eラーニング・ファンダメンタル
eLearning Fundamental

Chapter 10 Motivation Design in e-Learning

Learning objectives:

Be able to analyze e-Learning material or learning environment based on the ARCS Motivation Model and suggest improvements.
Be able to analyze impacts of networked environment on learning motivation, from the physical aspect and the personal aspect.

Summary of this Chapter

- Motivation design in e-Learning refers to the ID that supports the increase in learning motivation, or willingness to keep learning. Motivation is a major issue in psychology, and there are various types of achievements.
- The ARCS Motivation Model is an ID model proposed by John M. Keller, an educational technologist in the United States, and it considers learning motivation from four factors: Attention, Relevance, Confidence, and Satisfaction. It categorizes the causes to decrease motivation and the measures for them into four categories, and proposes strategies to increase motivation for each of them.
- There are three design conditions required to promote collaborative learning in a networked environment: (1) member's responsibility and mutual independence, (2) supportive interaction, and (3) skills and training for collaborative learning. Each of them is closely connected with an increase in learning motivation.
- The influence on learning motivation from a networked environment has two aspects: (1) physical changes and (2) interpersonal changes. The influence from a networked environment has both advantages and disadvantages, which can be analyzed on the basis of the four factors of ARCS.

Section 1 What is motivation design in e-Learning?

What is motivation design in e-Learning? Motivation is an issue of "willingness," as well as an issue of desire for learning. Clark & Mayer (2003) indicate three pitfalls of e-Learning: (1) lack of definition of job knowledge and skills (materials do not increase the knowledge or skills that can be applied to the job), (2) lack of attention for learning process (materials exceeds the capacity of cognitive process, and therefore the learning does not proceed), (3) disruption (some of the learners do not complete the material). The last pitfall (disruption) is an issue of motivation. When autonomous learning is required in e-Learning, "freedom to learn whenever, anywhere, for anybody" is given, and at the same time, "freedom to quit learning whenever" might be given as well. Here the question of how to deal with the issues on motivation arises. The answer for the question of how to increase attractiveness of learning in e-Learning environment is the function referred to as "motivation design" in ID.

Figure 10-1 shows keywords that explain motivation in training in industry organized by Gagné and Medsker (1996). Motivation is a major issue in psychological research, and a number of theories have been proposed. Let's look at ID theories based on them.

Figure 10-1: Keywords for motivation in education in industry (Gagné & Medsker, 1996)

Keywords	Description
Intrinsic, extrinsic	Difference between feeling motivated by what they are doing itself (intrinsic) and feeling motivated by the result (extrinsic: reward, position or fame) irrelevant to what they are doing. Whether they enjoy the job itself or they do it for salary.
Curiosity	Inquisitiveness is essential motivation, which is also said that the human reason makes a human being. As a child, everybody used to irritate their parents by asking "Why?".
Goal Setting	Concrete goal increases motivation. A person who does not have enough confidence may follow escape behavior so that no one sees that s/he fails.
Self-Efficacy	Recognition of how much ability to manage difficulties a person has. If one thinks that it is determined to fail, no motivation arises. If one thinks that it can be managed, one can be motivated.
Expectancy Fulfillment and Reinforcement	Feeling of achievement that one has fulfilled expectation and satisfaction that one succeeded one's learning achievement in one's job lead to further motivation.
Autonomy	High degree of autonomy in learning style leads to motivation
Attribution	A theory that motivation differs depending on where one attributes the cause of failure or success. If one has strong belief that one's action can change things, one can be motivated. If one thinks that it has been determined by luck or talent, one cannot be motivated.
Social Context	Competitive or cooperative. The research says that cooperative context can increase motivation. Whether or not what a person is doing is approved in an organization (or supervisor) has significant impact on motivation.

Note: Keywords that are introduced in the body text by Gagné & Medsker (1996) (pp.169-173), with description added by Suzuki.

Section 2 Keller's ARCS Motivation Model

10-2-1: Categorizing the research on motivation into four factors

John M Keller, an educational technologist in the United States, is a professor of Florida Sates University, as of 2003 (and still is in 2008). Professor Keller was recruited from Syracuse University for his research achievement on learning motivation, while I was studying at the University. I took Keller's special lecture "motivation theory and motivation design" in graduate school, in which he asked students' opinion on the paper he was writing (Keller & Kopp, 1987). I made a hard request on it, that led me to the opportunity to co-write the next chapter with him (Keller & Suzuki, 1988). Since then, we have had a good relationship both scholarly and privately, and he has visited Japan more than 10 times. On each of his visits, the author had opportunity to hear his invited addresses in many places (Tokyo Institute of Technology, International Christian University, Tohoku Gakuin University, Iwate Prefectural University, Miyagi University of Education, Research Institute of Software Engineering, etc) or his advices for various projects. Professor Keller is a very active person; he has been involved in various projects (consulting, etc.) in the United States as well as in Indonesia and Malaysia.

