

Exploring Research Methods in Language Learning-teaching Studies

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ARTICLE INFO

Article history

Received: July 27, 2018

Accepted: September 21, 2018

Published: December 28, 2018

Volume: 9 Issue: 6

Advance access: November 2018

Conflicts of interest: None

Funding: None

Key words:

Methods,

Research Methods in Applied

Linguistics,

Second Language Acquisition,

Language Teaching,

ESL/EFL

ABSTRACT

Research methods offer authentic ways to elicit useful data based on which informed decisions can be made. With respect to their design and data collection or analysis, research methods are traditionally divided into qualitative and quantitative types, each with its strengths and weaknesses. In response to new theories and technological developments, new methods have evolved as extensions of qualitative or quantitative methods or as combinations of the two with promising features. This article presents an overview of the common methods used in language learning-teaching research.

PHILOSOPHY OF RESEARCH

Research means a systematic way of determining a problem and then collecting and analyzing relevant data to solve the problem. Research methods are approaches that have stood the test of time in helping researchers obtain valid and reliable outcomes and helping policy makers make informed decisions. Research in the area of language learning has focused on diverse topics, such as language assessment, form/meaning-focused instruction, learners' affective and cognitive differences, extracurricular activities, technology and flipped classroom, team teaching, and work abroad among many others. Language learning uses a wide range of research methods which originated from different paradigms to study related topics. Any research method is founded upon particular ontological and epistemological underpinnings. Ontology is the nature of reality which may be viewed objectively or subjectively. Epistemology is the researcher's philosophy of research. The common epistemological paradigms include, *Positivism* (experimental testing), *Post-positivism* (context-bound experimental testing), *Realism* (credible data based on observable phenomena), *Interpretivism* (reality based on subjective meanings, social phenomena and situational reality), and *Pragmatism* (inte-

grating observable phenomena and/or subjective meanings to interpret the data). Any methodological choice indicates the translation of a researcher's ontological and epistemological views into methodological frameworks of data collection and analysis. Researchers with more positivistic inclinations tend to favor quantitative methods; those with constructivist epistemologies are in favor of qualitative methods; and finally those with pragmatic beliefs support mixed methods (Riazi & Candlin, 2014). Researchers may take three different positions regarding the distinction between qualitative and quantitative methods; for Purists, the two approaches are mutually exclusive; for Situationalists, both methodologies have merits if applied appropriately depending on the research context; and for Pragmatists, integrating the qualitative and quantitative methods is useful for initiating, confirming, and/or elaborating the results elicited via other methods (Dörnyei, 2007).

QUALITATIVE RESEARCH METHODS

Qualitative methods to research provide close analysis of a single case generating valuable insights. They are exploratory, offering effective ways in exploring new areas. The

groundedness and flexibility of qualitative research allow the researcher to study real and complex phenomena in their natural contexts, resulting in valid and rich data. Qualitative research commonly entertains why and how questions and favors longitudinal examination of dynamic phenomena. However, qualitative research is less generalizable since its focus is on a single case in a unique context. With its interpretative analysis, it usually lacks methodological rigor. It may also result in too complex or narrow theories, besides being time consuming.

More qualitative studies have gained ground in recent years. Richards (2009) mentions a number of common themes which have been the focus on qualitative studies since 2000 as follows:

(i) Approaches to teaching

Exploring what happens in language classrooms, studying teachers' perceptions of communicative language teaching and their approaches to it, teacher collaboration, understanding of team teaching in numerous countries, contribution of team teaching to development of good practice, parents' involvement in their children's language development, impact of family lives on language learning, student writing and feedback, effect of learning biography, beliefs and previous writing experience on the writing process, autonomy in feedback, language environments, new aspects of interaction such as humor and laughter, classroom interaction (student questioning, problems with teachers' questioning behaviour, shift from peripheral to engaged participation in classroom literacy events, children's emergent L2 interactional competence, influence of attitudes to home language on reading behaviour, relationship between refugees' social backgrounds and their literacy development, influence of ethnicity on accomplishing literacy events, study of ESL learners' listening strategies and tactics, and new aspects of the classroom community, improved understanding of pedagogic practice; qualitative research methods under-exploited in the area of reading and listening

