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A CONVERSATION ON INSTRUCTIONAL DESIGN WITH ROBERT GAGNÉ AND DAVID MERRILL NO:4

Necmi Esgi[1i], Omer Arslan[2]
[1]Assoc. Prof. Dr., Gazi Osman Pasa University,
Comp. and Instructional Tech Dep. Tokat, Turkey
[2]Res. Asst. Gazi Osman Pasa University,
Comp. and Instructional Tech Dep. Tokat, Turkey

Abstract:
The purpose of the study is to bring in the fourth part of diachronic conversation on instructional design with Robert Gagné and David Merrill to trancripts. This conversation was hosted by Utah State University, in the United States of America, in July 10, 1989. Throughout the history of instructional design, these two scientists are considered as the pioneers of the field and in these sessions, they summarize and compare their studies.

Keywords: Gagné, Merrill, conversation, instructional design

1. Instruction

Robert Gagné was the most important name in the field of instructional design area. He followed by many researchers and scientists. Like David Merrill ve Charles Reigeluth. Merrill's Component Display Theory, Reigeluth's Elaboration Theory have some marks from Gagné s work.

[i] Correspondence: email necmiesgi@gmail.com

2. Method

Conversation videos are not commercial. Utah State University made open acccess to find them at https://archive.org/details/ConvInstDesign. So those videos are dowloaded. Transcripts are created.

3. Findings

Don Smellie: I am Don Smellie, professor of education and head of the Instructional Technology department at Utah State University. Recently we hosted a conversation on instructional design with Doctor Robert Gagné from Florida State University and Doctor M. David Merrill at Utah State University. Now, neither of these individuals needs an introduction. Doctor Gagné is among the most prominent names in our field and considered by many as the father of instructional design as we know it today. Objectives, hierarchies, and the conditions of learning form the theoretical foundation upon which many have built in designing and developing instructional products. Doctor Merrill has based much of his efforts on Doctor Gagné's work. He has elaborated areas which he felt needed more detail. Component display theory and elaboration theory are recognized as major contributions to the field of instructional technology. Together Doctor Gagné and Doctor Merrill represent fundamental theoretical focal points upon which much of what we know about instructional design is based. These two prominent theorists have cooperated and shared their views before but never before in such a lasting and personal way as you are about to see. This is a video transcription with minimal editing. It is not a commercial studio production but a working transcription of the live proceedings. You should have also received a graphics package which contains the visuals used with other supporting materials that were distributed during the conference. As you will see the agenda acted as a guide rather than a blueprint. Now don't be alarmed that many of the graphics and agenda items are not mentioned are used during the discussion. We are richly rewarded by the content that they choose to address. Session four is a look towards the future of instructional design. Here doctor Gagné and doctor Merrill exchange ideas on how they see expert systems will be used to further the effectiveness and efficiency of the instructional design process. Doctor Gagné shares his ideas about the roles of both instructional design and technology in the schools. Now let's look in on this final session.

Gagné: Instructional design issues for the future. Well I don't know, I suppose we need to say something about ICAI hee? I'm a little skeptical about ICAI. I see a lot of ideas that come partly from AI and partly from cognitive psychology that seem to me be very good; for example, the design instruction that takes into account the knowledge background of the student. You know all of the or many of the research studies on experts versus novices have been very interesting, and I think they've discovered some relatively important things. One of the things that you can say what they have discovered it in a number of ways. First of all the negative way to say it is that well you know there really isn't any difference in logic or an intellectual functioning between the expert and the novice, that is not much different at all. Whatever's different is learned and what is different usually comes down to a sort of set of problem specific knowledge. If you say what is a difference between a novice physicist and an expert physicist, for example, what the research says is the difference is the physicist knows enough about this particular problem, so he is able to, let's say, conceptualize it in terms of kinetic energy, whereas the student the real novice might very well, think it has to be looked at in terms of force see not energy, and there are number of examples like that. Generally speaking it seems to me that what had come out of these studies is that the difference between novices and experts is knowledge, see. The expert has a lot more knowledge about the particular problem, particular field, particular set of ideas that are being worked with, and therefore is better able because of that knowledge to formulate the problem in a way that makes it more readily soluble. Now that's fine, so I think we need to know what this knowledge is and we need to make the attempt to teach it to students, of course it's perfectly true is that you know but is that intelligent CIA is will perhaps put that's a rather simple one among notion that seems to me. The other idea that has come from various studies like this is that we must activate task relevant strategy. I have spoken about this before and I think that's a good idea, too. If you want to teach somebody troubleshooting electronic equipment, you teach him about the strategies as well as about the components of this equipment, the nature of the system, how it's connected, and particularly you teach him those things rather than I would say the principles of electronics whatever that means. So you do teach strategies, you teach strategies like you want it is very familiar to me because I used to work on these things what's called to have split strategy if you want to find the trouble in a series circuit, you look in the middle first and then you go from there see or another strategy is has to do with how difficult is it to make this test or this check or this replacement whatever has to be done with this equipment, how difficult is it. Well you take that into account, you sort of way the probabilities of what would happen if you made that check versus some other check which may be easy to make, maybe like

