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Research Hypotheses: A Theoretical Approach

1. Introduction

It may not be an exaggeration to claim that hypothesis is the steering wheel of research, which eventually defines which direction this would take. Although some exploratory studies may do away with hypothesis, it is widely recognized that the formulation and testing of the hypothesis is paramount in research. It is a human nature to try to advance a tentative explanation of why phenomena occur in that particular way. In so doing, they are said to be hypothesizing, i.e., they are either offering an explanation or making a guess. In either case, it is not easy to be certain of the veracity of the explanation and or guess/ prediction. On the other hand, the explanation or prediction can be easily negated. One good illustration is Darwin's Evolution Theory; no one is conclusively certain that Man descended from apes. It could be argued that apes and humans have different number of chromosomes. Negating, thus, Darwin's hypothesis. This is known as Karl Popper's Principle of falsifiability (see p. 4).

The current paper aims to ease novice researchers (namely Master's and doctoral students) into raising their awareness to understand, come to grips with, and formulate workable hypotheses.

2. Etymology of hypothesis

It appears that the term hypothesis derives from *building* jargon as it literally refers to bases, foundations, groundwork. It is deriving from two Ancient Greek words (hupo and thesis) where *hupo* means under or beneath and *thesis* placing or groundwork. The bases or foundations of one's ideas, arguments, way of thinking indicate the person's hypothesis to explain and/ or predict why things occur the way they do.

3. Scholarly Definitions of Hypothesis

Hypotheses in research are actually means to an end: They are clearly stated once the research question and literature review have been fully identified and undertaken; the view is to engage in serious research by the end of which an explanation and/ or a generalization is provided and an informed decision is made. Ary et al. (2010, p.82) corroborate '"Hypotheses are tools not ends in themselves". Therefore, researchers' main concern is to accept or refute the falsibility of the hypotheses.

Researchers come from two research backgrounds: They are either experimentalists or descriptivists. Regardless of their backgrounds and how they couch their definitions of hypotheses, three terms seem to spring from almost every single definition: explanation, prediction, and testable. These three terms speak volumes of the nature of hypotheses: They would offer an explanation why phenomena happen the way they do, or they predict the

relationship between variables (independent or dependent) by stating whether they are bound by a cause-effect or correlation relationship. In either case, hypotheses are to be tested.

Bailey (1994, p.43) defines hypothesis as "a proposition that is stated in testable form and predicts a particular relationship between two (or more) variables". Bailey further points out "A hypothesis is [...] a tentative explanation for which the evidence necessary for testing is at least potentially available" (1994, p. 43).

Atkinson (2011, p.102) identifies research hypothesis as "a statement of prediction between two variables". Differently stated, the collocation or juxtaposition of the independent variable (IV) and the dependent variable (DV) should point out to the nature of the relationship between these variables. Either causation or correlation is explicitly expressed in the prediction between the two variables.

Weaver et al. (2017, p.9) notes "A hypothesis is a testable statement that provides a possible explanation to an event or phenomenon". A well couched hypothesis attempts to offer a tentative explanation of why phenomena occur the way they do and not in the way they intuitively or expectantly would do.

Overall, research hypotheses are expected to predict and/ or offer a tentative explanation when two or more variables interplay.

4. Dual Nature of Hypothesis

On account of its falsifiability-based nature, hypotheses are primarily meant to negate popular beliefs and assumptions. "By convention, research is conservative and assumes the absence of a relationship between attributes under consideration; hypotheses, therefore, are expressed in null terms (Cohen, 2009, p.331). Even if this may prove to come down right from quantitative, i.e., empirical approaches, it is still valid for qualitative research. This may be better illustrated from medical sciences where physicians follow the *elimination principle* which reposes on the elimination of the shadow of doubts of life-threatening diseases in their diagnosis. In so doing, they will have a chance not to waste time and reach an early diagnosis, which would eventually save lives.

