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Chapter 1 : David Reinking - The Full Wiki

Formative and design experiments represent a methodology uniquely suited for educational research. Providing a practical overview of this emerging approach, the authors address the following questions: What is the origin of formative and design experiments and how do they compare to other approaches to investigating interventions in classrooms?

Formative Experiments What are formative experiments? Formative experiments are grounded in developing understanding by seeking to accomplish practical and useful educational goals, and, as such, it is a natural fit with the philosophical tenets of pragmatism. According to Reinking and Bradley Formative experiments fill a neglected gap in research aimed at guiding instruction, because they address more directly the questions and issues that practitioners face and that are not addressed by other methodologies. That is, scientific inquiry comparing the effectiveness of alternative instructional interventions provide useful generalizations across diverse contexts. However, experimental studies of classroom interventions must simplify and control the wide range of variation that is inherent in classrooms and schools and that often influences the effectiveness of an intervention in a particular classroom. Ignoring the panoply of variables that are continually fluctuating in classrooms and failing to adapt instruction to those variables are contrary to the essence of teaching. Naturalistic studies, on the other hand, may document the complexity and subtleties of implementing an intervention, but they do not typically address how that complexity might be managed by a practitioner working to accomplish specific pedagogical goals. Formative experiments, unlike experimental or naturalistic studies of instructional interventions, accommodate both the variation inherent in classrooms and the need to adapt interventions in response to relevant variation p. Formative experiments utilize less controlled, authentic environments, instead of tightly controlled laboratory-like settings. A formative experiment seeks to understand and describe rather than to examine a treatment against a control as in experimental and quasi-experimental designs. As with ethnography , formative experiments recognize that experimental control requires laboratory-like conditions, and that such conditions may obscure important situated processes in the implementation of a pedagogical technique. Overall, they aim to bridge theory and practice. What types of questions do formative experiments answer? Formative experiments are used to answer the following type of question: Given that intervention X or pedagogical theory Y shows promise to bring about a valued pedagogical goal, can it be implemented to accomplish that goal, and, if so, how? However, two other key questions are important to keep in mind when using a formative experiment research design: How might the implementation of the intervention be modified, in light of these factors, to be more effective? Some examples of questions that might be answered through the utilization of a formative experiment are: What kind of claims can formative experiments make? In general, formative experiments in the field of education seek to address specifically how promising instructional interventions might be implemented in authentic classrooms to best achieve particular pedagogical goals. They also endeavor to bridge the gap between research theory and the actual practice of teaching. Formative experiments focus on the processes and on recognizing patterns that appear to co-occur and may thus be linked. Consequently, they aim to understand and describe rather than to examine a treatment against a control as in experimental and quasi-experimental designs. Reinking and Bradley add: A formative experiment then, with its emphasis on workability or achievability, is a methodological parallel to a science of engineering that tests theory and empirical research in the real world of practice. It employs systematic and rigorous data collection, qualitative and quantitative see mixed methods for more information on how to integrate qualitative and quantitative research designs , toward achieving a desired pedagogical goal while valuing intuitive knowledge and engaging in experimentation beyond formal hypothesis testing. Further, formative experiments are aimed toward generating research that not only is more directly relevant to practice but can inform theory development and identify variables that might be investigated through conventional experimental or naturalistic approaches p. What are the standards of quality used when assessing formative experiments? When evaluating formative experiments, several characteristics are important to establishing this research designs appropriateness, rigor and validity. These are as follows:

