

Using Student Affective Motivation as an Assessment of Dairy E-Learning Modules

EMMA ALLEN M.S.



What is Motivation?

- ⦿ "those processes that can: (a) arouse and instigate behavior, (b) give direction or purpose to behavior, (c) allow behavior to persist, and (d) lead to choosing or preferring a particular behavior." (Wlodkowski, 1985)
- ⦿ The conditions that influence motivation can be "both internal and external" to the learner. (Gagne 1985, Nwagbara, 1993)
 - > Internally: any skills or knowledge that the learner has about the content before the instruction.
 - > Externally: any experiences that learner is afforded through the instruction (Gagne, 1985).
- ⦿ Several educators have determined that learner motivation is a factor that cannot be ignored in the design and development of instruction (Briggs, 1977, Keller, 1983b, Gagne, 1985, Wlodkowski, 1985, Mayer, 2014, Nwagbara, 1993).



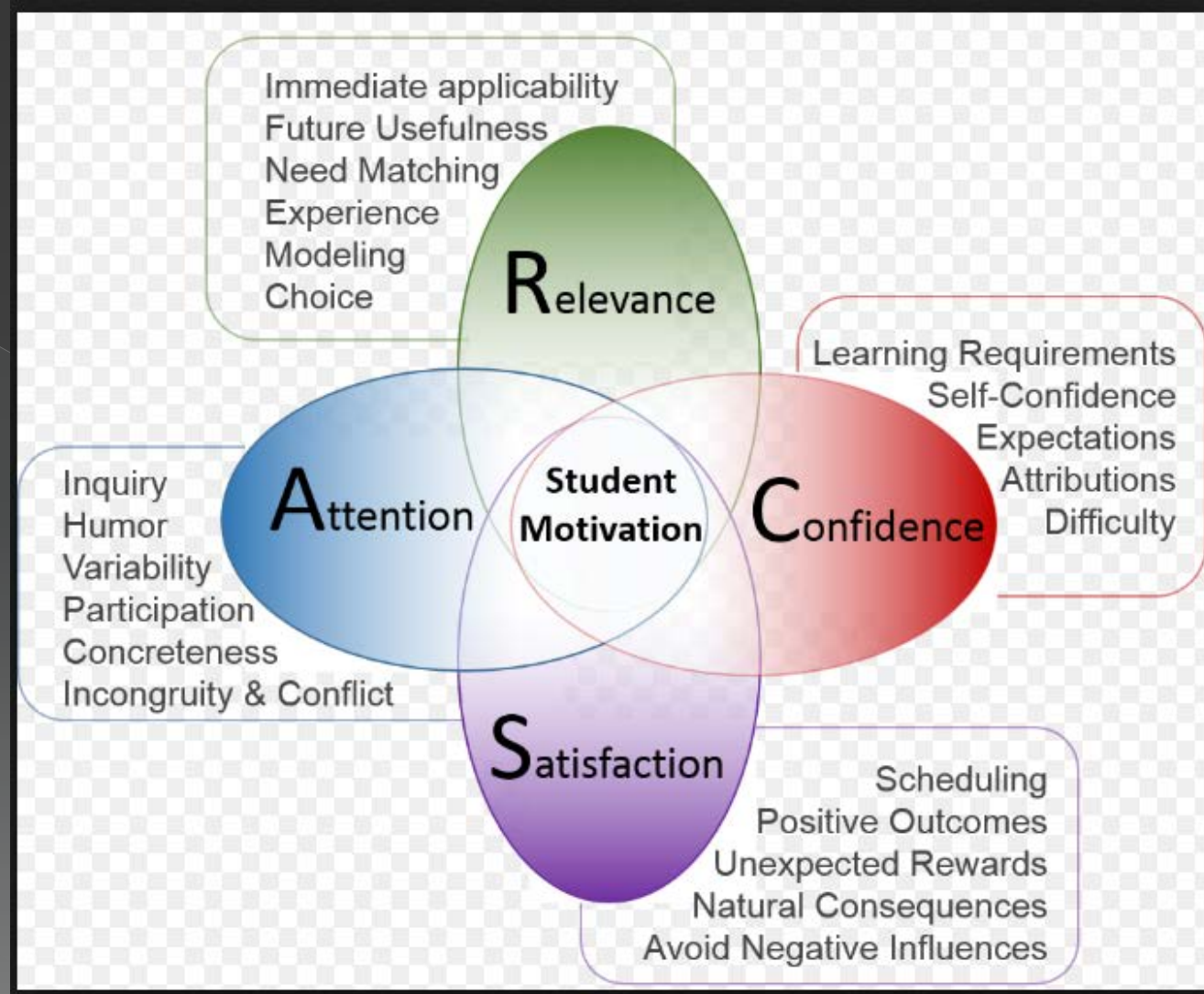
What role do students play in their own learning?