Bailey (1994, p.43) believes that hypotheses should meet three "No" criteria:

> **4. 1. No normative**: According to Britannica Dictionary, *normative* refers to what is 'based on what is considered to be the usual or correct way of doing something" such as in "normative rules of ethics or normative tests/ grammar". As it is, normative is synonymous with prescriptive. Hypotheses should, therefore, avoid being prescriptive as in "All adults must attend religious service at least once a week" (Bailey, 1994. p.43).
>
> **4. 2. No opinion**: *Wars are unjustified* may be considered an opinion in that opinions express intuition-based impressions rather than verifiable knowledge. Along those lines, Merriam-Webster Dictionary defines opinion as "a belief based on experience and certain facts but not amounting to sure knowledge". Opinions are often intuitive and fraught with bias, subjectivity, and wishful thinking. Leonardo Da Vinci notes "The

greatest deception men suffer is from their own opinions". Thus, opinions cannot be part of hypotheses.

4. 3. No value judgments: The subjective evaluation by applying one's own standards constitute value judgments particularly when "should- should not" are forced into place. Some people think that target culture should only be sparingly introduced in the teaching of foreign language teaching and learning is obviously an instance of a value judgment.

As norms, opinions, and value judgments are hard to test, they cannot be part of hypotheses, and. therefore, they are all excluded.

5. Perspectives of Hypotheses

5. 1. Inductive Hypotheses: Inductive hypotheses characterize qualitative research. Inductive hypotheses are developed from specific observations or events tracing up patterns with a view of developing "explanations-theories- for those patterns" (Bernard 2013, p.12). According to Maxwell (2005, p.69), "The distinctive characteristic of hypotheses in qualitative research is that they are typically formulated after the researcher has begun the study".

5. 2. Deductive Hypotheses (DH): Deduction is generally understood to refer to the process of deriving conclusions from broad and/or abstract premises. The process starts with theories (common sense, observations, and reading the literature) then undertakes measurements or observations which are, eventually, either confirmed or rejected (Bernard 2013, p.12). Deductive hypotheses are the cornerstone in quantitative research.

6. Features of Hypotheses

Good and/ or strong hypotheses are basically characterized by their straightforward outward statement structure. They are explicit, succinct, and informative.

6. 1. Explicitness: Hypotheses are couched as statements (never as questions). The statement need be soberly expressed so that no equivoque sneaks into the text of the statement particularly by eliminating redundancy and loaded language. In wide brief, hypotheses ought to be clearly stated. To achieve this, hypotheses are to be expressed in reasonably precise statements and in very simple terms so that they come to be understood by all.

6. 2. Logic: To be understood by all, hypotheses ought to be in line with logic and common sense. Gravetter & Forzano, 2012, p. 28) note " [...] a good hypothesis should be the logical conclusion of a logical argument". Differently stated, when observations are based on facts, they prompt the formulation of sound hypotheses. For instance, (observation 1) societies highly value education, and (observation 2) learners with high IQ excel in education, then the logical conclusion is (1) societies value learners with high IQ, or (2) learners with high IQ value education. The hypothesis that could be

drawn from these premises is: Learners with high IQ are more aware of the importance of quality education to succeed in life and careers.

6. 3. Specificity: Hypotheses outline the nature of the relationship between variables (cause-effect, correlation, etc.). Once the relationship between independent and dependent variables is identified precisely and concisely, measurement tools will be easily put in place.

6. 4. Testability: According to Merriam-Webster Dictionary, to test refers to "a critical examination, evaluation, or trial specifically: the procedure of submitting a statement to such conditions or operations as will lead to its proof or disproof or to its acceptance or rejection". Hypotheses are said to be testable when they undergo a "trial" operation with the intention of being accepted or negated. For Gravetter and Forzano (2012, p. 29), " a testable hypothesis is one for which variables, events, and individuals are real, and be defined and observed". In short, good hypotheses test what is concrete.