They rely on well-specified goals that are explicitly linked to both theory and practice. Moreover, they investigate interventions which already show promise in achieving the specified educational goal s. These data are used to modify the intervention and how it is implemented, as needed" p. Any approach to data collection and analysis may be appropriate, as long as the researcher can justify how the particular approach furthers understandings about an intervention and how it might be more effectively implemented. In fact, mixed methods research fits naturally within a formative experimental design. Additionally, exemplary formative experiments often address the following questions: What is the pedagogical goal and what theory establishes its value? What classroom intervention has potential to achieve the pedagogical goal? What factors enhance and inhibit the effectiveness of the intervention in achieving the pedagogical goal? How can the intervention be modified to achieve the pedagogical goal more effectively? What unanticipated positive or negative effects does the intervention produce? Has the instructional environment changed as a result of the intervention? Examples of formative experiments: Linking reading comprehension to language development for language-minority students. Elementary School Journal, 96, Explores the use of reading comprehension instruction to develop oral language in language-minority students. Outlines six teachable abilities that could be developed in students--including determination of important and unimportant aspects of text. Lists ten instructional suggestions that draw on the primary language, cognitive strengths, and social skills of language-minority students, including shared reading and conversational opportunities. Writing conferences and the weaving of multi-voiced texts in college composition. Research in the Teaching of English, 31, Abstract The inquiry posed two basic research questions: This study tracked the discourses generated by 4 teachers around a set of their teacher-student writing conferences. They collected copies of first drafts, tapes of their conferences, and copies of subsequent drafts from one stronger and one weaker student, for a total of 8 students and 32 texts. All students revised their papers in ways indicating that the conference had had an effect on their revision process. The findings indicate that what is ostensibly the "same" treatment does not generate the same response from all students. They also indicate that the divergent backgrounds students bring to instructional events have a structuring effect that cannot be dismissed solely as teacher bias and self-fulfilling prophecy. Reading Research Quarterly, 35, Consistent with formative experiments, the following questions were addressed: Diverse quantitative and qualitative data were gathered during 2 academic years in fourth- and fifth-grade classrooms in 3 schools. Also discussed are what unanticipated effects were observed and the extent to which the respective classroom environments were changed by the intervention. Other resources you may find helpful: Theoretical and methodolofical challenges in creating complex interventions in classroom settings. Journal of Learning Sciences, 2, Design experiments in education research. Educational Researcher, 32, An emerging paradigm for educational inquiry. Balancing change and understanding in literacy research through formative experiments. National Reading Conference Yearbook, 47, On formative and design experiments: Approaches to language and literacy research. Connecting research and practice using formative and design experiments.

Chapter 2 : On Formative and Design Experiments: Approaches to Language and Literacy Research by Da

Formative experiments utilize less controlled, authentic environments, instead of tightly controlled laboratory-like settings. A formative experiment seeks to understand and describe rather than to examine a treatment against a control as in experimental and quasi-experimental designs.

Introduction The hypothesis of formative causation, which I first proposed in SHELDRAKE, postulates that organisms are subject to an influence from previous similar organisms by a process called morphic resonance. Through morphic resonance, each member of a species draws upon, and in turn contributes to, a pooled or collective memory. Thus, for example, if animals learn a new skill in one place, similar animals raised under similar conditions should subsequently tend to learn the same thing more readily all over the world. Likewise, people should tend to learn more readily what others have already learnt, even in the absence of any known means of connection or communication. In the human realm, this hypothesis resembles C. The hypothesis also applies in the chemical and physical realms, and predicts, for example, that crystals of new compounds should become easier to crystallize all over the world the more often they are made. The hypothesis of formative causation raises many theoretical and philosophical questions, which I have discussed in detail in my books SHELDRAKE, ; ; , but as a scientific hypothesis, its value has to be assessed by empirical tests. When I first proposed the hypothesis of formative causation in , it aroused considerable controversy, and was attacked in an editorial in Nature entitled "A Book for Burning? As a result of this attack, Steven Rose of the Biology Department at the Open University in Britain, wrote to me offering facilities in his laboratory for testing the hypothesis in the learning of animals. We discussed this possibility soon afterwards, but for various practical reasons, nothing came of it. In , as a result of an article I wrote on morphic resonance in The Guardian, a British newspaper, Rose wrote an attack on the concept and publicly repeated his offer to test this "seemingly absurd hypothesis" in his laboratory ROSE, This time, it was possible to take up the offer. Funding was available, and a summer student, Ms Amanda Harrison, was appointed to carry out the experiment in the summer of She knew nothing of morphic resonance, and was deliberately not informed of the hypothesis being tested until the experiments were completed. Thus the experiment described below was performed blind. The design was agreed in advance by Rose and myself, and we both recorded our predictions before the experiment began. Rose predicted that the experiment would show no morphic resonance effects; I predicted that it would. Experimental Design The research of Rose and his group is largely centred on biochemical changes in the brains of chicks following various kinds of learning. In designing an experimental test of morphic resonance together, Rose and I decided that it would be best to use a technique routinely employed in his laboratory, namely a form of learning involving conditioned aversion. Day-old chicks peck at small bright objects placed in their immediate environment, and they normally do so with little hesitation. But if they peck something distasteful, such as a bead coated with a bitter substance, then they show a strong tendency to avoid pecking it again, even many hours later. They are not averse to pecking beads of different colours, showing that this response involves a specific kind of learning, known in the literature as "one-trial passive avoidance learning" CHERKIN, A similar response occurs even with tasteless beads if, after pecking, the chicks are made temporarily sick by an injection of lithium chloride. Thereafter, they show a strong tendency to avoid those beads. The chicks are exposed to a stimulus, such as a shiny chromium-plated bead or small coloured light. Most peck at it quickly. Half an hour later they are injected with lithium chloride; they are then tested with the same stimulus four hours later, and also with a control stimulus to which they have not been made averse. Under these conditions, most chicks show a strong aversion to the test stimulus but not to the control stimulus. Control chicks injected with saline solution do not show any comparable specific aversion. In the present experiment, this kind of aversive response was brought about in chicks exposed to a small yellow light, a stimulus not previously used in experiments of this kind. Control chicks pecked at a chromium-plated bead. Exactly the same experiment was performed with fresh batches of day-old chicks for 37 days, spread over ten weeks. According to the hypothesis of formative causation, subsequent batches of chicks should have a progressive tendency to avoid pecking the yellow light. They should be influenced by the experience of