- It is the teacher or instructional designer's job to ensure **educational theory is used as the basis** when designing a program or other type of instruction. (Bird and McClelland 2010, Contento, 2001)
- "Learners should be **directly involved** in developing, implementing, and evaluating learning experiences to encourage critical reflection between teachers and learners, and realignment of programs." (Franz, 2007)
- Learner motivation can predict accomplishment of learning outcomes. (Walberg, 1980, Walberg, Schiller, & Haertel, 1979 as cited in Nwagbara, 1993).



ARCS Theory of Motivational Design

- An educational theory developed by John Keller when the motivation theories of his time (1983) failed to take into account that the instruction itself might motivate students.
- Four constructs make up his theory:
 - > Attention
 - > Relevance
 - > Confidence
 - > Satisfaction
- At right, see the ways that the ARCS theory constructs can be added to instruction.



Purpose

- The purpose of this study was to assess and analyze student learning outcomes and student affective motivation following a self-directed learning experience with modules from the Cow to Cup Educational Module Series.

Need for the Study

- When developing new curriculum, it should always be developed with motivation in mind and the motivational components assessed by students to garner feedback for further changes to the curriculum.

The Modules

- A set of four educational modules that teach the path of milk from the cow to cup
- Modules took on average 25-30 mins to complete.
- Developed and designed by the researcher with Articulate 360 software.
 - Evaluated and Reviewed by educators, animal scientists, undergraduate students, graduate students, farmers and agriculture professors.

The Cow to Cup Educational Series Module



Research Questions

1. Do the Cow to Cup Series educational modules increase content knowledge related to the dairy industry?
2. Is there a relationship between content knowledge related to the dairy industry and affective motivation score after completing a Cow to Cup Series educational module?

Population

◎ Population

- › High school agriculture classrooms for the study were chosen based upon the interest of the teachers who attended the Dairy Modules workshop, a breakout session during the IHSATW (convenience sample).
- › Teachers determined which of their classes they felt the modules would benefit based upon state educational standards that the modules were aligned.
- › 4 schools/agriculture programs with 165 students participated.

Instrumentation

- ◉ The Dairy Content Knowledge Survey was created by using Bloom's Taxonomy and the Indiana State Academic Standards for each module.
 - > graded by hand and
 - > each correct item (or part of an item) was given +1 point and each incorrect item was given -1. This allowed scores to actually be negative and more fully reflect student knowledge.
- ◉ The Affective Motivation Survey was minimally adapted from Huang and Hew's (2016) paper titled, "Measuring Learners Motivation Level in Massive Open Online Courses."

Instrumentation

Affective Motivation Survey

- Used a Likert Scale (shown below)
- Consisted of 35 items regarding:
 - > Attention (12 items)
 - > Relevance (9 items)
 - > Confidence (6 items)
 - > Satisfaction (6 items)

There were stories, pictures, or examples that showed me how this material could be important to some people.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

There was something interesting at the beginning of this module that got my attention.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Instrumentation

Dairy Content Knowledge Assessment

- Consisted of items based upon the standards the modules were aligned to :
 - › Module 1: Breeding and Genetics (11 questions)
 - › Module 2: Product Production (13 questions)
 - › Module 3: Product Processing (7 questions)
 - › Module 4: Grocery Store (11 questions)

Instrumentation

Dairy Content Knowledge Assessment

- Various types of questions:
 - List or short answer questions (A)
 - Matching questions (B)
 - Short answer questions (C)

Please match the process to the correct type of change.

Items	Physical Change
Cutting	
Mixing	
Freezing	
Blending	
Chopping	
Reducing Particle Size	
Chemical Change	
Heating	
Burning	
Digestion	
Baking	
Maillard Browning Reaction	
Decomposition	

List the two processes done during the processing of milk.