replacing a bulb or something like that you see. So these are strategies, they are troubleshooting strategies, see, they're not general problem-solving strategies, they are troubleshooting strategies specifically. That is another idea that has come from various studies of experts and novices things like that and I think that is a find thing to be incorporated into instruction. Now if you do those things are out what gives you intelligent CAI, well I doubt it, I don't think so. Well I won't say so if you stop right there I think of course if you want to develop some good computer aided instruction and you want to get funded for it, you call it CAI and you get some funds. There are verbs to use and they need to know where to put the subject and the predicate. All of those things very basic kinds of mechanics of writing, should I think be taught and automatized in the first grade. You know what is the result of this, why it doesn't happen now and what is a result of that the result of it is that we have remedial programs or reading and writing and arithmetic beginning with the grade five it go all away up to the university and in some high schools in many high schools 30 percent of the instructional time is spent on remediation. I don't think they should be any remediation at all. And there wouldn't have to be if kids learn the basic skills by at least the most grade three no reason why they can't do that, people have said this for years, no kids can learn these things, how did they learn them? Well teachers don't like to teach these things because they require a lot of practice. Now practice I think can be doll if you want or it can be interesting, it can be designed so that it captures the kids' interest and so on but that really requires having the kids were on the computer, what does he do with the computer, he does nothing but practice. That is all. He doesn't learn to logo and do all these other things just practices and that's where the computer is very well designed to do in order enable him to practice, well designed programs of practices that are interesting for him or her and you know that, don't take up too much time with of the school day, but in which at the end of the time we could say okay these are the kids who know the basics of reading the basics writing, the basics arithmetic and that's it. And whether they know anything else or not they know all those things. That is why are the computer as its greatest use in the schools, that's what I'd like to see happen but I don't know that I'm going to see it. I'm trying.

Merrill: What you say is barriers to that happens?

Gagné: Well I think barriers one is an attitude about computers, the idea is you get one for a class and that is enough, that isn't. You have to start by saying I'm you know I've got a class of thirty kids; I have to have at least 20 computers that is it you

know. They don't cost so terribly much, do they, you know or maybe Apple will give them to you or something I don't know but...

Merrill: I'll give you one if you buy the other 29.

Gagné: Ohm well, but I think that's one attitude that is wrong. The other attitude is that you know somehow they do magical things; I don't think they do magical things, but I think they're terribly useful machines and you know it's not a new idea that kids can practice these necessary basic skills, let's say each kid taking something like 20 minutes a day or half an hour a day if you want to go to a computer room and go through and practice these skills. The teacher doesn't want to do this, the teacher in the elementary school has too many things to do and is being, you know the secretary of education is piling more things on her all-time to do, civic education and values and everything else at the same time what's happening to reading, writing and arithmetic. Well I don't know. I mean they are not being talked to the point to the extent of automaticity that they need to be.

Merrill: In your opinion are there existing programs in those areas that do this job or is that those programs yet to be developed and I guess the second part of that questions if they are yet to be developed, you should do them, you think they're going to come from the commercial sector or we're going to have to have government funding or how do we get the kinds of programs we need to, I mean I suspect one problem is getting the computers, I expect in via the computers there of really answering the question .