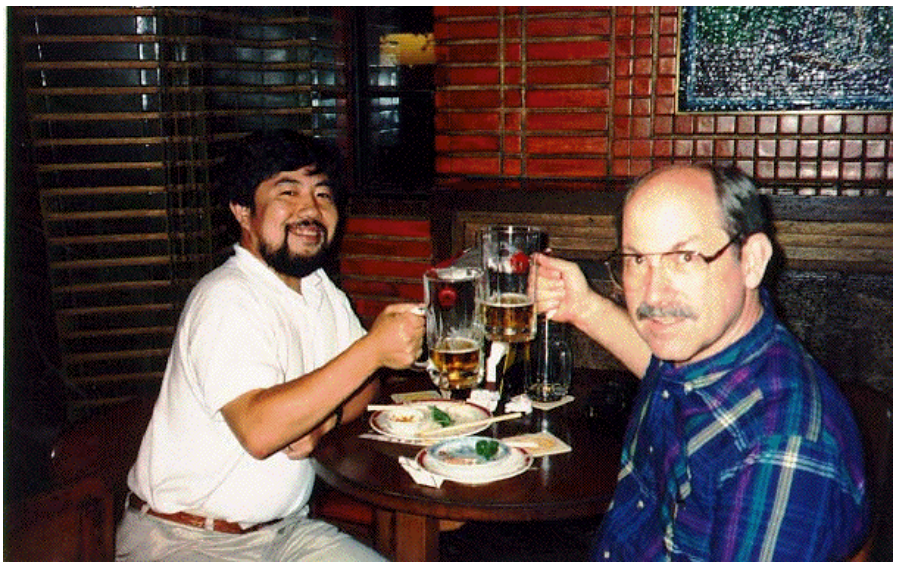

Image 2: Professor Keller and the author (somewhere in Ginza)

The ARCS Model that Keller advocates is a framework to organize strategies to enhance appeal of instruction by looking at learning motivation from four aspects: Attention: Interesting, Relevance: I see the value, Confidence: I can do it if I try, and Satisfaction: I am glad I did it. It was named the ARCS Model, taking the initial letters of the four aspects. It integrates a large amount of findings of psychological research and practices on motivation and organizes them into a form that is good for practical use.

The factors of learning motivation are traced according to the ARCS Model; first, a person is attracted to an aspect that there seems to be something [Attention]. Next, a person learns what the learning objective is and then notices an aspect that one sees the importance and relations between the one and the value in it [Relevance]. Not only is the future value of the task relevant, but so is the meaning that one enjoys the process. If a person finds meaning in learning but at the same time feels that the possibility to achieve is low, one loses motivation.

On the contrary, if a person has had successful experiences a number of times initially and can attribute them to one's own efforts, it stimulates an aspect that "I can do it if I try"[Confidence]. If a person can feel that "I am glad I did it" [Satisfaction] reflecting one's learning, it leads to motivation for the next time (Figure 10-2).

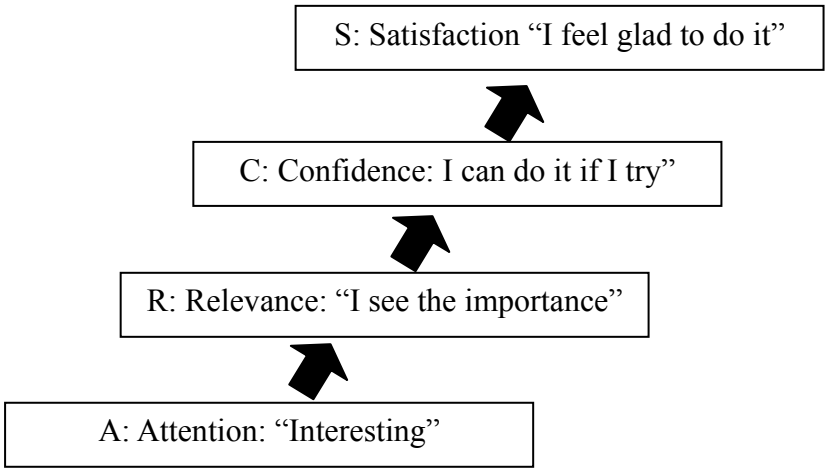

Figure 10-2: Four factors in ARCS Model (Suzuki, 1995)

When I first encountered the ARCS Model, it revealed that I had a narrow recognition of increasing learning motivation or enhancing appeal of instruction. Comparing instruction to medicine, there is no meaning if the medicine does nothing good. Thus, if there is nothing to learn from the instruction (other than the psychological effect to make one feel easy), there is no meaning to have it. However, like the saying that "good medicine tastes bitter," instruction does not need to be merely something to endure. With a skillful way to swallow the medicine to avoid contacting the part to give a bitter taste, it is possible to ease the bitterness. There are "medicines with sugar coating" in the world also. It is one of creative methods to secure effectiveness of the medicine while avoiding bitterness. However, even if a person would be satisfied with the taste of the medicine in sugar coating, there is no increase in "attractiveness of medicine" in the true sense if what is inside of sugar itself does no good.

Attractive instruction does not always mean "interesting" instruction. "Surprise," "laughter," "mystery," and "freshness" are definitely factors of attractive instruction. However, they are all attractiveness from the aspect of Attraction. As the objective of instruction is not only to let learners spend enjoyable time, but also to support learning, joy of "understanding" "accomplishment" and Confidence that one can do it if one tries are essential for attractive instruction. In addition, an answer is required to the question on the issues related to Relevance, which is whether or not the contents dealt with in the instruction are worthy of efforts. It may appear to be boring, but if the learners try very hard earnestly feeling its importance, then instruction should never be regarded as not attractive. That is what I became aware of by learning the ARCS model.