previous similar chicks, even though they had never met them, and without any possibility of communication by conventionally-recognized means. This effect should happen as a result of cumulative morphic resonance from the previous chicks that had developed an aversion to the yellow light. This increasing aversion in naive chicks should be measurable in terms of an increase in the time-lag between being exposed to the stimulus and pecking at it, or in other words an increasing latency. Meanwhile control birds should show no such tendency to avoid pecking chrome beads. In addition, the increasing aversion to pecking the yellow light should also be apparent in control chicks after being injected with saline solution. Rose is very sceptical about the hypothesis of formative causation, and made the common-sense prediction that there would he no progressive aversion to pecking the yellow light. The predictions as recorded in advance were as follows: We both hoped for a clear-cut result, and our original intention was to publish the results of this experiment jointly. However, we disagreed over the interpretation of the data, and Rose decided he did not want to publish the results as we had planned. I am therefore writing this paper without Rose, but inviting him to comment on it. Ross Chunky chicks of both sexes were hatched in the laboratory and held in a communal incubator until they were 24 to 36 hours old, when they were transferred to metal pens, lined with coloured cardboard, at the beginning of each experiment, and were kept under red lights. Two chicks were placed in each pen to minimize isolation stress. One of each pair was marked with a spot of dye so that the two could be distinguished. They were allowed to acclimatize for The chromium-plated bead and diode were on hand-held rods, and the LED was powered by a 9V battery. Both chicks in a given pen were exposed to the same stimulus, either the control or LED, and the assignment of treatments to pens was randomized. In the initial training period, each chick was exposed to the control or LED for a period of 30s, and the number of seconds taken to the first peck was recorded with a stopwatch. This figure is referred to as the latency. The number of pecks was also recorded. Chicks that did not peck at all within the test period were recorded as having a latency of 30s, and these "untrained" chicks were dropped from the experiment, although they were left in their pens. Half an hour after the training period, each trained bird was injected intraperitoneally with O. OM LiCI in 0. These injections were carried out by Rose or one of his colleagues while the student, Amanda Harrison, was not in the room. She was thus unaware of the treatments administered to the birds and was working "blind". Three hours after these injections, each bird was tested sequentially by Harrison with both stimuli, first the chrome bead and then the yellow LED. The latency to first peck, up to a maximum of 30s, was recorded. Exactly the same procedure was followed every day for 37 days. The experiment was carried out on Tuesdays to Fridays inclusive in the period from 20 July to 21 September On all days except Fridays between 10 to 18 test birds were used, together with similar numbers of controls; on Fridays about half as many birds were used. There were considerable fluctuations from day to day in the average latency of chicks when pecking at the control and test beads. Variations in general levels of activity are well known to researchers on chicks; the day-old birds may be sluggish one day, while those hatching a few days later may be hyperactive. Such fluctuations are associated with changes in the weather, particularly with the barometric pressure around the twelfth day of incubation BATESON, In order to smooth out such fluctuations, and also to compensate for variation in sample size from day to day, the data for successive three-day periods were pooled days , , and so on. The last sample included data for the last four days. The data were analysed in several different ways: By the standard method used by Rose and his colleagues e. The number of chicks not pecking at the stimulus within the first ten seconds was divided by the total number tested, giving a proportional measure of aversion. By calculating the mean latency. By calculating latencies in terms of trimmed means. Changes over time were analysed by computer using a linear regression program. Results The effects of practice by the experimenter The results clearly reveal how Harrison improved as an experimenter through practice. This is hardly surprising; she was learning on the job, and had never worked with chicks before. This experimenter effect is evident in the data shown in Fig. Both test and control birds were trained more successfully as time went on; in other words, a higher proportion of the birds pecked at the yellow light or chrome bead within the initial 30s training period. This effect was greatest with the yellow light over the first six days, and corresponds to the fact that Harrison initially experienced greater difficulty learning to manipulate the rod with the yellow LED that the rod with the chromium plated bead. The former was larger and more bulky. A value of 1. For the analysis of overall trends,

