simClass: Simulation for Improving Motivational Skill

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Abstract: simClass is a web based simulation. It provides the users with an opportunity to practice their motivational skills in the classroom. It focuses on the teacher-student interaction and models of the interaction in perspective of improving the students' motivation to learn. This short paper describes rationale, design and development, and educational importance and expectation of the simClass .

Keywords: simulation, motivation skill, teaching skill, teacher education, simClass

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Introduction

The quality of school education is largely dependent upon the effectiveness of teaching and the amount of time which students are spending in learning. Teaching skill is one of the factors affecting the quality and the efficiency of school education. Also, it is one of the most important teaching skills to motivate students to participate in learning with willingness and a sense of purpose. Thus, in order to make students engage in learning and spend more time on their tasks, teachers have to increase student motivation levels. However, it is hard to imagine how teachers can practice those skills with their students. Because teachers' classroom behaviors cannot be reversed, it is difficult for pre-service and novice teachers to practice their skills in real situations. Participants in simulations will be able to experience an artificial classroom environment, practice skills without any harm to students, participate in problem solving, have a chance to reflect on the process and the result of their behavior, and get an expert's advice.

The 'simClass', one of the teaching skill simulations, was designed to be used as a laboratory component in teacher education. The purpose of the current developmental study on the simClass is to design and develop a simulation to improve teachers' teaching skills and ability for motivation to learn. Continuously, this study can be expected as a part of the combined teaching skill simulations. This article describes the key features of the simClass that is designed and developed to help pre-service and novice teachers improve their skills in dealing with improving students' motivation.

Rationale of the simClass

1. Simulation as pedagogy for teaching and learning

The idea of learning through simulation is not a new one. Simulations as learning environments have a long history of use in education and training (Grabinger, 1996). Until now, a great deal of learning has been accomplished through mimicking, experiencing, and apprenticeship. However, as real life becomes more complicated, mimicking and copying masters does not help to solve real problems. For the sake of efficiency and expediency, the need has arisen for the abstraction of masters techniques. This abstraction has become prevalent in modern teaching and learning.

Learning in an abstracted world, rather than the real world, has become increasingly popular. Learning through simulation play has at least one advantage over

learning in a real situation, and learning in this manner is natural to humans (Brown, 1999). The advantage is that simulation play allows enough room for error while field work does not (Brown, 1999). In simulation it is always possible to redo a badly or carelessly done piece of work.

Simulation as an educational tool is particularly appealing for situations where physical safety is an issue. However, simulations seem to be useful for activities that require learners to become better or more informed decision makers regardless of the relative safety of the actual situation. Simulation can substitute for costly or hazardous situations in a real world setting. Gredler labeled this type of simulation "experiential simulation" (1996).

Another advantage which simulation has over traditional instructional methods is that it produces effects in the affective domain, such as positive interest in a subject matter leading to better retention of information and change in attitude (Esslin, 1976). Aside from the effects of simulation on academic achievements, there is the further benefit of students being more involved in learning. Simulation provides students with a more challenging environment, induces more positive attitudes and makes them more motivated. Simulation play requires the participants' use of meta-cognitive strategies and very frequently causes them to face a complex task and environment, additional assistance and direct guidance are needed for effective learning (Nurmi, 2004).

To maximize the benefits which simulations can provide to the participants, there should be an open and exploratory environment for learning as indicated by Towne (1995). When simulations support the exploratory environment, it leads to a positive relationship so that learning can be effective. Towne (1995) argues that in order to set up the exploratory environment in simulation two prerequisites should be met: meaningless conditions should be excluded so that participants' capability for success can be enhanced through predetermined explorations. The second prerequisite is that guides for discovery such as hints, cautions and scaffolding should be provided to the participants as simulation feedback. Satisfying the two prerequisites, simulations in nature try to abstract the learning environment of the real world to a targeted model in order to have participants focus on the topics to be learned.

Simulation as an educational activity has received support on the grounds of the natural tendency of humans to learn through mimesis, a safe environment to explore possibilities and decision making opportunities for the beginner in professional fields. In the area of teacher training, it's hard to find a program which adopts and utilizes the play instinct and mimesis of human nature. Thus, as Esslin (1976) posits, simulation as

an instructional activity deserves greater attention as a method for teacher training, as long as it adopts the basic components of human development and thought.