10-2-2: Strategy to increase learning motivation

Now, let's sort out the idea to approach appeal of instruction along with the four aspects of the ARCS Model. Figure 10-3 shows a list of hints on the four aspects of the ARCS Model. This figure was created for a lecture on the issues of learning motivation to undergraduate students by myself; therefore it is written not from the standpoint of instructors who attract attention from the learners, but from the standpoints of learners who use creative means to increase their own motivation in learning. There are a number of things in our life that have to be done even if a person does not want to do. There are also a number of things that have to be tried, even if a person is not confident in it. A subject that a person is not good at, or studying for examination is typical examples of them. It is a listing of ideas that may be used to increase one's motivation on that sort of occasions.

Looking at the strategies in the list, imagine the figures of learners and organize creative measures you are exerting as an instructional designer. However, before working on this, consider what strategy you usually take. A person who cannot control one's own motivation cannot help others to increase their motivation. Just by meeting an instructor who is full of motivation, the learners are attracted. It would be a good idea to start with checking your own motivation at first. Later on, this will serve as a hint to create environment that supports motivation (enabling learners to utilize strategies to increase their own motivation by themselves) in e-Learning.

First of all, the strategy on Attention is roughly divided into three categories: changes in environment to open their eyes (Perceptual Arousal: A1), mystery-oriented stimulation to curiosity (Inquiry Arousal: A2), and to avoid being stuck in a rut (Variability: A3). It is said that introduction determines the instruction itself. We use creative means considering both the learner's mind-set that something might happen in today's instruction and the direction that attracting the attention of learners, with the aiming that the results approach the focus of the instruction. In addition, creative means to do something new or to vary instruction without using the same pattern every time is also included in this category.

Next, sample strategies to increase Relevance are in a list, being divided into three categories. In order to let learners feel that the training is worth doing, it is necessary to let them know that the contents of the training are not "a problem for someone else," but is closely related with themselves. The strategy for this is R1: Familiarity. Next, consider a strategy to increase their interests in the outcome of the training (R2: Goal Orientation). Clarify what the learners can achieve as a result of their efforts so that they can clearly confirm the meaning to find the significance in it. Lastly, consider creative means that enable them to enjoy the process of the training itself. Seek the way to let them find significance in joining the training in a form that they can exercise their ability, even if they cannot find "significance" in the outcome they can obtain (R3: Motive Matching).

The third aspect of ARCS Model is Confidence. First, Clarify "what" they can do if they try (C1: Clarification of Learning Requirement). A person who is making efforts blindly in a tunnel with no way out is less likely to feel "accomplished." Define the goal clearly and let the learners aim for it to establish confidence when they have achieved the goal. The second strategy is, to give "C2: Success Opportunities." If their clearly defined goal is too far away, they have only few opportunities to feel improvement. It is essential to prepare conditions that enable the learners to feel that they are improving steadily, step-by-step. Let them have a number of successful experiences. Then, in order to let them feel that they succeeded due to

Figure 10-3: Strategies for motivation (for learners) - Hints based on ARCS Model-

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■ Attention [Interesting!] ■

Open your eyes widely: A-1: Perceptual Arousal

- Prepare the environment to learn appropriately so that they can be "ready" for learning
- Create a way to prevent drowsiness (gum, menthol, music, air conditioner, or exercise)
- People feel sleepy when they are sleepy. Sleep well then learn.

Value your curiosity: A-2: Inquiry Arousal

- Value simple question or surprises, such as why?, why it is so?, and pursue them
- Consider whether there is any inconsistency with what you have learned or thought in the past
- Try and confirm your own idea actively
- Create your own applied questions by yourself and solve them
- Pursue what makes you wonder thoroughly
- Ask opinions of your fellows who have different perspectives from yours

Avoid being stuck in a rut: A-3: (Variability)

- Occasionally change the style or environment to study for refreshing yourself
- Do other things before getting tired of it, then do it again after a short interval
- Enjoy using creative means to learning itself
- Divide up your time to learn, do not dawdle over it

■ Relevance [I see the value!] ■

Make it to your own taste: R-1: Familiarity

- Apply the new learning to the field in which you have interest or are good at and seek an example that is easy to understand
- Put the explanation into your own words (what is the meaning of it)
- Check how it connects to what you learned in the past or what you know well about
- Create a metaphor or parable for what you learn, such as that it is like xx.

Aim for the goal: R-2: Goal Orientation

- Do not just perform given tasks passively, work on it as your own
- Think about benefits you will have from your efforts and persuade yourself
- Set a goal in which you can see significance and aim for it
- If you do not find significance in the task itself, think about benefits you will have when you have accomplished it
  For example, achieving a good reputation, obtaining rewards, taking a great weight off your shoulders, being appreciated by somebody, or being freed from suffering

Enjoy the learning process itself: R-3: Motive Matching

- Do it using the method you like or that you are good at
- Enjoy learning at your own pace
- Think of means to enjoy learning itself
  For example, learn with (girl/boy) friends, ask questions to a teacher you like, do not tell (your parents) to surprise them, compete with friends, work on it like playing a game, or teach it to your junior fellow

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Source: Suzuki, K. (1995a) 'Premier of instructional design using Educational Broadcasts', Japan Association for Educational Broadcast, free distribution allowed for pp. 102-105, provided that copyright notices are maintained, 1995, Katsuaki Suzuki

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■ Confidence [I can do it if I try!] ■

Set the finish-line tape: C-1: Learning Requirement

- Set the goal before making efforts and be conscious of the direction of the goal
- Have a clear and concrete idea of what you consider to be the goal
- Identify what you can do and you cannot do at present to confirm the distance from the goal
- Determine immediate objective that is neither too high nor too low; possible to achieve, if you try and make efforts
- Aim for defining objectives that are appropriate to your own abilities at the moment