Gagné: Well, there are some programs you see which do these things, but they are very scattered and they are incomplete, you see. For example the programs that are good I mean that do this well are more like programs that are sort of they're almost like demonstration programs. So they don't do the whole job you see. If you're going to teach kids decoding the words, you have to teach them all the sounds of English words, not just some that you happen to select, but you have to teach all of them. Then you need to teach all of them.

Merrill: We did what.

Gagné: Well I didn't know but. No I would like to hear more about it. But the ones I've seen and some of them are verbs in the sense that they do the right things

but they're more like demonstrations, they teach the kids how to pronounce you know combinations of others like b u t and I u t and so on but then they stop there, see. R I T and B I T won't do that.

Merrill: What do you think we're going to get these? As is going to be developed bycommittees in public schools, they are going to develop and the government grants, private enterprise; I mean it is obvious there is not a market there. I mean that the demonstration has been pretty clear in the past few years that they we are all these companies have come and created educational software. Now you can't find a single at anywhere for educational software. They are obviously not making any money. Most of them out of business even the big ones that is making word processors.

Gagné: You know a lot more about that than I do.

Merrill: Yeah, any feelings on that.

Gagné: I don't know you have actual experiences so I don't but I would think that it would be possible, well here is one possibility. It is possible seems to me for somebody to develop a set of things that I guess I call shells and get the teachers to fill them in. Yeah, I think that's one approach that I think might work well and it means you know all the teacher has control over this and teacher can do with it what he or she wishes and also it is a way of decentralizing the whole effort and so I have some hope for that I think. I don't know how else to say but. You know government doesn't like to support these things any longer and yet it seems to me that this is as important an issue of national security as is selling arms to the Iranians.

Merrill: And sending the money to the conference. Besides that for the amount of money they said to the conference with support educational research for a long long time.

Gagné: Indeed that's true, yes that is true.

Merrill: One bomber would go for a long long time.

Gagné: Well, this is the problem then you know come back down to convincing schools that this is what they should do, that this is what they need, this is what they should be or you know others. It's white cat or something similar I don't know but I

mean is that the problem, mean the things is all developed we're being told, okay fine I'm glad, I'm delighted to hear that you know I really am, but now what.

Merrill: How did we get out there? You are waiting for us to tell you how to do there, you know.

Gagné: I am trying to tackle it, well I shouldn't say much about this but because I am not really too hopeful about it, but I think of tackling it perhaps through teacher education. I am trying to advise a group of people in my college who want to establish a teacher education program for teachers of basic skills and I think that's a good idea you know just as there are teachers of special education or teaches of this and that, there have to be a program, teacher education program for teachers of basic skills that's what we're interested in and I'd like to see that happen, but obviously if they going to be teachers of basic skills they going to have to use computer programs to get this job done.

Merrill: I like to shift to topic because our time is running. I want to dress another topic in the last 15 minutes we have. What do you say Bob, you know we've talked a little bit about instructional design theory, we've talked about some reconciliation between some of the differences and things and I think that might be an important step but what do you see from your perspective as you know really I suppose the key leader in developing instructional design theory. What you see is the future you know do we know what we need to know, if not in this room I know because I know some of these people are some budding instructional design theorists, who are likely to going to academic positions and to write and do research in this area. Where should they be going, what's the future, what needs to be developed, what are the burning questions or where should we be ten years from now in instructional design theory, should we still be using the conditions of learning addition four or what else needs to be done, where should the next generation take this kind of theory and what should they do with that.