2. Using simulation for teacher training

As with most teacher preparation programs, student teachers spend an allocated time with qualified teachers in their training. Traditionally, this experience in the field means that student teachers follow their senior teacher's teaching behaviors without purpose or thought. They are apt to internalize the senior teacher's behaviors and habits in teaching without having evaluated these behaviors. In the classroom, the teacher's decisions and behaviors affect students directly. Once any behavior is carried out in the classroom, it can be reversed. Knowing this pitfall, student teachers usually take the safe way in emulating senior teachers (Brown, 1999).

In 2003, the National Science Foundation noted that the nation's teacher preparation programs are "disconnected from classroom practice" and called for innovative ways to prepare teachers (Zibit & Gibson, 2005). The classroom is changing to meet the various needs of students, using teaching methods that range from lecture and discussion to role playing, decision making, and project based learning. One of the major objectives of teaching is to provide students with experiences similar to real life. This trend implies that prospective teachers need to be trained in a real classroom or through simulation of one. This is supported by Sottile and Brozik (2004) who state that a teaching approach which helps to meet this objective in the classroom is the use of simulations that replicate real world situations.

Thus, it is highly recommended that the participants in teacher training simulations get a feeling of engagement from activities which reflect the real situation of classroom in order for it to be successful (Brown, 1999). One of the key benefits of simulation is that the participants can have experiences similar to real classroom teaching, leading to a more active involvement in the exercise. In teaching simulations there is usually a virtual student or virtual avatar representing a real student in the classroom. This avatar reacts to the participant who is a teacher in the simulation. It can provide participants with the opportunity to make mistakes and to try their re-prescribed behavior in a repeated manner, as well as the chance to experiment with ethical issues. It acts as a one-way mirror for participants wherein students cannot overhear their teacher's discussion. In addition, they cannot be adversely affected by any of the practicing teacher's actions or behaviors.

As seen below, Vanlehn et al. (1994) posit that there are advantages specific to the use of simulation in teacher training, in addition to those normally achieved with simulation-based training (cited in Brown, 1999).

> Simulations can be rigged to require teachers to articulate, reflect on, and evaluate their implicit theories of learning and teaching.
> Simulations can provide an effective means of facilitating the transfer of educational research findings into classroom practice.
> Teachers can be encouraged to try different teaching strategies with the same simulated student and to evaluate the results.
> "By removing the time pressure and affective stresses that come with tutoring a human student, teachers have more opportunities to become ... reflective practitioner[s] and learn from their own activit[ies]" (Vanlehn et al., 1994, p. 143).

Lerner & Schuyler (1974) argued that the simulation used in their case study had the following strengths (cited in Brown, 1999):

> Effective additional experience, not a substitute.
> Technique can be adapted to any training program.
> "Children" with extensive variety of learning disabilities can be included.
> Can be effective for pre-service and in-service. (pp.38-39)

The simulations in teacher education can be made to be dynamic enough to facilitate pre-service teacher's decision making on the content and strategies to be used, and the management of students to promote certain characteristics. In simulation, participants can focus their attention on decision making and can reverse their decision many times. One of the aims in simulation is to experience the results of decisions on a specific issue and think over the results of their actions as well as the processes in simulation. They can try out different approaches on the same student and see the reactions of other students (Sottile & Brozik, 2004).

However, the simulation in teacher education can never replace a real classroom. It is simply an aid in the teacher's preparation and practice. This implies that simulations in teacher training should address other major issues that the real situation cannot easily provide for pre-service teachers. That is, simulations should be theory-based so that participants can practice what they've learned and thought about before

entering the teaching profession. The possibility of providing pre-teachers with a better service increases as technology develops and the tools and strategies become more elaborate. This presents a bright future for simulations which adopt most classroom realities in an abstracted mini world.

3. Keller's ARCS factors for motivation

In simClass, student's motivational variables are originated from Keller's ARCS factors and its sub-components. Student's acts are defined by the degree of the A, R, C, and S factors. Keller (1999) has developed a four-factor theory to explain motivation. These four factors are ordered like that the first is attention (A), the second relevance (R), the third confidence (C), and the fourth satisfaction (S). Keller breaks these four-factors down into three strategy sub-components. The following are sub-factors, their process questions, and strategies to support the ARCS Model (Keller, 1987; 1999).