Advance confirming your steps: C-2: Success Opportunities

- Recognize progress by comparing how you did in the past, not with how others do
- Failure breeds success: create an opportunity to practice that you can fail without being humiliated
- A journey of a thousand miles begins with a single step: achieve small successes steadily, assessing the possibilities
- First, set an easy goal to establish confidence
- Set a number of intermediate goals and check what you accomplished to have a future perspective
- After establishing confidence to a certain extent, try to achieve an objective that is a little difficult, not too easy

Control your learning by yourself: C-3: Personal Control

- Determine how you do it by yourself and think, "I succeeded because of my efforts, not luck."
- Do not accuse yourself when you have failed, thinking, "I do not have ability" "I am determined to fail."
- If you fail, consider what was wrong in your method to gain something from it
- Check your method comparing to the method of your fellow who succeeded
- Work out creative measures by recalling what you are good at or from your experience in overcoming something you were not good at.
- In order to avoid being seized by a sense of powerlessness, think about what you are good at, not about what you are not good at
- You are the main character of your life: have the strength and courage to cut your way

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■ Satisfaction [I am glad I did it!] ■

Make the most of the efforts: S-1: Natural Consequences

- Check the outcome of your efforts immediately according to the goal you have set
- Create opportunities to use/utilize what you once acquired by yourself
- Try applied questions to confirm the achievement of your effort and enjoy that you did it
- Try to teach it somebody to check whether you really acquired it

Have an opportunity to be admired and approved: S-2: Positive Consequences

- Consider a reward to yourself who achieved something while overcoming difficulty
- Create an opportunity to be encouraged or admired by someone who can share the joy of it
- Have comrades who make efforts together to decrease hardship to half and double the joy

Value yourself: S-3: Equity

- Keep consistent attitude from start to finish so as not to lie to yourself
- Do not modify the goal you have once determined
- Do not think it natural that you have accomplished the goal; have pride in yourself and simply be pleased
- If you cannot be pleased to reach the goal, check whether or not the goal you set was too easy

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Source: Suzuki, K. (1995a) 'Premier of instructional design using Educational Broadcasts', Japan Association for Educational Broadcast, free distribution allowed for pp. 102-105, provided that copyright notices are maintained, 1995, Katsuaki Suzuki

their efforts, pay significant attention to let them use creative means by themselves; thus, allow the learners to control their own learning (C3: Personal Control). If they feel that it went well as they did according to what the instructor said, it does not help to establish confidence that they can do by their own. If they use creative means to learn and it results in success, it will help to establish confidence to learn.

The fourth aspect is Satisfaction. First, in order to let the learners feel that their efforts have paid off, creative means to make the most of their efforts are required. Pay attention to provide an opportunity that they can utilize the learning they have achieved, so that they can confirm its significance. (S1: Natural Consequences). Next, exert creative means to let them feel satisfied through interpersonal relationships, such as encouragement or praise from instructors or what they can be proud of in front of their colleagues or supervisor (S2: Positive Consequences). Then, keep Equity (S3) so that they can make efforts with no worries. The equity can be realized by maintaining a consistent attitude, such as avoiding favoritism or keeping promises.

10-2-3: Theological bases of ARCS Model and its systematic application

The ARCS Model has psychological bases and organizes them as an ID model. As a result of organizing various kinds of concepts on learning motivation that have been proposed in the past, Keller considers it effective to divide them into two factors of expectancy and value. Thus, concepts of motivation, such as self-determination (deCharm), self efficiency (Bandula), locus of control (Lotter), attribution theory (Weiner), and learned helplessness (Seligman) are categorized into “expectancy for success,” and concepts such as hierarchy of desire (Maslow), accomplishment motive (Atkinson), reinforcement value (Lotter), anxiety (Miller), and curiosity (Berline) are categorized into “motive and value”. ARCS model is an ID model that aims for a problem-solving created by applying the research results in the past in terms of eclecticism. This is a practical model that integrates a huge amount of findings from psychological research and practices in the past, and there has been an attempt to apply this to media development and evaluation, too (Keller & Suzuki, 1988; Suzuki, 1995b).

Among the four factors of the ARCS Model, the major factors are “Relevance (value)” and “Confidence (expectancy),” which are derived from “expectancy-value theory.” It focuses on self-consciousness of the meaning by the learners themselves and awareness of the possibility of accomplishment as a factor that supports learning motivation internally. Creation of the environment to support it externally is required for instructional designers. The meaning of the factor Attention is exerting creative means in order to let learners see the learning tasks in the early stage of learning and to keep them from being bored in the middle stage of learning. The condition of Attention includes elements that are originally regarded as part of Relevance, as it serve as the first step to convey the joy of learning itself and to stimulate the value of learning. Keller regarded Attention as an independent category considering practical use of ID, and this indicates that the existing research mainly dealt with novelty seeking or inquiring mind among the factors of Attention. The fourth factor Satisfaction is included with the intention to maintain learning motivation by rewarding efforts in response to the research based on the behaviorism paradigm. The distinction and order among the four factors are not entirely clear. However, the practical meaning of this model is significant, as it organizes the sources of various types of motivational research findings and theories simply and indicates that a certain degree of creativity can be applied in ID.