6. 5. Falsifiability: Before Galileo Galilei, Europeans used to think that the Earth was flat. Thanks to Galileo and his insistence that the Earth turns around itself , he proved that this popular and naive perception was false. Hence, the hypothesis that the Earth was flat was falsified. This is the whole point: Research is meant to disclose the truth that is hidden. Salkind (2012, p. 13) notes "a research hypothesis sets out to test an outcome and not to prove it". Laws of Nature are oftentimes covered in riddles shrouded in mysteries, which caused common people to have that outward, simplistic (mis)interpretation of phenomena. It is incumbent upon researchers to need verify the veracity or falsity of such beliefs. S

Karl Popper, a philosopher and critical rationalist, believes that a hypothesis cannot be conclusively confirmed but instead it could be negated (Principle of Falsifiability). As "the primary aim of all scientific theories is to produce a true description of the world" (Popper, 1976 cited in Gorton, 2012, p.53), the role of the researchers is to try not to be deceived by inductive (i.e., stereotypical) conclusions or generalization. Popper's popular illustration that Europeans being acquainted to seeing only white swans in Europe led them to think that swans were only white not until they explored Australia in the 18th c. when they came to see black swans. This discovery refutes age-old beliefs. On score of that, Popper concluded that the ability to falsify theories and hypotheses is what distinguishes science from pseudoscience.

7. Hypothesis vs. Assumption

Apparently, assumptions and hypotheses refer to the same concept, which is often the case in common parlance. In everyday English, it is not unusual to hear somebody say to you "I assume that you know this young lady because she lives in the same neighborhood as you". What they are trying to say is that they are making an educated guess that is likely to be true but not *definitely* true. By definition, this is what the scientific term *hypothesis* is all about-making education guesses pending proof. In research methodology, however, it is not the case. A distinction is, therefore, an absolute necessity.

An assumption, a Latin word for to take to oneself (*ad*, to and *sumere*, take), refers to what one believes to be true without proof. Gay (1976, cited in Sevilla et al. :18) define assumption in the following terms "An assumption is any important fact presumed to be true but not actually verified". Along those line Cohen (2009, p. 331) states "... assumptions can be viewed as something the researcher accepts as true without concrete proof" (Cohen 2009, p. 331). Therefore, an assumption does not necessitate to be proved empirically. In wide brief, assumption is not to be tested.

Hypotheses, on the other hand, do not present a general truth. Hypotheses are either explanations or predictions of the relationship between variable the veracity or falsifiability is to be measured and/ or tested. Hypotheses are, therefore, to be accepted or refuted. In the table below examples of assumption and hypotheses are juxtaposed.

Table 1. Assumptions vs. hypotheses

Assumptions	**Hypotheses**
There is a strong correlation between reading and writing	EFL Learners who read in the target language (TL),i.e., English, produce better essays.
Brain dominance defines talents	EFL left brained learners excel in creative writing, and EFL right-brained learners excel in argumentative essays
Learning styles are correlated to teaching styles	If teachers' teaching styles match EFL learners' learning style, learners will achieve better scores.
Good achievers are highly motivated	Highly motivated EFL learners develop fluency and accuracy faster than less motivated EFL learners

All things considered, assumptions deal common sense truths that do not necessitate testing whereas hypotheses *raison d'être* is verification.

8. Hypotheses vs. Research Questions

Although hypotheses and research questions are in complimentary distribution, they are different in terms of functions. Both are included in qualitative and quantitative research. While hypotheses lend themselves to explain relationship between variables or predict an influence of variables over others, research questions are asked to seek "understanding and accomplishment" (Maxwell 2013:69). As both derive from the researcher's theory, i.e., vision or perspective developed from observations and extensive readings, they both mean to achieve different research goals. hypotheses try to identify the nature of the relationship between variables; research questions attempt to grasp the nature of the relationship and its outcomes.

Research questions are 'ambiguities' that the researcher would like to address in his research (Awang, p. 53). Research questions are about what is unknown, and, therefore, questions are asked to demystify what is unknown. According to Politano et al. (2018) "The research questions boil down to what, when, where, and why, where "why" captures the question of "how" (p. 49). Maxwell (2013, p. 70) explains that a common problem in developing research questions is confusion between intellectual and practical issues. Whereas intellectual issues are meant to be what you want to *understand* by doing the study, and practical issues target what researchers want to *accomplish*.

