIT prospective teachers. In terms of attitudes toward scientific research, prospective teachers studying in Dept. of Teaching Physical Sciences possessed significantly higher levels of positive attitude compared to prospective teachers from other departments. Akar (2007) in his study manifested that prospective teachers in Classroom Teaching department lacked high levels of scientific process skills. Similar findings on the attitude toward scientific research were also detected in Yakar’s (2014) study and it was concluded that pre-service training that prospective teachers in Dept. of Teaching Physical Sciences receive had a positive effect in developing their scientific process skills.

It has been concluded in present study that scientific research methods course posits no significant effect in gaining scientific research competencies to prospective teachers and that this effect showed no difference with respect to departments and on the contrary the course negatively affected prospective teachers’ attitudes toward research and that there occurred a difference to the disadvantage of prospective teachers in Primary Education Mathematics Teaching. On the other hand as regards self-competency. Nartgün et al. (2008) identified a difference in favor of prospective teachers having taken the course. In the study of Büyüköztürk (1999) it was manifested that prospective teachers having taken competency-relevant courses, in comparison to the ones not taken the course, proved to be more efficient in research practices. The discrepancy in the results of studies conducted for similar motives might be explained with the differences of research competency related courses in the process dimension.

5. Conclusion and Recommendations

It has been concluded at the end of study that prospective teachers’ level of exhibiting the kind of behaviors indicative of scientific research competency was in “Mostly” and their attitudes toward research was in “I agree”level. It has also been detected that behaviors indicative of scientific research competency were significantly more widespread among CEIT (Computer Education and Instructional Technologies) prospective teachers compared to prospective teachers from departments of English and Classroom Teaching and as regards their attitudes toward scientific research, prospective teachers studying in Department of Teaching Physical Sciences held further positive attitudes than the prospective teachers studying in different departments. It has thus been concluded in this study that scientific research methods
course had no significant effect in gaining scientific research competencies to prospective teachers and that this effect demonstrated no differentiation with respect to departments. On the other hand it has been explored that scientific research methods course had a negative effect on the attitudes of prospective teachers toward research and that there was a differentiation to the disadvantage of prospective teachers studying at Primary Education Mathematics Teaching Department.

Based on the deduction that attracting the teacher to research process and allowing personal integration to research activities is the pivotal factor in perpetuating learning activity, it is safe to argue that instead of transferring theoretical knowledge alone more emphasis should be rendered to practice stage in gaining research skills to prospective teachers. Accordingly it becomes feasible to instill the essentials of scientific research methods course and the kind of settings favorable to put into practice their theoretical knowledge could be arranged for prospective teachers. By associating the context of scientific research methods course with real life, the kind of studies in which prospective teachers may utilize their course learning can be designed in the future. Present study could be repeated among wider samplings and varied groups and to obtain more elaborate data, it could be patterned on the basis of qualitative research methods.

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La estructura Diacrónica de los sistemas de Acción y el concepto de 'ACTITUD'

En el texto anterior no se distingue entre las visiones sincrónica y diacrónica de la estructura de la acción. Así planteado, el modelo podría sugerir que cualquier individuo es capaz de cualquier acción, sin explicar, por ejemplo, cómo es que una acción es ejecutable por unos individuos y no por otros, aun cuando todos compartan unos mismos datos contextuales o cómo ocurre que la ejecución de una determinada acción depende estrictamente de toda una serie de acciones y eventos previos (como es el caso en el refrán "tanto va el cántaro al agua hasta que se rompe").

En esa versión, los conceptos de "conjunto epistémico" (que incluye presuposiciones, valores y normas) y de "reglas de interpretación y evaluación de situaciones iniciales" serían los responsables teóricos de todo esto (ya que las diferencias de conjuntos epístémicos entre actores es lo que explica el caso expuesto en el primer ejemplo, mientras que las reglas de interpretación y evaluación podrían explicar el caso del segundo ejemplo). Sin embargo, dichos conceptos resultan demasiado generales para cubrir las explicaciones de la acción en cuanto estructura diacrónica, es decir, en cuanto hecho que se va gestando en el tiempo. En esa misma versión se habla de un nivel de variaciones de acción basado en el carácter progresivo de ciertas acciones (como en el ejemplo de "tocar el piano", comparado con el de "comprar un apartamento"). Pero todos estos conceptos son demasiado generales y hasta ambiguos.

En realidad, lo que está en el fondo de estas cuestiones es la diferencia entre lo sincrónico y lo diacrónico en la estructura de la acción. Lo sincrónico puede ser reducido sólo a la estructura general de la acción en términos de $< (S_0, S^n), (S_1, S_2, ..., S_{n-1}), S_n >$ dentro de una sucesión temporal $t_0, ..., t_n$ y enfatizando el carácter recursivo de los factores $S_1, ..., S_{n-1}$. Dentro de esta visión sincrónica estarían las redes de acción que dependen de las relaciones de complementariedad e inclusión.

La visión diacrónica, en cambio, considera las acciones como productos de todo un sistema de acciones y eventos y, además, como generadores de acciones sucesivas. Desde este punto de vista las redes diacrónicas vendrían a ser sistemas complejos de acción estructurados en el tiempo, sobre la base de mecanismos generativos, progresivos. Esto puede ser estudiado tanto en el nivel del sistema individual del actor (interno a él) como en el nivel del sistema social o supraindividual (externo al actor). En este último nivel la diacronía de las acciones se fundamentaría en las relaciones de dependencia entre acciones (castigo, venganza, etc.). Pero en el nivel individual la diacronía se fundamentaría en las relaciones entre el resultado de una acción y el conjunto epistémico del actor.