Attention:

Perceptual Arousal (A1): How can be student's interest captured? And can this be achieved through curiosity and astonishment by adding personal and mentally stimulating contents or a new approach?

Inquiry Arousal (A2): How can be a sense of inquiry stimulated? Or, how can they be curious enough to indulge in it? This can be achieved by promoting curiosity through the raising of questions, exploration, challenge, and paradox.

Variability (A3): How can be their attention maintained once it's been gained? This can be achieved by sustaining interest through variations in materials presented, substantial comparison, interesting humane examples, and unexpected events.

Relevance:

Goal Orientation (R1): How can students' needs be met and how can they be satisfied? This can be achieved by providing them with statements of learning effectiveness and with examples, presenting learning goals and asking them to state learning objectives.

Motive Matching (R2): When and how can be students provided with appropriate choices, responsibilities, and influences at key points in the learning process? This can be achieved through instruction that is sensitive to their motive and value by providing them with opportunities for success, cooperative learning, leadership and a positive role model.

Familiarity (R3): How can be student's experiences connected to learning? This can be achieved by familiarizing them with learning content and concepts by providing concrete examples and comparisons related to their environment.

Confidence:

Learning Requirements (C1): How can be a positive expectation of success encouraged? This can be achieved through the positive expectation and belief in success by explaining conditions for success and the evaluation criteria

Success Opportunities (C2): How will the learning experience support or enhance student's belief in their competence? This can be achieved by promoting belief in them through challenging but attainable tasks.

Personal Control (C3): How can students clearly recognize that their success was due to their own efforts and abilities? This can be achieved through feedback on the success of their personal efforts by using control techniques with the students whenever necessary.

Satisfaction:

Natural Consequences (S1): How can meaningful opportunities be provided for learners to use their newly acquired knowledge? This can be achieved through feedback and information making students feel positive about their personal efforts and achievements.

Positive Consequences (S2): What will provide reinforcement to learners' successes? This can be achieved through verbal appraisal, any kind of substantial reward, incentives and what they want as a reward.

Equity (S3): How can students be assisted in securing a positive feeling about their accomplishments? This can be achieved through alignment performance as targets with outcomes, goals and the use of consistent evaluation criteria for assignments and achievements.

The ARCS Model has provided educators with a heuristic approach to generally increasing the motivational appeal of instruction (Arnone & Small, 1995). However, it is also a very prescriptive approach in that it implies that the questions and tactics based on this model should be oriented toward the autonomy of the students. Meigher found that students in classrooms of autonomy-supportive teachers tended to display more intrinsic motivation, perceived competence, and self-esteem than students in controlling classrooms (2001). The design based on the ARCS Model should take her findings into

consideration in that intrinsic motivation is self-determined or autonomous. According to Meigher, all external input for motivating students goes through a process of internalization, introjection, and integration, resulting in highly intrinsically motivated students (2001). This implies that any questions and tactics designed in accordance with the ARCS Model should also be autonomy-oriented.

Overview the design and development of the simClass

1. Defining simulated students

Motivational types:

In simClass, students' motivational variables are made from Keller's ARCS factors and its sub-components. The main reason why students react variously on teacher's same motivational treat is that they have various motivational states. simClass uses a continuum vector approach to deal with the ranges from low to high in each of these components. Simulated students are defined their motivational types by levels of the ARCS components of motivation (Figure 1). Each A, R, C, and S components is divided roughly three groups such as low, common, and too high by degree of motivation. These three groups can make simulated students have various types, but simClass defines only six types because of the order of A, R, C, and S.