(ii) Identity and socialization

Exploring L2 and multilingual contexts, focusing on learners of different ages and backgrounds in different contexts, the process of classroom socialization in a variety of settings and levels, the influence of cultural and educational background on performance and classroom behaviour, use of another language inside and outside the English classroom and the concept of crossing, studies on immigrant in particular groups, educational settings, lives and careers of teachers working with marginalized youths, influence of studying abroad on identity construction, engagement with the host culture, and cultural adjustment, teacher's professional identity formation, racialized identities, religious beliefs, and relationship to place, and finally non-native-speaker teachers cultural knowledge, legitimacy, and relations with native-speaker teachers;

(iii) Narrative/Lives

Understanding the L2 learning experience from a biographical perspective, role of narrative inquiry as a

tool in language teacher development, and autoethnography of an English teacher and Japanese learner;

(iv) Other developments

Teacher beliefs, learner strategies, teacher reflection and learning to explore aspects such as time management and differences between teacher and learner agendas, and linguistic ethnography with focus on the relationship between language and social life.

Some of the commonly used qualitative data collection methods mentioned in Richards' (2009) review of qualitative studies in recent years include, in-depth interviews, between-method triangulation, online discussions from the course, videotapes of tutoring sessions, retrospective interviews, reflective papers, questionnaires, think-aloud protocols, classroom observation and documents, student journals, students' drafts, genre analysis and focus group interviews, student process logs, student developing text, student bulletin board exchanges and post-hoc interviews, conversation analysis, multiple methods (for example, recordings of classroom talk, observation and documentary evidence; or lesson observation, semi-structured interviews and focus group discussions; or observation and interviews, sometimes combined with discourse analysis), microanalytic and ethnographic methods, longitudinal microethnography, open-ended interviews, self-assessment inventories, reading comprehension measures, analysis of classroom extracts, biographical interviews, introspective methods (such as diary studies and field notes). What follows presents some of the qualitative methods used in our field.

Big Data Analysis

Big data (also known as composite data) are data with big volume (>100 GB), velocity (real-time data streams >25,000 events per second), variety (a combination of numeric and alphanumeric data), variability (changing meaning), and veracity (high quality and accuracy).

Content Analysis

It involves quantifying and analyzing the occurrence, meanings, and relationships of words, phrases, and concepts manually or using computer-assisted techniques to achieve valid inferences and contextualized interpretations of documents.

Conversation Analysis

An approach used for analyzing both verbal and non-verbal everyday social interactions, CA focuses on casual or task-centered conversations (for example, conversations in courts, helplines, and the mass media).

Corpus Analysis

It involves studying real-world samples (or corpora) of the language derived manually or automatically from source texts. Corpus analysts favor representative corpora which have been collected in their natural contexts in the field without experimental-interference.

Critical Discourse Analysis (CDA)

As an interdisciplinary approach to the study of discourse, CDA regards language as a form of social practice. Linguistic practice and non-linguistic social practice constitute one another. Critical discourse analysts are interested in how language use establishes and reinforces societal power relations.

Discourse Analysis (DA)

It is an approach to analyze language use. Discourse analysts are interested to study naturally occurring language use beyond the sentence boundary. A closely related field is text linguistics which is more concerned with text structure rather than analyzing interlocutors' socio-psychological characteristics.

Document Analysis

Usually used as a part of most triangulation schemes, Document Analysis involves looking into the relevant records and documents and then analyzing and interpreting the generated data. Documents may cover a wide range of documents such as Cumulative Grade Point Average (CGPA), public records, media, private papers, visual documents, minutes of meetings, e-mails, and government policies/blueprints.