Según lo se acaba de decir, hay entonces dos criterios que permiten explicar la diacronía de los sistemas de acción (y, por tanto, la pertenencia de una acción a una red temporal). El primero de ellos, correspondiente al nivel supraindividual, externo al actor, es la relación de condicionamiento o dependencia entre acciones. La venganza, por ejemplo, es una acción típicamente consecuente, igual que el castigo o el premio. Estas relaciones de dependencia fueron ya explicadas en el texto anterior. Su importancia ahora es que permiten postular redes diacrónicas de acción: la venganza, el premio, el castigo, el diálogo, la negociación, la trama de una novela, etc., resultarían inexplicables si no fuera por estas relaciones de condicionamiento, ahora redimensionadas en el concepto de sistema diacrónico. El principio aquí es que toda acción puede ser estudiada como el efecto de una acción anterior y como la virtual condición para una acción posterior.

Por otro lado, manejando ahora el segundo criterio, que corresponde al nivel individual, interno al actor, los resultados de toda acción (tanto de éxito como de fracaso) tienden a modificar el conjunto epistémico del actor, lo cual, en parte, explica el concepto de "aprendizaje"[6]. Estas
modificaciones se convierten en generadores de nuevas acciones, de modo que el resultado $S_{n1}$ de una acción antecedente $A_1$ produce ciertas modificaciones del conjunto epistémico del actor (tanto de refuerzo como de reconfiguración), tal que el conjunto epistémico $E_1$, previo a $A_1$, pero como efecto de $A_1$, se reconfigura para dar paso al conjunto epistémico $E_2$, el cual generará una nueva acción $A_2$, y así sucesivamente. Esto puede ser ilustrado con un diagrama como el del Gráfico 2, donde los símbolos $\bullet\rightarrow$ representan el encadenamiento sucesivo entre un conjunto epistémico reconfigurado por una acción anterior y una nueva acción.

Gráfico 2: ciclo iterativo de las Acciones

El conjunto epistémico es estructurado sobre la base de aquello que, empíricamente, se conceptualiza como información recibida, valores transmitidos, experiencia del actor, etc. Lo importante aquí es que resulta modificado por los resultados de sus propias acciones previas. En este sentido, el conjunto epistémico podría ser el correlato teórico de las actitudes, en cuanto sistemas disposicionales.

En síntesis, la forma general de la estructura diacrónica de la Acción podría ser representada en un diagrama como el del Gráfico 3:

Gráfico 3: Estructura diacrónica de la Acción

Según esto, el puente que media entre una acción virtual y una acción real o efectiva (en el sentido aristotélico de "potencia" y "acto") es la "Actitud" o "Disposición de Acción". Si existe una cierta configuración del conjunto epistémico, si al mismo tiempo el actor se halla en una situación socio-espacio-temporal adecuada a los valores de esa configuración, entonces el actor ejecutará esa acción. En ese sentido, una ACTITUD (o "disposición de acción") vendría a ser, teóricamente, una cierta configuración del Conjunto Epistémico correlacionada con una determinada clase típica de acción ($A$) y un cierto contexto socio-espacio-temporal $c$, también correlacionado con $A$.

Por ejemplo, tomemos una clase típica de acción como "Atracar". Esta clase típica de acción requiere de una cierta configuración del Conjunto Epistémico asociada a esa clase de acción (cierto
cuerpo informacional, cierto cuerpo axiológico y cierto cuerpo operativo-procedimental, o sea: conocimientos, preferencias y habilidades orientadas a "Atracar"). Pero también requiere de una cierta situación socio-espacio-temporal, la cual describe las oportunidades y circunstancias del atraco. Basta con que se produzca esa relación, para que un Actor X ejecute la acción de Atracar. Si un Actor Z tiene un conjunto epistémico no asociado a "Atracar", la acción no será ejecutada, aun cuando estén presentes las mismas condiciones contextuales.

Esto implica que para cada clase típica de acción existe un cierto conjunto epistémico correlacionado y un cierto contexto también correlacionado, lo cual podría simbolizarse en la fórmula siguiente, donde \( A \) es una relación que vincula entre sí a un Conjunto Epistémico \( E \) con un sociocontexto \( c \):

\[
A(E, c)
\]

Una cierta Actitud o Disposición en el Actor X nos dice que X tiene tal configuración epistémica que ejecutará una determinada Acción si X llegara a encontrarse dentro del sociocontexto apropiado para esa Acción. Así, por ejemplo, si decimos que "X tiene una actitud agresiva", estamos diciendo que, con respecto a la Acción en que "X agrede a W", X efectivamente agredirá a W si se dan las condiciones sociocontextuales, ya que su conjunto epistémico contiene los valores, los procedimientos y las informaciones adecuadas para la acción de agredir. Sería un error decir que "X tiene actitudes agresivas" si lo que estamos observando es que, de hecho, X está agrediendo a alguien. En ese caso no sería una actitud, sino una acción real.

Para el análisis de las Acciones es necesario considerar las actitudes (que son disposiciones o tendencias a actuar en cierto sentido), las cuales, a su vez, son el impacto de los resultados de las acciones previas de un actor en su propio Conjunto Epistémico. Entonces, el análisis de las Actitudes comprenderá los siguientes elementos mínimos:

- Determinar la estructura de una clase típica de Acción
- Determinar los datos del sociocontexto asociado a esa clase de acción
- Determinar los datos del Conjunto Epistémico asociado a esa clase de acción, esto es:
  - Los cuerpos presuposicionales (informacionales)
  - Los valores o preferencias
  - Los cuerpos operativo-procedimentales