Now, how can the ARCS Model be applied in order to design e-Learning material that can increase learning motivation? First of all, create the profile of the learners categorized based on ARCS, and determine the focus of which category is to be mainly adopted. This procedure is common to every design effort of instructional material or group instruction. Next, consider psychological characteristics determined by media attributes, which are peculiar to e-Learning in learning situations (for example, various types of modes to propose materials, detailed corrective feedback, etc.). Examples of strategies that can be adopted as major parts of WBT materials are listed as shown below. Remember that having many strategies does not necessarily help in designing the learning environment that can increase learning motivation (Figure 10-4).

Figure 10-4: Creative means based on ARCS Model applicable to WBT materials

(1) Title screen	The title screen is the symbol of the material and can be used to attract the interest of the users with its eye-catching design (A-1); however, do not use graphics that require a long time to display, as the users would be irritated to see it every time. In addition, graphics may help to arouse curiosity, if they are related to the task (A-2). Emphasis should be placed on the Attention.
(2) Introduction	In the introduction, indicate the objective of the course in an easily understandable way (R-1), clearly (R-2), to establish Relevance. In addition, indicate the entry behavior and show that the material is appropriate to the learners (C-1), so that they can have Confidence. Optional items for review can be added to raise the entry level of the learners (C-1).
(3) Menu structure	Except for courses that are very short or have only one limited usage, a number of elements for motivation can be included in its menu structure. First of all, the users are given control to select from the menu (C-3). In addition, menu structure can be used to reduce size of each item, giving variety to learning on the whole (A-3). Giving an indicator to completed items shows how long the user took to complete it (C-1), reinforcement is given every time the user completes an item and come back to the menu screen (S-2). This is an exciting challenge for the learners who have strong accomplishment motive (R-3), and advice is added to support dependent learners.
(4) Presenting materials and learning guidance	There are varieties of methods to present materials in WBT; they can be used to give variety (A-3) or warm up the learners who may feel relaxed (A-1). Arouse curiosity by proposing items step by step or letting them answer partially (A-2). Give opportunities to establish confidence by inserting easy questions before practices or encourage responses with no risk (C-1, C-2).
(5) Practice and feedback	Practice should be composed so as to give the learners successful experiences. First, monitor the skill level of the learners to adjust difficulty (C-1). Give words of praise to increase leaning motivation for correct answers (S-2), for incorrect answers, indicate the cause of the mistake and give another opportunity (C-2). Give control to choose the number of questions or to specify “target percentage of correct answers for today” (C-3), or give goal orientation (C-2).
(6) Evaluation and termination	If it includes tests, clarify marking criteria and use the same condition as for practices to maintain equity (S-3). Options that enable the learners to apply the skills they learned in a practical situation also help to increase their Satisfaction (S-1).

Note: Indications of A-3, etc. are abbreviation of subcategories of ARCS shown in Figure 10-3.

Section 3 Influence of network environment on learning motivation

When CBT changed to WBT, learners who learn together appeared on the network. This has removed the image of traditional individual learning in distance education, in which the learner studies alone, and has been investigated by many researchers as a possibility for collaborative learning. Overview of the guidelines for designing materials to realize effective collaborative learning and its reason based on Hooper's (1992) are introduced here (Research Institute of Software Engineering, 1994). The relationships with the aspects of the ARCS Model are also indicated to support further understanding of the ARCS Model.

10-3-1: Members' responsibility and mutual dependence

When success of the whole group depends on the performance of each member of the group, "mutual dependence" among the members is considered high. Some researchers insist that increasing mutual dependence is the most significant key for successful collaborative learning. In the ARCS Model, assuring positive mutual dependence is considered an issue related to Satisfaction in terms of preparing a system that enables the learners to make efforts with no worries. Also it is a matter particularly related to the sense of equity that eliminates unfairness and that lets the learners feel that the results of their efforts are recognized properly.

In order to assure positive mutual dependence, the guideline for designing material shown in Figure 10-5 is proposed. One requirement is creative means that realize the success of the group in a form that is meaningful for all individual within the group.

Figure 10-5: Guideline for designing material to assure positive mutual dependence (Hooper, 1992)

Design Guideline	Description
1) Set a certain degree of individual success for each group member in learning as a requirement for the success of the group on the whole, rather than collaboratively creating one deliverable result by all of the group members	Evaluation should be in a form that the reward is given to group (group reward), not in a form that the reward is given individually regardless of the performance of the group (individual reward) or that the group members compete with each other within the group (competitive reward). It is a good idea to reflect the performance of each member in the evaluation (e.g., adopting the mean score of the group members' scores as the evaluation for the group). The method to evaluate one deliverable result created by all of the group members reflects the ability of the most skilled member in the group, therefore it does not show the learning status of each member of the group. The work on the task can be collaborative work in which all of the group members join in the work supporting each other, or individual work in which the work is divided among the members based on their contributions to the group. When adopting individual work, it is better to regard individual work as the entry condition of collaborative work, rather than deepening the outcome of collaborative work by individual work of each group member. When collaborative work is developed into individual work, the final evaluation is to be given to each member separately, according to the final individual work (individual reward).
2) In order to limit the adverse effect of mutual dependence by grouping, compose the group of two or three members at the maximum	Adverse effects of dependent thought among members in a group are shown below. An increase of the number of group members results in spoiling them and decreasing their motivation, hiding them within the group (laziness in group). Learners think their efforts are not necessary, because other members will do it (the coattail phenomena). On the contrary, coattail riders discourage other members, causing their motivation to decrease (exploiting effects). As a measure to prevent these adverse effects, creation of small groups is recommended.