Ethnography

The primary goal of an ethnographer is seeing the events through an insider's view and to focus on the participant's meaning. It involves prolonged engagement (minimum of 6-12 months) in a natural setting. Ethnographies comprise the four different phases of;

- (i) entering an environment as a stranger (negotiating the entry to find a way, reason, and role for the researcher who observes the environment);
- (ii) observing as a nonparticipant (initial interviewing, analyzing the preliminary data, and developing some ideas);
- (iii) acculturating (continuing fieldwork until the exact focus emerges and then analyzing data via progressive focusing that consists of sifting, sorting, and reviewing the data)
- (iv) withdrawing (collecting more data to resolve ambiguities, fill gaps, and verify previous findings and then gradually disengaging from the field without causing disruptions to the community).

Grounded Theory

It is a systematic methodology that results in the construction of theory by inductive analysis of data. A study that employs a grounded theory typically begins with a question or collection of qualitative data. The data are analyzed thematically (see *thematic analysis*) whereby the analyst examines the data in search of repeated ideas or patterns which are then coded. As the researcher collects more data and reviews them, more codes may emerge. Data collection continues

(reiteration) until no more new codes emerge (saturation). The codes are grouped into concepts, and then into themes (or categories) which may become the basis for new theory.

Interaction Analysis

Also known as Classroom Interaction Analysis, Interaction Analysis involves the process of analyzing the teacher's and learners' interactions. As an observation technique for collecting data on the teacher's verbal behavior in the classroom, Interaction Analysis can also serve as an effective diagnostic tool for analyzing the social-emotional climate of the classroom.

Narrative Methods

Narrative methods, also referred to as Narrative Inquiry or Narrative Analysis, involve analysis of autobiography, field notes, letters, photos, and stories, as instances of life experience, to understand how individuals create meaning in their lives. The researcher sets off by developing a research question, and then selecting or creating data, which are organized and interpreted.

Oral History

Also known as Biographical Methods, Oral History is a method used for analyzing historical information concerning individuals, communities, and events, via recordings, videos, or interviews with individuals involved in the events. The method favors information from a variety of viewpoints.

Phenomenology

In contrast to a narrative study that relates the life of a single case, phenomenology analyzes the meaning of several cases' lived experience. It starts by identifying a shared experience, locating its universal nature, identifying shared experience of several individuals, and locating essence of the experience.

Semiotics

It is the study of signs and sign processes (semiosis), metaphors, symbols, and meaningful communication. Semiotics involves the analysis of the structure and meaning of both linguistic and non-linguistic signs as a significant part of communications.

Thematic Analysis

As one of the most common form of analysis in qualitative research, thematic analysis involves highlighting, examining, and recording categories, patterns, or themes within data. It consists of six phases:

- (i) data are examined until the research familiarizes with them;
- (ii) initial codes are generated;
- (iii) codes are examined in search of themes;

- (iv) themes are reviewed;
- (v) themes are defined and named; and
- (vi) the final report is written.

Visual Methods

Visual methods involve collecting image-based data (such as diagrams, drawings, film, maps and the like) generated in the learning-teaching context under investigation. Visual methods are particularly useful when the researcher cannot directly record observations, when the researcher needs to observe learning-teaching from different perspectives, when other methods are not particularly accessible to some or all of the participants. Participants take photos or videos from their activities and create images representing their perceptions toward their environment; finally, the researcher uses these to stimulate discussions among participants.

QUANTITATIVE RESEARCH METHODS

Quantitative methods are used for confirming theories and testing relationships between variables. Quantitative data are numerical collected from multiple cases, analyzed by statistical methods. A typical example would be survey research using questionnaires analyzed by statistical software, such as SPSS. Quantitative studies are systematic with standardized procedures for different phases of data collection and analysis with in-built quality checks for validity. The main goal is collecting and analyzing data reliably and objectively. Quantitative research is controlled and rigorous; the instruments used for data collection or analyzing data take a long time to prepare and pilot. The focus is on the common characteristics of the sample; therefore, quantitative research deals with variables that capture these common characteristics, and thus quantitative results are generalizable. The research process is relatively quick and economical. Nevertheless, quantitative research assumes a simplistic reality, involves obtrusive measurement, gives the researcher a decontextualized outsider's perspective, is product-oriented, has limited exploratory capacity, and requires time-consuming instrument construction. Different types of quantitative methods are recognized below.