Mertler (2009, p. 74) notes "qualitative research questions should be stated in more open-ended fashion; quantitative research questions should be more focused". A research question starting with auxiliary verbs and requiring a simple yes/no are best avoided: research questions should not assume an answer beforehand such as "Do motivated EFL learners like reading?" On the other hand, researchers questions, and specifically quantitative questions, should be focused and not too broad "What are the factors that may be said to affect EFL learners' motivation to learn?" Furthermore, research questions should be related to a body of literature in that theory should be seminal in coming up with questions. finally, Research questions should be nonjudgmental, i.e., fair. The following question is clearly biased: "Do EFL male learners engage in unethical practices such as plagiarism than female EFL learners?"

Research questions and hypotheses differ in punctuation. While research questions end in question marks (**?**), hypotheses end in periods (**.**). Knapp (1998, p. 13) defines research questions as interrogative sentences that pose a researchable problem regarding the advancement of knowledge". Not only research questions are meant to guide research, but also to occasion discovery of the unknown. According to Knapp (1998, p. 12), not all research questions are explicitly couched. Some research questions, particularly longs ones are expressed in declarative structures such as the objective of this investigation is to disclose the psychological, pedagogical, and administrative reasons why EFL master's students engage in plagiarism.

According to Dixon, Singleton & Straits (2016), quantitative research questions ask: is there a relationship between X and Y, controlling for other factors? Qualitative research questions ask about the meaning and cultural significance of social phenomena (p. 82). Maxwell (2013) further explains the nature of qualitative research questions:

> Qualitative researchers .. tend to focus on three kinds of questions that are much better suited to process theory than to variance theory: (a) questions about the *meaning* about the events and activities to the people involved in these, (b) questions about the influence of the physical and social *context* on these events and activities, (c) questions about the *process* by which these events and activities and their outcomes have occurred. p.75

While quantitative research questions are focused and specific in the attempt to identify the cause-effect relationship, qualitative research questions go beyond statistics to try to account for the real meaning of variables interplay in social context and the mode of this development.

All things considered, hypotheses and research questions, if properly identified and expressed, will keep the whole research process in the right direction. While hypotheses offer a speculative answers (Leedy &Omrod, 2005, cited in Mertler 73), research questions concentrate the effort on understanding the relationship under investigation and eventually accomplish what the researchers intend to attain in terms of time and validity. It is also interesting to note "research questions are often used in place of hypotheses and may indicate that a study is non-experimental" (Neuton & Rubinson, 2010, cited in Cottrell & McKenzie, 2011, p. 82). It is not uncommon that research questions replace hypotheses in qualitative research particularly when "only one group [...] is being examined and no comparisons are being made" (Cottrell & McKenzie, 2011, p. 85). This what might explain the intimate relationship between hypotheses and research questions.

9. Components of Hypothesis

Research hypothesis encapsulates the major pillars of the research problem, which are the variables, the relationship between these, and the population (and/or sample). Hypotheses need, thus, be succinctly informative in order to be effective.

9. 1. The variables

Variables derive from to vary, the act of changing in nature, position, status, and value. Weather forecast displays temperature degrees of high and low temperatures. Temperatures may vary by 10 degrees from morning to evening. Any entity, quality, and/ or quantity that varies is called variable (namely, age, monthly income, height, and weight, etc.). In research methodology, "[a] variable is any characteristic that can take on different values" (Heath, 2018, p.12). A variable can be likened to a staircase: By going upstairs this implies going upgrade, and by going downstairs indicates coming downgrade. Two types of variables are included in hypotheses: Independent and dependent variables.

9. 1.1 Independent Variables (IV): According to Bryman (2012, p. 712), "A variable that has a causal impact on another variable" comes to be termed independent variable. In other words, the ID is the ***cause or prompter*** of the change and without which no effect is observed.