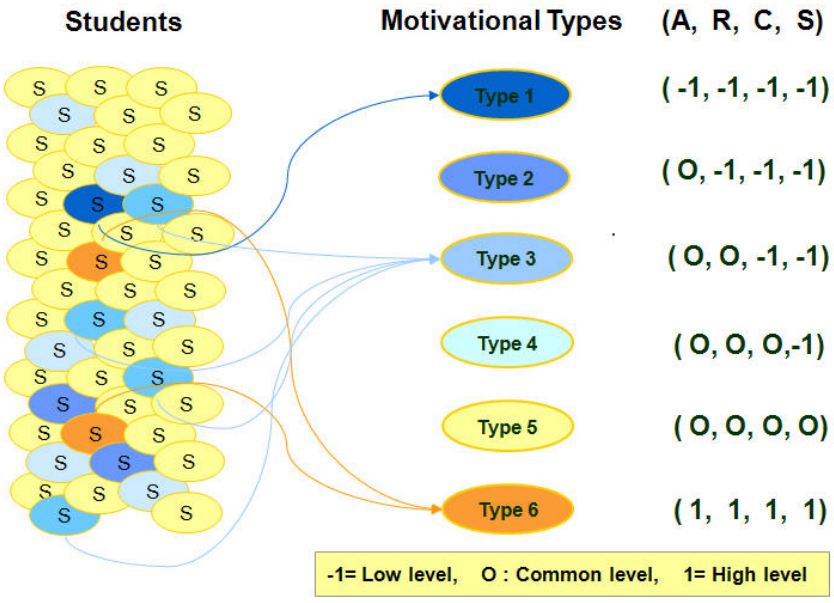

Figure 1. Motivational types of simulated students

More detail, when (A, R, C, S) is set by degree of motivation, six types defined in simClass are low type1 (low, low, low, low), low type2 (common, low, low, low), low type3 (common, common, low, low), low type4 (common, common, common, low), common type5 (common, common, common, common), and too high type6 (too high, too high, too high, too high). Every A, R, C, and S component is subdivided into three sub-components which have three different levels such as low, common, and too high. Also, simClass defines ARCS factors level by the minimum value of three sub-components, but if three sub-components are all too high levels, ARCS factors level is defined by the maximum value of sub-components.

Simulated student's acts:

In simClass, student's acts are defined by the degree of the A, R, C, and S factors. Attention is represented by simulated student's eyes, relevance is represented by student's posture, confidence is represented by student's facial look, and satisfaction is represented by bubble of text of the student's thought (Figure 2). According to the four levels(too low, low, common, too high) of each A, R, C, and S factors, their representing is defined such as, attention: (blink, left and right side part by turns), (blink, side and front part by turns), (blink, front part), (not blink, front part); relevance: (folding one's arms), (lay down one's arms in the desk), (good posture and writing), (stiff posture, motionless); confidence: (gloomy face, knit one's brow), (expressionless face), (smile face), (stiff face); satisfaction: (studying is too difficult and tiresome…), (studying is sometimes difficult…), (studying is always funny and delightful!), (studying is very easy but I'm too nervous because of exam…).

Figure 2. The acts of simulated students

More detail, motivational state of students can be changed by the teacher's treat. Also, the changed motivational state of students can not change the past information of students but the present information of students. Additionally, combination of ARCS and four levels can make arithmetically 4 · 4 · 4 · 4 ways to activate the simulated

students. But six types of students are used only in “Repeat” and “New” simulation. In “Random” simulation, simulated student can be activated differently with 4 · 4 · 4 ways. The explanation of the “repeat, new, and random” simulation will be in the next section.

2. Defining levels of simulation

In simClass, participants are guided to select three levels of simulation which consists of four simulated students who represent different motivational types.

The first simulation:

The First Simulation is designed to play easier than any others because four students have fixed motivational state. Each of them has the types such as fixed in Type 1, fixed in Type 2, fixed in Type 5, and fixed in Type 6. It makes participants to exercise motivational treats on the same simulated students repeatedly. Because this simulation offers the values of motivational state immediately for the players to be able to compare student’s past and present information with motivational values. Thus, participants also can observe the changes of student’s act and motivational values after their motivational treats.

The second simulation:

In the Second Simulation, two of them have fixed motivational state and the other two of them have randomly assigned motivational level. Each of them has the types such as randomly assigned in Type 1, randomly assigned in Type 2, 3, and 4, fixed in Type 5, and fixed in Type 6. It is more difficult to play than the first because the second simulation does not offer the values of motivational state to the participants. But two of students are known in the first simulation.

The third simulation:

The Third Simulation is designed to play most difficultly because all students have randomly assigned motivational levels. All of them has the types from the randomly assigning in Type 1,2,3,4, and 5 and are unknown to player.