Data Mining

The term is a misnomer, since the main aim of data mining is to extract patterns from an extremely large dataset, rather than mining or extracting the dataset itself. As an interdisciplinary subfield of computer science, Data Mining involves discovering patterns in large amounts of data through computational processes. The goal is analyzing a large dataset, extracting knowledge from it, and transforming it into a comprehensible structure.

Descriptive Data Analysis

Descriptive data analysis includes simple statistical measures such as frequency, percentage, measures of central tendency (mean, median, and mode) and measures of dispersion (standard deviation, variance, and range).

Inferential Data Analysis

Inferential data analysis involves hypothesis testing. The significant value (p) is calculated and based on the decision criterion (reject the null hypothesis if the significant value is smaller than alpha, $p < .05$) the results are interpreted and the conclusions are made. When a null hypothesis is rejected it provides empirical proof for the research hypothesis and the generalizability of the results beyond the sample being studied.

Latent Variable Models

Latent variables are not directly observable but are inferred through mathematical models from other variables that can be directly measured and observed. Hence, Latent Variable Models are mathematical models that explain observed variables in terms of latent variables. When latent variables represent physical reality and in fact could be measured, but measuring them is not possible, they are referred to as hidden variables (that is, they are there, but hidden). In contrast, when latent variables represent abstract concepts, such as mental or behavioral states, categories, or data structures, they are called hypothetical constructs or hypothetical variables.

Longitudinal Data Analysis (also Panel Data Analysis)

When the researchers measures a dependent variable (DV) repeatedly through time for multiple subjects, Longitudinal Data are generated, with the characteristics of both time-series data and cross-sectional data. In longitudinal studies, the dependent variable may be numeric or alphanumeric. Commonly the objective of longitudinal data analysis is modelling the expected value of the dependent variable as a function of some independent variables.

Microdata Methods (also Microdata Statistics)

A piece of observational data collected from an individual case. In surveys, microdata is information (such as age, educational level, and employment status) provided by individual respondents. Survey results are reported as aggregates for all the respondents, for ethical and practical reasons; for example, in a census, microdata may consist of thousands or millions of records, each containing many data items; therefore the data are transformed to an aggregate level to make them more manageable and interpretable. However, this can also result in information loss. As an example, if the data for education level and employment status are aggregated separately, the researcher cannot analyze them to test the relationship between the two variables. Microdata leave the researcher free to perform such analyses.

Multivariate Analysis

It involves analyzing more than one DV at a time. As an example of MVA, Factor Analysis is often used for confirming the validity of questionnaires or scales, for grouping variables under certain domains, and for removing any of the variables that is not significant in the model.

Multilevel Modelling (also Hierarchical Linear Models, Nested Models)

These are statistical models of parameters that vary at more than one level; for instance, a model of student attrition with measure for each student in addition to measures for all the students' classrooms. In studies where the data are organized at more than one level (i.e., nested data), multilevel models are suitable. The units of analysis at a lower level are usually individuals, nested at a higher level within aggregate units. In multilevel models, while an individual case is at the lowest level of data, repeated measurements may also be performed on individual cases. Hence, these models can alternatively be used for multivariate analysis of repeated measures.

Multivariate Analysis (MVA)

Multivariate analysis involves analyzing more than one dependent variable at a time. It is used to do studies across multiple dimensions while accounting for the effects of all independent variables on the dependent variables. As an example of MVA, Factor Analysis is often used for confirming the validity of questionnaires or scales, for grouping variables under certain domains, and for removing any of the variables that is not significant in the model.

Non-parametric Approaches (also Non-parametric Statistics)

These are distribution free statistical methods such as Spearman, Chi-square, and Mann–Whitney U which make no assumptions about probability distributions and normality.