9. 1.2 Dependent Variables (DV): Weathington et al. (2012, p.45) define DV as "the focus of the study and the condition that the researcher wants to explain, describe, and predict". The centrality of the DV is also recognized by Brown (1988, p. 10) "[...] it is the variable of focus- the central variable- on which other variables will act if there is any relationship". Owing to the fact that DV receives the impact of other variables, it is occasionally referred to as *response variable, criterion variable* or *outcome variable*.

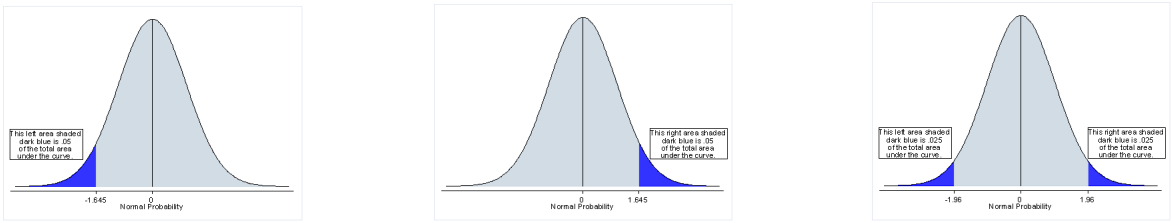
9. 2. The relationship between variables: The relationship between variables is causal or correlational. A causal relationship is primarily interested in pointing out the cause-effect relationship in which the IV impacts DV. Correlational relationship points out to an existing relationship without specifying its nature. Consider these two hypotheses: (1) Master's II students' anxious feeling of pressing time may occasion instances of plagiarism, (2) There is a correlation between the mastery of the mechanics of writing and effective academic essay

writing. The first hypothesis discusses the cause of the instances of plagiarism, i.e., anxious feeling of pressing time while the second hypothesis suggests the existence of a relationship between the mastery of mechanic of writing and the effective academic essay writing.

9. 3. Population and/ or Sample: As population includes all the individuals and entities, it may not be possible or practical to study every single individual or entity in which case a small, if representative is drawn from the whole. This portion of the population is called sample. Peck et al. (2008, p. 37) propose the following definitions "The entire collection of individuals or objects about which information is desired is called population of interest. A sample is a subset of the population, selected for study in some prescribed manner". The example below clearly (in **bold**) specifies the sample and/ population: Cheating on tests among **EFL third/ senior students** is maybe due to test anxiety.

10. Types of Hypotheses

Two types of hypotheses seem to characterize research: **directional hypotheses** (also known as one tailed hypotheses as in graphs left and middle) and **non-directional hypotheses** (also known as two-tailed hypotheses as in the graph on the right). In statistics, when the left end of the curve bell is specified, the hypothesis is termed one-tailed. But, when the two ends of the curve bell are specified, then the hypothesis is said to be two-tailed (see the figure).



10. 1. Directional Hypotheses (DH)/ One-Tailed Hypothesis (OTH): DH tend to specify the direction of the relationship between variable: larger-smaller, faster-slower, higher-lower, etc. In DH, "the researcher can speculate about the direction of differences (higher or lower) or the direction of the relationship (positive-negative) (Suter, 2011. p.93) as in *EFL students with long reading habits tend to write better and more efficiently than those who rarely or never read in the target language*. It is interesting to note that DH could also be expressed in conditional (if-then) particularly in quantitative research as in *If close reading is implemented regularly in EFL classes, learners' critical reading skills will be significantly enhanced.*

The high certainty in the prediction appears to justify the resort to DH. Weathington et al. (2010, p. 280) corroborate "[t]he justification for this tactic is that if you are confident in your prediction based on existing research and/ or theory, then you should expect only one form of outcome".