Note: Hooper (1992), briefed into a table by Suzuki. Research Institute of Software Engineering (1994)

10-3-2: Supportive interaction

In making efforts aiming for achieving the objective given to the group, supporting other members is referred to "supportive interaction." In a group in which the members perform supportive interaction frequently, the members have a close personal relationship and a strong sense of belonging to the group, and this has a positive effect on their learning motivation. The ARCS Model, along with increasing Satisfaction by praise and encouragement from fellow members, is regarded as having effects on Relevance that deepen the meaning of making an effort within a group and increase significance.

Most studies show that the degree of supportive interaction is determined by the composition or age of the group members, but it is also shown that feedback in the learning process can strengthen supportive interaction. In order to strengthen supportive interaction, a design guideline shown in Figure 10-6 is proposed.

Figure 10-6: Design guideline to strengthen supportive interaction (Hooper, 1992)

Design Guideline	Description
1) Do not create a homogeneous group of learners with low academic skills or young learners (thus, create a group mixing such learners with those of high academic skills or elder learners).	Becoming able to learn collaboratively with different types of members is one of the objectives of collaborative learning; therefore, creating groups with heterogeneous members is recommended. Advanced learners have high possibilities to create a enlightening relationship with each other; however, according to past research, there is no common view on collaborative learning between homogeneous learners. In a group composed of learners who do not have sufficient ability to give helpful advice to other members, there is a low possibility that their relationship has a positive effect on them mutually. For low-academic skill learners or young learners, the significant meaning of collaborative learning is that, through observing fellow members who are advanced in skills or years and receiving their advice, they can have an opportunity to develop themselves; therefore, creating groups with heterogeneous learners is recommended (this factor can be ignored for training in industry or life-long learning for adults).
2) Provide plenty of feedback that enhances causal attribution to their efforts.	It is said that showing learning status in the learning process increases Confidence in the ARCS Model, and is effective for approaching the objective step by step. In order to maintain learning motivation, it is regarded significant to highlight that it is learners' efforts that determine whether or not they succeed, and if it goes successfully, it can be attributed to their efforts, as well as encouraging them by showing the degree of their learning achievement. This is referred to as causal attribution to efforts (the ARCS Model recommends providing a wide selection for learning and letting learners control their learning process in order to let them feel "I succeeded because the method I chose was good"). According to recent research, an attitude to try more difficult tasks and to make more efforts to achieve the objective given to a group is observed strongly in a group that received a feedback message that highlights causal attribution to the effort (e.g., you succeeded because you made a great effort. Congratulations!), as compared with a group that received a feedback message that reports only their score as their learning status.

Note: by Hooper (1992), briefed into a table by Suzuki. Research Institute of Software Engineering (1994)

10-3-3: Skills for collaborative learning and training for the skills

In order to promote learning collaboratively with other learners, each learner needs to exercise his or her skills to promote collaborative learning. As this requires behaviors that are different from the common learning style in classes, it should not be assumed that it is possible to promote effective collaborative learning without any training. Just saying "Please study collaboratively" does not produce effective collaborative learning. A design guideline is proposed for training to promote effective collaborative learning as shown in Figure 10-7.

Figure 10-7: Design guideline for training to promote effective collaborative learning (Hooper, 1992)

Design Guideline	Description
1) Teach how to make effective collaborative learning happen before doing it.	Some studies, which compare groups that are trained in advance and those that are not trained indicate that, it is effective to teach how to make collaborative learning happen in advance. In advance training, it is effective to teach not only strategies related to the task in question, but also general principles such as "creating an itemized list of significant points" or "asking questions of each other to confirm acquisition." As a procedure of the training, there are some methods; for example, let them consider what strategy is effective, let them create a list of strategies, and let them understand them, then, give them an opportunity to use the strategies in the list to see their effectiveness; monitor collaborative learning for a certain period of time and indicate/propose effective strategies on the site.
2) Give opportunities on appropriate occasions in the process of collaborating learning to reflect and check their collaborative learning and let them consider how they should proceed in the next collaborative learning,.	Along with the training in advance, through promoting collaborative learning, giving regular opportunities to reflect the collaboration status in their group promotes metacognition of collaborative learning. It has been confirmed to be effective to give learners opportunities (1) to check their skills of collaborative learning, (2) to see effects of collaborative activities on self-evaluation of learning results, (3) to determine the effectiveness of collaborative activities and modifying them if necessary, or (4) to reflect upon significance of collaboration. Give time to discuss what strategy went well among their strategies or what can be improved reflecting their studies on appropriate occasions, or propose a successful example of strategy in other groups on a similar occasion.

Note: by Hooper (1992), briefed into a table by Suzuki. Research Institute of Software Engineering (1994)

I was involved in a project where a multimedia material for learning language that was originally developed as a standalone material was to be converted to support networked environment ("The Secret of Aunt Mariko" -> "Kenichi's school life abroad") (Research Institute of Software Engineering, 1994). The purpose for supporting networked environment was to examine what additional element technologies and contents should be added to the original material. I took part in research to estimate the aspects that the changes in the contents of the material or learning environment by networking might contribute to increase the attractiveness of the material and learning motivation of the users, and to collect the evaluation data.

From the viewpoint of the effects of networked environment on learning motivation, what changes are expected in learning environment? Can networked environment enhance "appeal" of the material, obtaining and maintaining the learning motivation of the user? The changes in learning environment by networking include at least two aspects: additional elements related to physical changes and those related to person.