Flow of the simClass work

simClass has circular three phases to improve participants' motivational skills as follows:

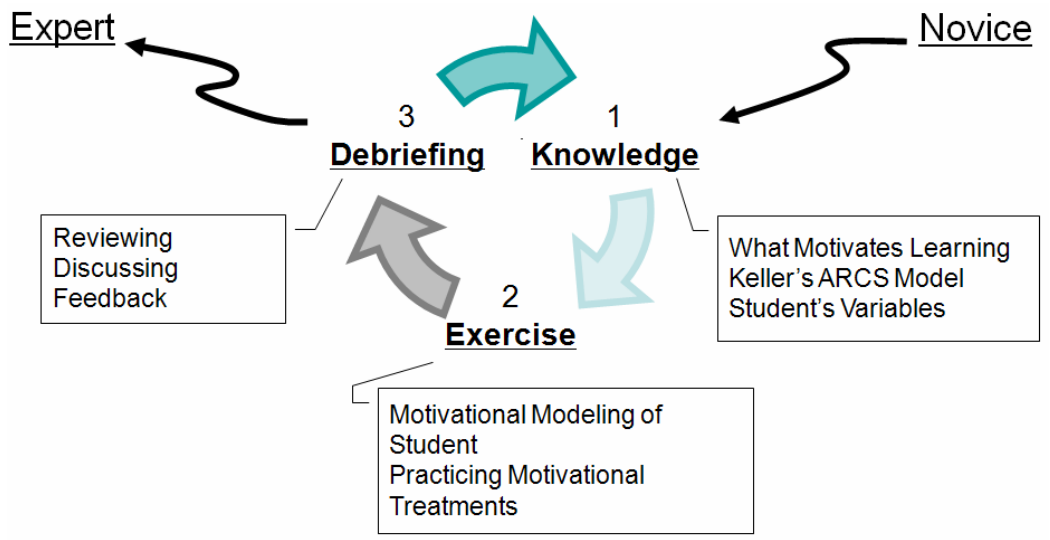

Figure 3. Three phases for improving motivational skills with the simClass

1. Knowledge

simClass is developed to help pre-service and novice teachers translate pedagogical knowledge acquired in lecture-based classes into successful teaching practices. It is needed to have at least the concept of learning motivation, Keller's ARCS Model, and student's variables for participants to play successfully in simClass. After playing the next phases of 'exercise' and 'debriefing', participants could add their new experience to their knowledge base.

2. Exercise

In this phase, participants can exercise the motivational skills by guided activities in simClass. For successive exercise of participant, simClass guide participant to do the student modeling, and then do the practicing motivational treating by the result of modeling. Student modeling is used to identify the current status of a student's motivation. This is done through three steps: gathering related information, analysis of the information, and judgment of the motivation level. Practicing motivational treatments consist of three steps of actions: locating, devising and sequencing, and treating. After participants' six step activities, he/she can do the recurring motivational treats with the new results of review of changed information about the student (Figure 4).