To opt for a DH/OTH means that previous literature on that particular topic exist and pave the way to making directional predictions. Searle (2002) note:

> Traditionally, you may select a directional hypothesis when the weight of earlier research makes it possible to make clear prediction. For example if there have been five

or six studies that have found that dogs *do* learn mazes faster than cats then you might feel able to say 'Dogs learn a simple maze faster than cats'. (p.7)

Motivation in EFL/ ESL classes is a well-researched topic. A hypothesis that attempts to account for the relationship between motivation to learn English and faster learning to be fluent may sit well with one-tailed hypothesis as long as the investigation does **not** use nominal scales. Nominal scales refer to the attribution of categories to participants such as weight, height, gender, etc. An illustration follows

Motivated EFL students reading Arabic and English novels:

	EFL **Males Students**	**EFL Female Students**
Reading novels in English	15	22
Reading novels in Arabic	25	10
Neither	05	02

10. 2. Nondirectional Hypotheses (NDH)/ Two-Tailed Hypothesis (TTH): NDH are couched in general terms and, therefore, they fail to specify the kind of direction that variables undertake. According to Weathington et al. (2010, p.280) justify the absence of direction because researchers are supposed to examine all results regardless of the direction of the outcomes. One such an example of NDH is *visual learners and auditory learners differ in the pace of learning grammar*.

11. Categories of Hypotheses

Hypotheses fall into two categories: *null* and *alternative* hypotheses. Both hypotheses are equally complementary and contradictory- a uniquely paradoxical, intimate relationship. When one is accepted, the other is rejected, and they both need to appear in ordinal sequencing. Null hypotheses are usually stated first and alternative hypotheses on the heels. Below the two categories are succinctly laid out.

11. 1. Null Hypotheses: In explaining why the term *null* in null hypothesis, Gravetter et al. (2016, p.) state "there is no change, no effect, no difference- nothing happened, hence the name null". Moreover, the term *null* denotes a negative meaning, which is why the symbol of null hypothesis is H_0. Null hypotheses are also called statistical hypotheses on account of the fact that they need be statistically accepted or rejected. Salkind (2006, p. 143) asserts "a null hypothesis acts as both a starting point and a benchmark against which the actual outcomes of a study are measured". Null hypotheses can be both directional or nondirectional. In case the null hypothesis is nondirectional, both independent variables are equal in the sense that no one variable has an impact on the other or implies the other. In which case of such "neutrality", the null hypothesis (**H_0**) is written as follows: **H_0**: (Independent variable) **μ_1** = (dependent variable) **μ_2**. Differently stated, the mean number in $\mu 1$ equals the mean number in $\mu 2$. Conversely, if the null hypothesis is directional, the relationship is either higher or lower, in

which case Ho is written: (1) $\mathbf{H_0}$: $\boldsymbol{\mu_1} \geq$ (higher than or equal) $\boldsymbol{\mu_2}$, or (2) $\mathbf{H_0}$: $\boldsymbol{\mu_1} \leq$ (lesser than or equal to) $\boldsymbol{\mu_2}$.

11. 2. Alternative (or Scientific) Hypotheses: Alternative (to Null) hypotheses affirm the existence of the relationship between variables. The alternative hypotheses (AHs) are at the opposite end of null hypotheses, and "[t]hey are mutually exclusive" (Kiess & Green, 2019, p. 162). If the null hypotheses are proven false (or rejected), alternative hypotheses are *de facto* true (or accepted). Cunningham et al. (2013, p. np) consider alternative hypotheses "the central thesis" of the study under investigation. AHs are what the researcher would like to prove, which eventually makes the outcomes of the investigation significant. Thus, a new theory is advanced.

12. Hypothesis Testing

The hypothesis-testing process is a logical sequence of steps to conduct the statistical analyses in a quantitative study (Bridgmon & Martin, 2012, np). On the other hand, Hair (2015, p.138) notes "hypothesis tests are systematic procedures followed to accept or reject hypotheses about certain patterns or relationships". The *testability* of hypotheses is, therefore, closely linked to the *measurability* of variables: If the variables can be *measured* somehow, then the hypothesis is said to be *testable*. Ary et al. (2010, p.88) corroborate "To be testable, a hypothesis must relate variables that can be measured. If no means are available for measuring the variables, then no one could gather the data necessary to test the validity of the hypothesis". Consider the following hypothesis: highly motivated EFL students produce better essays. This hypothesis is testable if and only if it can be verifiable in that "deductions, conclusions, or inferences can be drawn from the hypothesis in such a way that empirical observations either support or do not support the hypothesis" (Ary et al. 2010, p.87).