The first aspect was the changes in the elements related to machinery along with physical changes. Along with the physical changes in which multiple computers were connected via attached network cables, additional ability was required for the learner to manipulate options added in the environment. The increases in options in the learning environment increased cognitive load, requiring more advanced skills to control the learning environment to make the best use of new features. Learners who have not acquired the image of learning in the networked environment must learn this learn before learning the contents. On the other hand, it also created learners' expectation of an opportunity to learn in an unknown world. One can easily imagine that this would have impacts on the motivation of the learners.

The second aspect was the change related to person, in which the second person joins in the existing individual learning environment from somewhere through the network. In the standalone learning environment used before, there was no teacher who controlled the achievement status of the material and no fellows who competed in the same material. Under those conditions, learning was an individual matter and the user's learning motivation was not changed by the influence of other people. In the networked environment, however, there is "somebody" somewhere in the network, and the users learn while being conscious of somebody's presence. Thus, the motivation of the user was determined not only by the interest or attractiveness they feel in the material, but also by the personal relationships with fellows who learned together.

The possible influences from networked environment on learning motivation examined based on the four factors of ARCS Model are shown in Figures 10-8 to 10-11. The influences include both the changes related to physical aspect accompanying networking, and those related to personal aspect. In the Figures, + indicates positive influence and – indicates negative influence, with the points to remember shown in parentheses.

Figure 10-8: Network environment and obtaining and maintaining Attention

(Physical change)

+ As the uses of additional options in learning provided in a networked environment bring a new learning environment that the user has not experienced (new functions such as emails, chat, or help), the effect of "novelty (curiosity)" is expected (the functions to be newly added should be ones that arouse curiosity as much as possible, so that the users feel that they want to use it once. Consider factors that can attract the users also in the appearance of the options or the running processes).

+ The user may not understand technical novelty and may be unable to use the function or have to concentrate while using it, making them reluctant to use it (A function that the user has become familiar with should be consistent and stable to avoid unnecessarily arousing the user's curiosity by bewildering changes).

(Personal changes)

+ By exchanging information with fellow users using networking function when the user is getting bored in the progress of the courseware, the users can maintain their attention (Assure free information exchange among the users).

+ It can maintain "variability" by receiving emails or requests for help suddenly during learning (Allow the users to "interrupt" other users during learning).

− It may disturb the users to concentrate on their own learning because they too often consider the progress of other fellow users (Allow the users to refuse contacts from other users or to allow them to access the information later).

Note: Research Institute of Software Engineering (1994) (written by: Katsuaki Suzuki)

Figure 10-9: Networked environment and increasing Relevance

(Physical changes)

+ Using the cutting-edge learning environment itself has the possibility to increase "value" in terms of enjoying the learning process, in addition to the value of learning the contents themselves (Encourage users to enjoy it; tell the users that it is valuable learning experience, or explain the future meaning of the skills that enable them to utilize a networked learning environment, etc.).

− Without clarifying the necessity of using the network, the users may not be able to understand the value of learning with network to their individual learning (Indicate the reason to use the network to the users, or use creative means to enable the users understand, through experience, why they need to exchange information with other users during learning).

− The users who have difficulties in becoming familiar with the networked environment may feel uncomfortable with the additional options that they are not used to (Creative measures are required to keep continuity with the learning environment that the users have been using in the past, such as using metaphors that are easy to feel familiarity with).

(Personal changes)

+ Mastering the target contents gives the users the possibility to help other fellow users, and having perspective that their learning achievement can function as a tool gives the users some instrumental "value" (Inform the users or let them understand through experiences in advance how their learning can be connected with interaction with fellow users).

+ In addition to the contents of the material, for the users who have a particular strong affiliation motive (a person who has a mentality of wanting to be together with somebody), solving tasks with their fellow users itself has the effect of increasing the "value," and for the users who have strong power motive (a person who has a mentality of wanting to have strong influence on fellow users; a leader-type), having an opportunity to lead discussions and taking active initiative in the process of solving tasks has the effect of increasing the "value" (Do not force them to share roles in collaborative learning; allow them the condition in which a person who wants to take the initiative can take it).

− For users who have strong achievement motive (a person who has a mentality of wanting to approach the objective they set by themselves as quickly as possible), collaborative learning may annoy them, because they may not able to promote their learning at their own pace (Creative measures are required to give opportunities for individual work and evaluate the result of it, such as giving opportunities for individual and collaborative work separately or clarifying the degree of contribution of individuals in collaborative work).

Note: Research Institute of Software Engineering (1994) (written by: Katsuaki Suzuki)

Figure 10-10: Networked environment and securing Confidence

(Physical changes)

+ By adding options, the load of the contents of learning material is felt to be reduced relatively. This may have an effect of preventing reminding of past failure experiences in learning (Create a situation different from past learning experiences and provide circumstances that they can enjoy collaborative work rather than studying the contents).

+ If learners can adjust to the new learning environment, the feeling **"**We can promote our learning using the network" increases their confidence as learners (Create options related to collaborative learning as easy as possible so that they can use them successfully. Highlight that they succeeded because they were able to use the network successfully).

Note: Research Institute of Software Engineering (1994) (written by: Katsuaki Suzuki)

Figure 10-10: Networked environment and securing Confidence (continued)

+ The more options learners have, the more alternatives they have in their actions in learning, and this helps them to have a feeling that they are controlling their learning environment by themselves (Provide sufficient explanation of the options, but let the users decide whether to use it. Highlight that they succeeded because they were able to use the alternative options).