Gagné: Well before I forget to mention that I feel that the area of research that I would want to pitch into if I were going to do any more research is what you call the content structure. I think really to conceive that as the schema of whatever kind and they are maybe different kinds of course and what it takes to develop in the learner a new scheme or a revised to our tuned schema or whatever and to take that as the aim of instructional design and to work out the things that you have in the first column of your table that apply to all the others, I think that's what if I were going to be a

researcher you know. What's your student do with a dissertation, I think he should grab onto, he or she should grab onto those ideas and run with them and say okay that's what we're trying to do, what we mean by a content structure is a schema, I don't mean I do not care what you call yeah but it is what kind of organization do we need to have for the concepts, the facts whatever it is that we are trying to teach, what kind of organization do we need to have which will assure that we get the kind of outcome that we want to see in students and even perhaps what we want to see later on when they try to use their knowledge in in practical ways. I still think that, what I'm trying to say is that it seems to me that in David's presentation of that notion of the content structure and the aim of the notion that this is the aim of learning and not the objective itself but this structure. That could take a lot of research, so if we go in the research, that's where I would say to go. Now, if one is going into instructional design, then I still feel that there are many many things that can be learned about how to design instruction for the computer and that's where I would kind a put emphasis if I were a student, I think, I would like to see things going in that direction. It involves all the questions, many of the things we have talked about including you know where these images come into that. We know that you know the computer can present schematics and diagrams of one sort or another and we know that we have the video disk, all of these things can be connected together and they're all kinds of questions to be asked about what is the best way to design instruction within its some of the general rules that we talked about.

Merrill: Let me describe some the effort, I know you're aware of this, but some of the people in audience may not be, some of the effort that we're doing in trying to design an instructional design expert system because and to get you to respond to its methodology and I really like to characterize this not so much that I'm interested in this specific rules that we've come up with at this point in time but really as a methodology for instructional design theorizing. Let me describe briefly so the members in the audience will be with us not like to hear your response, your reaction to it. Very basically what we're trying to do is we're trying to identify first particular kinds of content structure and at this point we've identified how to instantiate a kinds of taxonomy, parts of taxonomy we're also working now with some procedural thing. We're trying to develop a computer program which actually queries and naive instructional design user so it ask them questions, the result of those questions is that it creates on the computer a content structure and instantiates that with their content. Then we've tried to develop a set of rules now I'm talking now expert system rules inside the computer which can take the information they've gathered from the

instructional designer and make decisions about these are the modules that we recommend, we being this computer program, this is the sequence in which those modules should occur, this is the point at which there could be branching between modules, these are the rules we think that those decisions should be made on and that be the next set of output. Than the next set is to say based on some additional information we gather from the instructional designer or subject matter expert these are the transactions that we think implement this particular module or should be used to implement it, this is the content representation, these are the points at which you make decisions to jump from one's transaction to another. Now at this point in time just so you know this isn't completely pie in the sky we actually have operational computer code for kinds of taxonomy of a limited sort, will actually make these decisions and make these recommendations in fact my colleague John Manley is sitting up here from University Southern California he's been working with me on this doing a lot of the actual programming as we actually have computer code that'll do this. Now I sight this you know we could spend a day talking about this particular project but I sight this in this context because several things have happened to me toas a result of doing that. I started out to do this as kind of a challenge from the intelligent tutoring people who had thrown so many rocks at that they find is trying to get back in and said you know what are the rules and what I started try to identify the rules, I find that the way we ride is pretty vague when your computer programmer and if you try to hand that to somebody who doesn't know instructional design and say translate this into production rules for an expert system they say what, and so that's how it came about. In the process, however, I have to confess that the whole notion of content structure kind of evolve because I wanted to know how do I decide what the modules are, and in the in the process of trying to decide what the modules rice and where do we start from and that worked back to this notion of spelling out the content structure. And the other thing as a methodology that I find is that the discipline of trying to be very very precise about what are all the factors that enter into deciding what goes into a module given this content structure and making those explicit and spelling those out has created a whole level of design theory that's previously was not within my cam. I mean I just previously had not thought about making specific some of these things which seem to be in the realm of art, but which now seem less that way to me. It seems that you can spell these things out. So I guess in this kind of a context in a short you know kind of thing here. I like to hear your reaction to the building of expert systems. I mean I start out to do this I really want to build instructional design theory and my funders around. This could be untapped, we edit this by part. I started to build this, I want a build instructional design theory and but nobody's in a fun to do that at but there will find to

build an expert system and so I said okay I will go an expert system. Now I'm kind of the other way around. I think as a result of having been forced into that from the funding situation I find building an expert system and expert an excellent methodology for theorize and that the theorizing I'm now doing is far more precise, far more detailed and as some other comments this morning making instruction even more complex than it was before by also giving the tools to deal that complexity than before. So I guess I like your reaction is you see this is a fruitful methodology, is this you think type of thing we're doing is a reasonable way to proceed to develop the next generation of instructional design theory.