Hypothesis testing lends itself to *explanatory* research on account of the search for why, i.e., causes and effects, phenomena occur the way they do. Atkinson recognizes that a statistical hypothesis test is a method of statistical decisions about the result of our research (2011, p. 103). Gravetter and Forzano corroborate "A hypothesis test is a statistical procedure that use sample data to evaluate the credibility of a hypothesis about a population (2018, p. 392). It all comes down, then, to how faithfully representative is the sample to the population so that generalizations can be claimed to be valid.

Gravetter and Wallnau (2016, p. 236) note "Hypothesis testing is an inferential process"**.** Inferences are made from samples with a quiet hope to extend it, i.e., generalize it, to the whole population. Inferential statistics implies the use of mathematical statistics, which is not the concern this paper. It is widely accepted that less than or equal to 5% (or ≤ 0.05) probability that the null hypothesis is true. In simple terms, thus, if the probability value (written *p*-value) is less than ($\leq$) alpha (α) , then the null hypothesis is rejected. If the p-value is more than (> 0.05) alpha (α), the null hypothesis is accepted.

13. Decision Errors

Potential threats to the validity of hypotheses may be occasioned because of different circumstantial factors such as the researcher's mismanagement of coding. These may lead to errors either in accepting or rejecting hypotheses.

13. 1. Type I Error (or False Positive): Type I error (or false positive) refers to the rejection of the Ho when it is actually true. Jex (2002, p.46) explains "falsely concluding that one has uncovered a legitimate scientific finding". In other words, the significance of the null hypothesis is due to pure chance. As an illustration the example that follows: Ho: *Test anxiety due to poor preparation does not contribute to cheating on tests*. If the researcher fails to reject it, then the researcher is- to all likelihood- committing a type I error. Intuitively, students who poorly prepare themselves for sitting a high stakes test see their test anxiety increase to such proportions that they are prone to cheat to "survive" the ordeal.

13. 2. Type II (or False Negative): Type II (or false negative) is generally defined as the failure to reject (i.e., acceptance of) the Ho when it is actually false. This type of error is reduced when the sample is sufficiently sizeable: The larger is the sample, the easier it is to unravel the significance. Consider the following example: The null hypothesis (H_0): reading does not increase vocabulary acquisition. It is a common knowledge that reading increases vocabulary stock. And therefore, it is counterintuitive to think otherwise. If the researcher proves that reading does not increase vocabulary acquisition, then s/he has indulged in type II error.

According to Gravetter and Wallnau (2016, p. 238), "The consequences of Type II error are usually not as serious as Type I error". If the researcher fails to reject a null hypothesis, which denies that the treatment has any effect, then little harm is occasioned. All that the researcher need to do is to take up a larger, more representative sample.

Conclusion

The current paper has undertaken to identify research hypothesis and hypothesis testing in research in general and (EFL) educational research in particular. Sound research hypotheses focus on predicting the cause-effect and/ or correlation relationships between variables and eventually provide an explanation for the interplay of these relationships. Although different methodologists offer different ways of couching hypotheses, the latter should, first, target to denote whether the research is quantitative, qualitative, or mixed methods and then couched so as to reflect the nature of the relationship between variables. It is also within the range of sound research hypotheses structure to provide a tentative explanation of the interplay that takes place between the variables. A research hypothesis is expected to be accurate, clear, and testable, without meeting those standards, a research hypothesis would only be another sloppy statement. In the same vein, Reyes (2004, p.20) succinctly corroborates " A problem for a research is not solved unless the hypothesis is proven either true or false". The veracity and/ or falsity of hypotheses, therefore, define the worth of research problems.

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