Name and describe the process developed by Louis Pasteur that is done to milk during processing. How does this process convert raw materials into products? Why is this process done to milk?

A

Describe ONE process that the milk processing industry has developed to improve the shelf life (or time before milk spoils) of fluid milk. Give the name of this process and explain what it was created to do. Explain how this process is different than the standard process that is done to ensure the safety of milk.

C

Data Collection

- This study was filed with the IRB under protocol #170519225
- Assessments were administered via class visits by the researcher.
 - Researcher spent one full course period in each selected classroom at each school that participated at each of the four participating schools to proctor the self directed learning experience and assessments
- Completion times of surveys varied. Most students finished both the module and assessments in one class period but some did not and they were allowed to complete the next day.

Data Collection

- The modules were found by the students online and at the request of most (3 schools) of the schools in this study assessments were taken by hand by the students.
- The researcher proctored the students and answered questions if students had them.
- Each module had the following protocol for assessment: Each student took a Pre-Content Knowledge assessment and ONE of the following post test options, according to their number.

	Students with Odd Numbers (i.e. 3001)	Students with Even Numbers (i.e. 3002)
Module 1 (M1): Breeding and Genetics	Post- Knowledge Test	Affective Motivation Survey
Module 2 (M2): Product Production	Affective Motivation Survey	Post-Knowledge Test
Module 3 (M3) Product Processing	Affective Motivation Survey	Post-Knowledge Test
Module 4 (M4): Grocery Store	Post-Knowledge Test	Affective Motivation Survey

Data Analysis

Research Questions	Data Set	Analysis	Statistical Test Used
1. Do the Cow to Cup Series educational modules increase content knowledge related to the dairy industry?	School 1, 2, 3, 4	Pre-test vs. Post-test	Paired T-Test
2. Is there a relationship between content knowledge related to the dairy industry and affective motivation score after completing a Cow to Cup Series educational module?	School 3	<ul style="list-style-type: none">•CK score* vs. Overall Mean AMS*•CK score vs. Attention, Relevance, Confidence and Satisfaction Mean of the module	Chi Square Test

*Note: AMS- Affective Motivation Score; CK- Content Knowledge Gain (Post-test minus Pre-test)

Results

Research Question #1:

Do the Cow to Cup Series educational modules increase content knowledge related to the dairy industry?

Participants achieved a significant amount of knowledge gain.

Module	Test Type	N	Mean	SD	Score Ranges		Student Ranges		P value
					Min Possible Score	Max Possible Score	Min Score	Max Score	
1	Pre-Test	44	22.9	13.3	-40	40	-26	36	0.005
	Post-Test	44	28.3	8.5	-40	40	-5	38	
2	Pre-Test	92	-3.3	7.8	-48	36	-16.5	26.5	0.000
	Post-Test	92	10.9	10.0	-48	36	-9.5	32	
3	Pre-Test	49	7.4	8.4	-55	34	-14	22	0.000
	Post-Test	49	16.4	11.1	-55	34	-11.5	33	
4	Pre-Test	44	10.1	3.5	0	19	0	18.5	0.000
	Post-Test	44	13.6	3.9	0	19	5.5	19	

Research Question #2:

Is there a relationship between content knowledge related to the dairy industry and affective motivation score after completing a Cow to Cup Series educational module?

According to youth's perceptions, there was no relationship between dairy content knowledge and motivation.

Back to the data....

- ◉ There was no statistically significant relationship between knowledge gain and affective motivation score within this population, however, there are several studies and an empirically supported theory that state that if students are more motivated this is positively correlated to their knowledge gain

(Walberg, 1980, Walberg, Schiller, & Haertel, 1979 as cited in Nwagbara, 1993).

- ◉ Upon evaluation of this analysis, we suspected that there may be one more variable that is accounting for variation within the data.
- ◉ Further analyses of variance were run to determine if the variable "school" accounted for differences between groups.