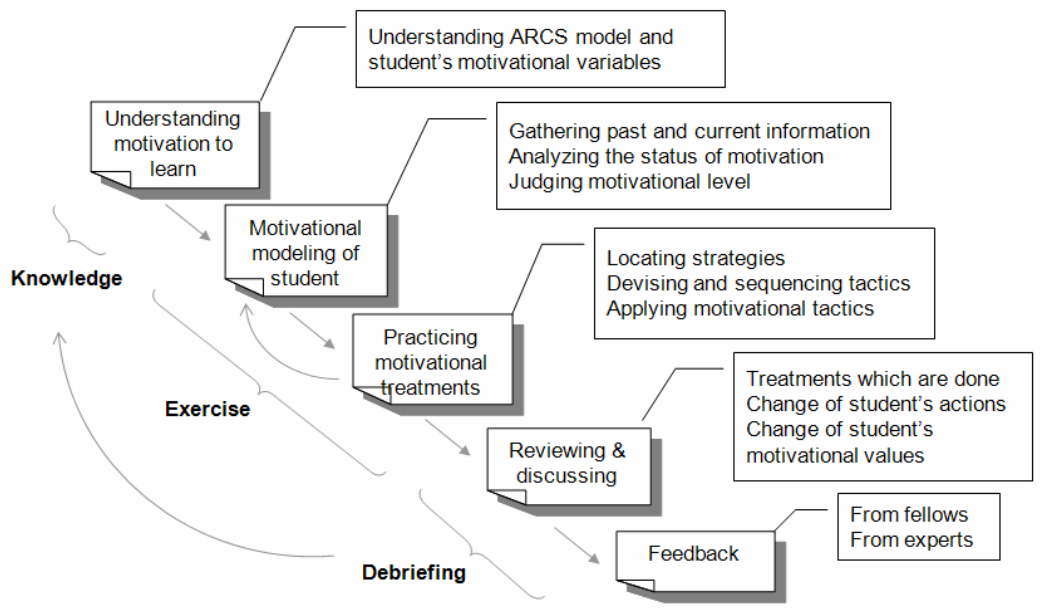

Figure 4. The flow for improving motivational skills with the simClass

Student modeling: Gathering information about the variables affecting student motivation is essential in the early stage. Participants are guided to read the student's record and to listen other teachers' opinion which could provide participants with the past information. Also, they are guided to observe student's acts and to converse with student which could provide the present information of the simulated student. The past and present information of student used in simClass is employed artificially to give some clues to participants to analyze student's motivational state. According to the six types of students, which are set in simClass, student's record contents, other teacher's opinion on the student's motivation, student's answer to some teacher's questions, and acts of simulated student are different. Judging the motivational levels is done once information gathering and analysis are complete. The reason why participants have to ascertain student motivation level is because the practice should be adjusted accordingly. This requires the participants to identify the motivation level in each sub-category of motivation affecting the overall level.

Practicing motivational treatments: Motivational treatment according to student motivational state is essential in this stage. simClass is designed for participant to practice motivational treatment by selecting verbal or nonverbal treatment from the lists. These treatments make changes of the student's motivational level and then the current information accordingly. Thus, in this stage, participant should locate the strategies suitable for the level of motivational factors which is revealed from the result of the

student modeling. And then, they should devise and sequencing actions to either remove or revise the factors which make students be in low motivational state. It is difficult to know where to draw the line of treats by the ARCS factors and its sub-components. But these applying the differentiated motivational treats to the students could be the valid proposal on the reason why students react variously on teacher's same motivational treat. After the motivational treat, student's motivational state is changed. According to the changed state, the current information of student such as acts and answers to questions are changed. Participants also could repeat motivational treatment according to the changes of student's current information.

3. Debriefing

More important in this phase is making participants learn effectively from the play of the simulation. After the exercise, participants are guided to review their playing, discuss with other participants, and get the feedback from experts. simClass can offer data informing the student's changes of motivational state according to the motivational treats in form of spread sheet.

Review, Discuss, and feedback can provide participants with the new knowledge on learning motivation, and students' variables. And then, this new knowledge could be expected to be translated more effectively into successful educational practice by participants' repeated play. Therefore, this repeated circulation could be helpful to make pre-service and novice teachers be more skillful in motivation.

Educational Importance and Expectation

Recently, although most of educators agree that teaching skills are needed in teacher education, the ways of coaching and feedback in the critical skills are not easily founded. With computer and network-based expert feedback, the simulation can be seen as a form of "simulated apprenticeship" (Zibit & Gibson, 2005). Simulations for teacher education can offer these ways of training and provide an initial platform for reconsidering theories of education as well. Although the art of teaching is too complex with many unknowns and variables, we can model the art of teaching with some degree of fidelity and effectiveness. With its evolving open structure, the simulation can more easily be integrated into methods coursework and can potentially also be employed as a diagnostic tool (Strang & Clark, 2003). Additionally, the research and development of

simulation for teacher education is just beginning, but the research and development efforts like simClass are undoubtedly soon to be surpassed.

While using simClass, participants will be able to review along with the guided motivational behavior, a reconstruction of knowledge, exercise of motivational activity, and evaluation their motivational treats. They will also be able to compare their playing with those of other participants, discuss with other players on their personal playing histories, and get the feedback from experts. The use of simClass particularly related to the content and procedures on motivation can be expected to be one of the good alternatives for pre-service and novice teachers' improvement of teaching skills. Although pilot testing of simClass is just beginning, it is hoped that there is much to learn through the synthesis of models represented by the simulation.

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