− If sufficient explanation is not provided on the functions related to the network and the users cannot understand how to use it, this may raise anxiety of the users (Adopt instruction or trial use creatively so that the users can have an image of the purpose of and when and how to use the network functions. Provide advice as options).

(Personal changes)

+ A sense of security that the users can have advice as necessary can promote learning without anxiety about failure (Provide options that enable the users to ask advice at the moment they need it).

+ Questioning themselves in order to organize what they do not understand before they ask for the help deepens their learning and increases their skills to ask, resulting in increased confidence as learners (It is possible to provide a framework to prepare questions structurally).
+ Providing help to fellow users who ask for help deepens the learners' own learning (Learners should be given the highest possible degree of freedom in the form of the method to give advice, since it is more effective to allow them to explain the procedure to reach the answer or method creatively rather than just telling the answer).

+ Discussion with other fellow users who have different perspectives deepens their learning (This is because they experience "cognitive conflict," to which social learning theory attaches significance. This is due to the effect that they are required to clearly indicate the grounds of their standpoints or opinions to persuade their opponents. Providing a framework that lets them declare the differences in their perspectives and then lets them discuss freely can contribute to increased confidence of the users from this perspective.)

Note: Research Institute of Software Engineering (1994) (written by: Katsuaki Suzuki)

Figure 10-11: Networked environment and increasing Satisfaction

(Physical changes)

+Simultaneous use of the network enables immediate information exchange between the users (Adopt creative functions by which the efforts of the users paid off immediately)

(Personal changes)

+ Enable the users to make the most of their learning achievement of individual work in collaborative work naturally so that they can immediately apply their learning achievement in individual work, enhancing their satisfaction (When individual work is combined, clarify the role of each user and the status of their contribution to the group).

+ The "sense of fulfillment" achieved when they accomplished their goal through collaborative work can be shared among the users, doubling the joy of it (The achievement of collaborative work should be evaluated as a group, rather than competing for a limited number of prizes, which makes winners and losers).

− If there are significant differences between group members' experiences in collaborative work, skills, or the attitudes toward learning, the equity is decreased and the users may feel their efforts are not evaluated appropriately (For the differences in experience or skills, provide a mechanism to let the users collaborate to achieve one outcome. Suppress coattail riders by evaluating fairly the degree of individual contribution).

Note: Research Institute of Software Engineering (1994) (written by: Katsuaki Suzuki)

Column: Is education investment or consumption?

Koshio (2003) introduced in his book 'Education from an Economic Perspective' that economic theories for education include human capital theory and signaling theory. Human capital theory is a theory that regards education as a method to invest in human capital stock. Education is regarded as "a method to earn money in the future" at individual level, and "a method to increase labor productivity and economic growth rate in the economy on the whole" at the level of macro economy.

In contrast, signaling theory views that "education is just a signal to inform the ability of the individual and people need education to obtain the signal" (Spence, etc.). Thus, it is considered that a university diploma does not show that the person has increased their ability in the university, but that the person inherently has the ability. This standpoint is completely different from human capital theory. Koshio (2003) explains the utility of the signaling theory that 'academic background' or 'school background' does not always indicate 'actual ability,' but they are related. Companies consider that it is more efficient to employ people according to this indicator than to consume costs to assess their 'actual ability'; therefore the signal has influence on it (pp. 42-43)."

However, human capital theory and signaling theory have a common perspective: education is considered a mean to an end in both of the theories. It is also pointed out that from the perspective of economics, approaches other than human capital theory or signaling theory are possible, and education is an object not only as investment, but also as "consumption." From this view, people attain their goal, by not getting something out of education, but by just being educated. Thus, people learn because it is enjoyable or parents let their children learn for their own satisfaction, where people do not seek what they can obtain from it. By the fact that they are learning or they are letting their children learn, their objective has already been accomplished. What do you think about this notion?

Figure 10-12: Agent of educational demand, matrix by purpose (Koshio, 2003)

		Purpose of educational demand	
		Investment	Consumption
Agent of educational demand	Him/Herself	Education as an investment for the person oneself: Education assumed by human capital theory (development of professionals, such as MBA, law school)	Education as consumption by the person oneself: typical "time-consuming" consumption behavior (culture school, lectures for local citizens in colleges, and hobbies)
	Parents	An investment by parents: it is not a usual investment, as no financial benefit is expected in return.	Consumption by parents: "conspicuous consumption;" self-fulfillment of parents just like having a dress-up doll, no firm reason to support it politically.

Source: Koshio, T. (2003)'Education from Economic Perspective' Nippon-Hyoron-Sha, (Figure 2-1; p. 48: translated by Suzuki)

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	End of chapter report assignment (Chapter 10)	

Write a report on <u>one or more</u> of the following three assignments:

1) After reading this chapter (Chapter 10), write a report including questions, comments, opinions, or thoughts you have. If you have past experience, additional information, or have conducted research (attach the name of the source of information) related to this Chapter, include them to deepen your understanding.

2) Analyze learning support design of an existing e-Learning instructional material or e-Learning environment (e.g.: the condition of e-Learning in a company) based on Keller's ARCS Model. Without limiting to examples of e-Learning, you can analyze and compare your experiences as a student in school or in a company, or an educational activity you are involved in.

3) Try to analyze the influence of networked environment (including collaborative learning) on motivation analyzed in this Chapter, giving an existing e-learning educational material or e-learning environment (e.g.: the condition of e-learning in a company) as an example. Without limiting to examples of e-learning, you can analyze and compare your experiences as a student in school or in a company, or an educational activity you are involved in.