it seemed best to exclude the initial period when this experimenter practice effect was so pronounced, since it overshadowed the differential pattern of change in response to the control and test stimuli. I therefore omitted the data for the first six days from the analysis. The overall pattern of results described below remained essentially the same if the initial three to twelve days were excluded; the exact number of days omitted was not critical within this range. Changes in initial latencies Unexpectedly, there was a change in latency in the control birds as time went on Fig. They showed a clear tendency to peck sooner at the chromium-plated beads as the experiment progressed; the mean latency declined from about thirteen to eight seconds. This effect was statistically significant at the 0. Although neither Rose nor I had anticipated such a trend in the control data, we agree that it was probably due to an experimenter practice effect cf. By contrast, in the test birds there was no such pattern of declining latency. Indeed, using the proportional method of analysis of Rose and his colleagues, there was a tendency for latencies to increase Fig. The crucial question in the present experiment is whether there is a progressive difference between the behaviour of the control and test birds. This difference can be seen by subtracting the average latency for control birds from the average latency for test birds in each period Fig 4. This procedure enables fluctuations due to changes in atmospheric pressure and other environmental factors to be controlled for. Since this is the crucial effect on which the interpretation of this experiment depends, I have examined several other ways of analysing the results. First, the statistical significance of this effect was calculated using pooled data for one-, two- and four-day periods, in order to ensure that the results shown in Fig. All these methods showed a similar increase in latency in test birds relative to controls. For each three-day period the proportion with a latency of 10s or more with the control bead shown in Fig. Second, the effect of comparing the test and control data in different ways was examined. Changes in latencies in control birds after injection with saline solution As in previous research by Rose and his colleagues, chicks that pecked the LED and then were made sick by an injection of LiCI developed a high degree of aversion to the test stimulus; most of the birds would not peck the yellow light at all when tested after the injection, although they readily pecked at the control stimulus, the chromium-plated bead. The control chicks after pecking the chromium-plated bead received an injection of saline solution, and they were likewise tested with both chromium-plated and yellow beads thereafter.

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Chapter 3 : Formative/Design-Based Experiments (10/11) by Katherine McPhillips on Prezi

What Formative/Designed-Based Experiments Are: Intended to help bridge the gap between research/ experiments and implementation (guides instruction).

Biography[edit] David Reinking is a researcher who is known for his work in investigating how literacy is affected by digital forms of reading and writing as well as his formative and design experiments. Moore School of Education, which is his current location. Bradley, is written to meet the needs of both experienced researchers and graduate students preparing to collect data for dissertation purposes. The book is organized into four chapters, beginning with a discussion of what formative and design experiments consist of and why they are useful. This formative experiment captures the interest of classroom teachers and researchers because it is written with practical language to allow teachers to implement the interventions researched into their own classrooms and it also dissects the formative design of the study to appeal to researchers. Selected works[edit] Beach, R. Resisting commercial influences on accessing scholarship: What literacy researchers need to know and do. Once upon an electronic story time. The New Advocate, 13 1 , Negotiating the multiple realities of technology in literacy research and instruction. Reading Research Quarterly , 34, The electronic transformation of literacy and its implications for the struggling reader. Reading and Writing Quarterly , 15, Toward a good or better understanding of best practice. Journal of Curriculum and Instruction. Accessed December 15, from http: Why literacy researchers have little influence on policy and what to do about it: On formative and design experiments. New technologies of reading and writing: A database modeling a dynamic, collaborative scholarly resource. Retrieved August 13, from http: From assimilation to accommodation: A developmental framework for integrating digital technologies into literacy research and instruction. Journal of Research in Reading , 23, Reading Research Quarterly, 35, E-mail and literacy education.

Chapter 4 : Formative Assessments in Science - Educational Innovations Blog

Formative and design experiments represent a methodology uniquely suited for educational research in general, and literacy research in particular. Providing a practical overview of this approach, the authors address topics such as the origins of these experiments, their execution, and ethical issues.