Regression Analysis

Regression analysis is an extension of Pearson correlation test. It can show the direction (positive or negative), strength (negligible, low, moderate, high, or very high), and significance ($p < .05$) of the association between one or more independent variable with a dependent variable. In addition, it can predict for one unit increase in any of the independent variables, how much the dependent variable will increase/decrease. Finally, it can also indicate, the relationship between a given independent variable and the dependent variable when the effect of one or more other variables is controlled.

Structural Equation Models (SEM)

Structural Equation Modeling (SEM), including various tests like confirmatory factor analysis, path analysis, and latent growth modeling, is commonly employed to test unobservable ‘latent’ variables. Structural Equation Models are measurement models which use one or more observed variables to define latent variables. SEM is useful in language learning research because of it can test relationships between latent variables based on observable variables.

Survey Data Analysis

Survey Data Analysis Methods are used for analyzing data collected from surveys. Survey data are commonly collected

by questionnaires. The focus of Survey Data Analysis is on methodological issues, which arise when dealing with complex sampling schemes. It can also support the researcher in dealing with missing data and measurement of error.

Time Series Analysis

Time series analysis consists of statistical methods that analyze a series of data points sorted in time order. Based on previously observed values, time series forecasting can predict future values in a model.

MIXED METHODS

Currently researchers increasingly prefer to combine qualitative and quantitative methods so as to benefit from the strengths of both methods. Mixed methods combine qualitative and/or quantitative methods during either collecting or analyzing data. The main assumption is that combining qualitative or quantitative methods provides a comprehensive understanding of the research problem. A typical example would be studies that consecutively use questionnaires and interviews for collecting data.

Mixed methods studies may be either sequential or concurrent; when researchers initially collect data either quantitatively or qualitatively, and then collect the other type of data, while the two data collection methods are mutually dependent, the study has sequentially designed mixed methods. On the other hand, in concurrent mixed designs, both quantitative and qualitative data are concurrently and independently collected (Creswell et al., 2003).

Mixed methods is commonly practiced for five purposes with respect to their contributions to research design, namely *triangulation* (seeking corroboration and convergence between the findings from different methods), *complementarity* (exploiting the exploratory strength of qualitative methods and the confirmatory power of quantitative methods), *development* (the outcome from one method informs another), *initiation* (possible observed contradictions encourage collecting more data using the other method), and *expansion* (extending the breadth and depth of the study via diverse methods used for investigating varying components of a program) (Greene et al., 1989).

STUDY DESIGNS

In contrast to research design with its broad definition as the complete research scheme or the detailed research plan, study design is used more narrowly, indicating how the study is going to be conducted. *Qualitative Study Designs* include case study (focusing on a case), focus groups (discussing with a group), participant observation (observing group members while closely interacting with them), holistic research (holistically observing multiple factors interacting in real life), community discussion forums (studying group members interacting in a forum and providing data on their attitudes and perceptions), reflective journal log (recording researcher’s thoughts during the study), and so on.

Following Kumar (2010), quantitative designs are presented in three trichotomies, namely (a) cross-sectional,

before-and-after, or longitudinal; (b) retrospective, prospective, or retrospective-prospective; and (c) experimental, non-experimental, or semi-experimental. In a cross-sectional design, the participants are approached once only. Before-and-after designs investigate the changes in the participants before and after interventions. In a longitudinal study, the researcher contacts the participants more than twice. A retrospective study investigates a phenomenon that occurred in the past. Prospective studies predict the outcome of a phenomenon in the future. Retrospective-prospective studies, the existing records from the past are collected and analyzed retrospectively and then the samples are followed up to study the impact of a treatment or program in the future. Experimental studies test the effect of some intervention. Non-experimental studies look into the causes of change. Semi-experimental studies have properties of both experimental and non-experimental designs.