School ANOVA

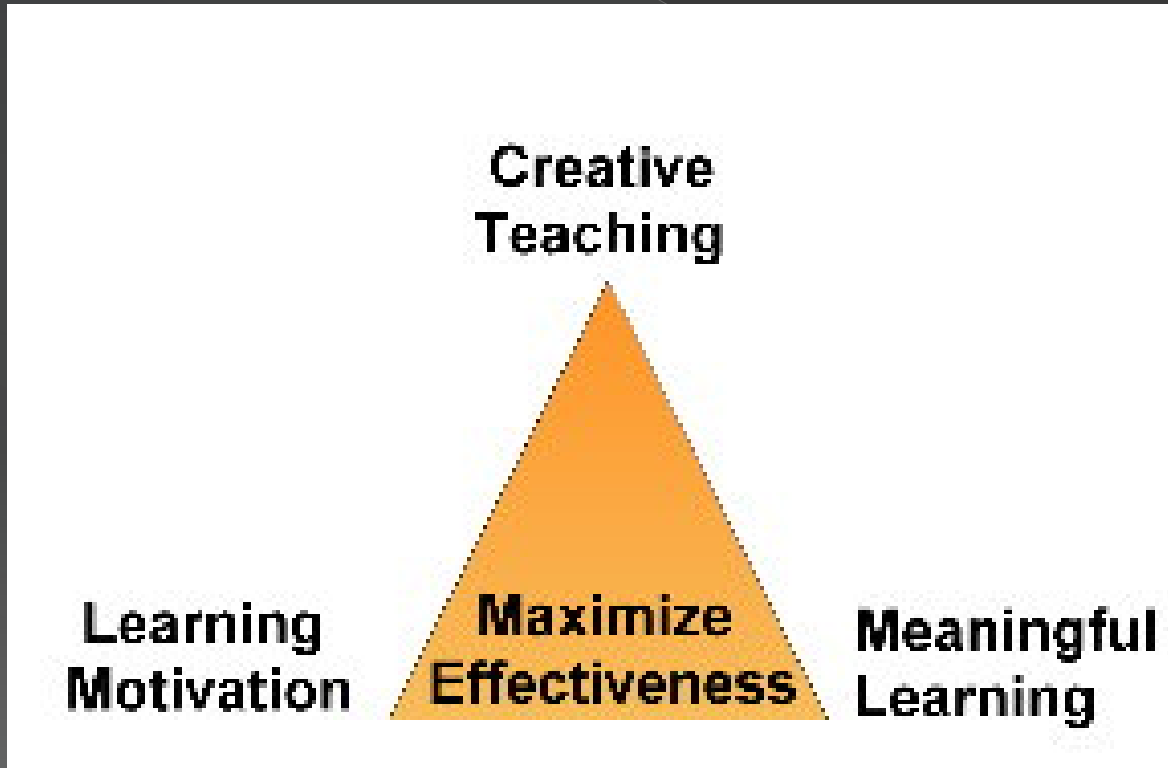
- There was a significant amount of variation between the schools on both the pre-tests and the content knowledge gain variable for Module 4.
- The variation could have been caused by:
 - 1 school reported that their students were overall low performing
 - difference in familiarity of self-directed instruction within the schools. Some schools have e-learning days and others do not.

		Sum of Squares	df	Mean Square	F	Sig.
M1 Pre-Test	Between Groups	4800.529	4	1200.132	4.791	.001
M2 Pre-Test	Between Groups	845.160	3	281.720	5.594	.001
M3 Pre-Test	Between Groups	2035.891	3	678.630	12.546	.000
M4 Pre-Test	Between Groups	302.608	3	100.869	5.911	.001
M1CK	Between Groups	384.000	2	192.000	1.375	.264
M2CK	Between Groups	515.572	3	171.857	1.695	.174
M3CK	Between Groups	483.311	3	161.104	2.728	.055
M4CK	Between Groups	194.615	2	97.307	6.329	.004

Implications for Practice

- Extension educators and agriculture teachers can use the information gained from this study to inform their decision to use this curriculum in the future.
- Educators should be aware of the implications student motivation has towards the learning experience and the merit in self-directed learning (SDL) experiences for knowledge gain evidenced by this study

Implications for Practice



- Although the researchers did not find that there was a relationship between the affective motivation score of the participants and their content knowledge score, other studies have reported this finding.
- When developing instruction, especially module-based instruction, it is important to obtain feedback on elements of the instruction, as is done in this study, and use that feedback to improve the instruction.



My favorite Holstein cow 853

“Learning and innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow.

William Pollard



My favorite Jersey cow, Juliet and her crossbred heifer, Baby Ruth

Questions?