Not only are they expected to teach complex concepts, but they also have to teach students how to apply these complex concepts to new situations. Unlike assessments given at the end of a unit, formative assessments are quick checks for understanding that give teachers valuable insight into the minds of their students. The key to a good formative assessment is that it is quick and easy, especially in the science classroom. There are mountains of content to cover, and there is simply no time to waste. They simply exist to give teachers feedback about how well their students are learning. Here are some tried and true formative assessment tools that all science teachers can use to better inform their teaching: At the end of class, ask students a quick question that covers what they should have learned that day. You can then sort the exit slips into piles to see how many students got it, and how many students need more help to understand the concept. Another option is for students to place their exit tickets in colored baskets according to their level of understanding. This also allows students to take it a step further and self-assess their understanding. After a lesson, students can list three things they learned, two things they found interesting, and one question they still have. This quick check for understanding gives you valuable insight on what your students need more help with as well as information on how to better tailor your lessons to their interests! Giving each student a set of colored cards on a ring is a great quick, assessment tool. Students can hold up green if they feel they understand the concept well, yellow if they need you to slow down or need more explanation, and red if they are totally lost. This is especially a great idea because it requires no paper! Another great, paperless way to see what students know is to have them answer a short question on Twitter. Students are already engaged with social media, so teachers might as well use it to their advantage! What Is the Question to this Answer? This simple, quick exercise will let you know who grasps the concept and who needs further instruction. This activity is also a good discussion starter because students can explore their questions in small groups. It is amazing what a teacher can glean from just walking around the classroom and listening to students discuss amongst themselves! So, there we have it: Do you currently use formative assessments? Are there any other formative assessments that you would recommend to teachers?

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Chapter 5 : Design-Based Research Methods (DBR) - Learning Theories

On Formative and Design Experiments Formative and design experiments represent a methodology uniquely suited for educational research. Providing a practical overview of this emerging approach, the authors address the following questions: What is the origin of formative and design experiments and how do they compare to other approaches to.

Moore School of Education, which is his current location [1]. Before his transition to higher education Reinking was an elementary school classroom teacher for 8 years [1]. He was the editor for the [[Journal of Literacy Research]], a peer reviewed journal published by the National Reading Conference from [2] and co-editor of Reading Research Quarterly, a peer reviewed journal published by the International Reading Association from [2]. In Reinking was inducted into the Reading Hall of Fame [3] [4]. His most recent publication, On Formative and Design Experiments: Bradley, is written to meet the needs of both experienced researchers and graduate students preparing to collect data for dissertation purposes. The book is organized into four chapters, beginning with a discussion of what formative and design experiments consist of and why they are useful [2]. The methods of formative and design experiments are examined with specific questions discussed, such as how to set up an appropriate site for research, when the formative phase should end, and troubleshooting guidelines [2]. Chapter three provides quality examples of formative and design experiments and chapter four guides the reader to determine if formative or design experiments are appropriate for their research interests [2]. This book is written with clear language to excite beginning researchers to discover a new method of literacy research and goes deep enough into the content to stretch the mind of experienced researchers [2]. This formative experiment captures the interest of classroom teachers and researchers because it is written with practical language to allow teachers to implement the interventions researched into their own classrooms and it also dissects the formative design of the study to appeal to researchers [7]. The results of this study include qualitative analysis collected from observations, interviews, journals, and focus groups as well as quantitative data collected from attitude surveys, and parent questionnaire. Selected works Beach, R. Resisting commercial influences on accessing scholarship: What literacy researchers need to know and do. Once upon an electronic story time. The New Advocate, 13 1 , Negotiating the multiple realities of technology in literacy research and instruction. Reading Research Quarterly, 34, The electronic transformation of literacy and its implications for the struggling reader. Reading and Writing Quarterly, 15, Toward a good or better understanding of best practice. Journal of Curriculum and Instruction. Accessed December 15, from http: Why literacy researchers have little influence on policy and what to do about it: On formative and design experiments. New technologies of reading and writing: A database modeling a dynamic, collaborative scholarly resource. Retrieved August 13, from http: From assimilation to accommodation: A developmental framework for integrating digital technologies into literacy research and instruction. Journal of Research in Reading, 23, Reading Research Quarterly, 35, E-mail and literacy education.

Chapter 6 : David Reinking - Wikipedia

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Chapter 7 : Formative Experiments - CEP/TE Resource Page - Your Research Oasis

Formative and design experiments represent a methodology suited for educational research in general and literacy research in particular. This work addresses questions like what is the origin of.

Chapter 8 : David Reinking (Author of On Formative and Design Experiments)

So-called "design experiments" have been presented as a radical alternative to traditional experimental designs in

behavioral sciences. A closer scrutiny of design experiments shows that they share the basic linear methodology of traditional randomized controlled trials, and thus ignore resistance and agency of learners as a source of surprise and novelty.

Chapter 9 : An Experimental Test of the Hypothesis of Formative Causation

Formative Research 5 experimental design, in which one creates an instance of each parameter of an independent variable, one collects data on the instances, and one generalizes back to the independent-variable.