Gagné: Well, instructional design theory is something that one wants to teach to instructional designers and if it gets too complicated then I don't know that it's worthwhile, because I think a lot of instruction will be designed well because we've been told today that a lot of instruction gets designed without instructional design, there's anyway, so I don't know I think there's a certain level of complexity I guess with which I think it is comfortable. For a design of instruction to deal, and I don't know whether the level that you are talking about goes beyond that but I think it may.

Merrill: I think it does but also I think it provides the tools and...

Gagné: I would not say it is not possible I think that is.

Merrill: Well, I think it may not be possible you know I'm just thinking of the system that we will piece of which we have at this point. For example, in making the decision about how to go what transactions might be involved in a given module, there's probably I don't know, I mean about the number rules but it is a lot, isn't it, several hundred or more. So maybe two hundred rules for a given module to decide which transactions to go. Now I know full well as a practicing instructional designer that if that was written on the page of a book there is no way on this earth I'm going to pay attention to two hundred rules. I mean I'm just going to say I think we ought to do it back but I have done this. We sat in a room and we say how we going to teach this thing on story problems and remember Benny Larry my colleague and I would sit down and I'd say well we could do it this way and I stand up and draw staff on the blackboard. It's, well no I don't like this not like this the subject matter experts say no I don't like this. After a day of that with have a design and then from then on we were crashing down the road implementing that design. Now I suppose that in doing that we're taking into account lots and lots of things, but I've gone back and looked at some

of those designs which I think you really need and other pieces of them I say I don't know why we did that if I was doing it over I do it this way, but now with an expert system we now have all of these rules built in and now as a designer I don't have to think about all those rules anymore, what I do is I say okay I make this assumption and I make this assumption, the computer goes for more and says I recommend these transactions. And I've already had this experience having created the system a look at and say oh I hadn't thought about doing that, but that's a perfectly reasonable thing to do or the other experience I've had even more often in this that's a stupid thing to do why would we do that, then we go back and we go back and say what's wrong with the rules, why did this come out this way and we adjust the rules, but it seems to me that in a way this gives us, it's kind of the instructional spreadsheet notion; that is if I have all these rules built in and let's think about these systems having two ports, two levels of interaction; one is kind of the instructional design theorist level of interaction which I can change the rules to get more reasonable decisions but the other is the practice, practicing instructional designer. This I do not want to change rules I just want to get the job done, who was it somebody was saying Fred you're saying you had so many thousand lessons the do the overwhelming, 450 lessons. If I am an instructional designer, I look at 450 lessons I don't want to think too much about theory and I mean I want to get down I want to say how am I going to do this if I could print this and say okay I'm making this assumption I get this kind of students I get this instances. We think you need these modules yup that looks good to me and it is OK when I need this and this, you need these transactions I say that looks good is it okay here's a shell fil them in that would really facilitate your job and in fact I could look at it and somebody .....level and look at and say no nono those that look like very good modules, I don't like those and he say what were the assumption you said this this and he says wait a minute, you can't make that assumption about our students is also a changes of value, it reorganizes everything this is ohm now that's better. That's the kind of thing we're trying to move.

Gagné: I think it's a fine thing, I'm glad you're doing it and I think that you know we have to wait and see what comes out.

Merrill: Well, that's a good point. Garbage in garbage out.

Gagné: Well no, you say you only have a little bit. I think it's very promising all I can say about it. If it does what you say allows an instructional designer to sit down at the terminal say this is you know this is what I want to teach and so on and the

computer will then tell him about the transactions on so on needs to that need to be devised I think that's fine. Very good!

Merrill: And it's time for questions.

References

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