QUALITY CONCERN

Research validity and measurement validity are considered in quantitative research. *Research validity* involves the entire research process and is divided into internal validity (soundness of the study and research outcome) and external validity (generalizability of the results beyond the observed sample). Some of the common threats to research validity in language learning research are Hawthorne effect (behaving differently when one is under observation), practice effect (improved performance due to repeated tests), history (unexpected events changing participants' performance), maturation (participants' mental and physical change), social desirability bias (under-reporting socially undesirable attitudes). *Measurement validity* is concerned with the test scores, their meaningfulness, and interpretation. Measurement validity is divided into face validity (measuring what one set out to measure), content validity (covering all objectives), predictive validity (predicting an outcome correctly), and construct validity (comprehensiveness of domains). *Reliability* means the consistency of data. Reliability may be influenced by the wording of items, ambiguity, the physical setting, regression effect (regretting having been too positive/negative in the first test, and thus choosing to be more neutral in the second), and finally participants' moods. Reliability may be tested externally or internally. External reliability procedures are related to the collected data whereas internal reliability procedures depend on the instrument. External reliability may be tested through test/retest procedure (whether the same participants respond consistently to the same items administered twice), parallel forms (whether two separate instruments that carry the same function elicit consistent responses), and split-half procedure (dividing the instrument in half and comparing the average of the results). In internal reliability tests usually the Cronbach's alpha determines how closely a set of items are related as a group.

In qualitative research, quality concerns often arise from (i) insipid data, (ii) quality of researcher, (iii) anecdotalism (findings depending on a few well-chosen examples and are not based on critical analysis of the data) (Dörnyei, 2007). Therefore, quality is controlled in qualitative studies through trustworthiness which has four main components,

including (i) credibility (the truth value or internal validity of the study), (ii) transferability (applicability of the results to other contexts and external validity of the study), (iii) dependability (consistency or reliability of the results), and (iv) confirmability (neutrality and objectivity of the findings) (Guba & Lincoln, 1985).

RESEARCH METHODS IN PRACTICE

Recent theoretical developments have motivated changes to research methods in the area and have questioned the feasibility of causal models. For example, the advent of Complexity Theory calls for research methods that can accommodate the dynamic, nonlinear, and open way in which language learning is viewed in this theory. Complex systems self-organize and interact across levels and timescales. Therefore, to research them one needs contextualized models that co-adapt and emerge. Language development is a complex system and it would be simplistic to isolate interrelated antecedents as independent variables. Eight methodological principles have been offered for language development research, including (i) ecological validity (context is essential) (ii) complexity (reductionism avoided), (iii) dynamic processes (changing relationships among variables), (iv) reciprocal causality (events having many interconnected antecedents), (v) co-adaptation (systems causing coevolution in each other), (vi) collective variables (variables showing the interaction among multiple systems over time), (vii) heterochronical analysis (linkages analyzed across levels and timescales), and (viii) variability (variability essential and expected around stabilities, rather than noise or measurement error) (Larsen-Freeman & Cameron, 2008).

Several research methods are already available whose designs are appropriate for studying complex systems while others require change. As they favor wholeness and situatedness, qualitative methods, like ethnography, provide highly suitable ways to study the language system. Action research is also recognized as another useful method which allows for reciprocally interacting variables changing over time. Other promising methods include longitudinal, case-study, time-series approach, (connecting levels and timescales), microdevelopment (the study of change in behavior over a relatively short time scale, with dense corpora that involve highly intensive sampling over short periods of time, allowing us to plot multiple developmental routes to the same endpoint, offering a new process-oriented view of learning and development). For more on this topic see Granott and Parziale (2009), Computer Modeling (creating computer simulations of the systems replicating change through multiple iterations over time), Brain Imaging, and finally Mixed Methods (Discourse Analysis and Corpus Linguistics, Second Language Acquisition and Corpus Linguistics, Second Language Acquisition and Conversation Analysis).

Computer simulation research has generated two major types of models, including: neural network models (which replicate the brain while learning through self-organization) and agent-based models (which create simulations of groups of interacting agents in a sequence of events over a period of time). Neural network models have been used in research in

the area of syntax and vocabulary development. The shortcoming of neural network models is that they fail to represent the learner as an affective and social being and they focus on the learner as a cognitive being in isolation. Agent-based simulations have already been used in studies on creolegenesis, language evolution in social groups, self-organization of lexical items, and language acquisition through situated input.

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