Systems Based Gamification: Play, Complex Science and Strategy

Part One: Play

By Eugene Sheely

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INTRODUCTION

"The child amidst his baubles is learning the action of light, motion, gravity, muscular force; and in the game of human life, love, fear, justice, appetite and man... interact." Ralph Waldo Emerson

The following are a compilation of some insights I've gain in the past few years while developing educational games. I wrote this several months from it's current publication as a reference to a circle of close friends who were working with me in a design. This was my contribution on how to enhance our educational game. My background is not in game design but history and knowledge management, so this work gives you some insights from a different perspective.

The basic idea is that the brain is evolutionarily hardwired to learn about the worlds *complexity* through play. Once you understand the basics of how the brain gains and uses explicit and tacit knowledge and the roles of declarative and implicit memory, I believe a more practical and scientific-based approach to educational design can be created. Traditional education and lectures are still necessary! But they all fit in a learning loop I call Gamified Praxis.

This work was aimed to be a quick reference point for my team, I'm not going into specifics in it and I don't hyper-link to outside sources. It's also more of a philosophical view on "gamification." The goal is not to increase happiness but to supercharge learning and make the individual more dangerous (which is one of the main evolutionary purposes of play). But fun mechanics are important in some contexts since dopamine increases implicit learning, it's a more complex and complete process than anything in the gamification literature I've come across so far.

A current problem is that a lot of the current gamification insights are directly taken from video games. There's a lot of good insights but virtual reality is not the same of reality and these gamification "gurus" are making over-simplistic assumptions that undermine basic facts about how skills are

improved in the real world. For example:

Most of the video games they're referencing to are called time-based games. These games reward a player with an artificial “level-up” in their virtual character after doing hours of grunt work. This means that the game characters strength points, health, magical items etc increase after doing X amount of repetitions in some activity (like killing 10 goblins), It's very Pavlovian. This type of game-play keeps the player in a nice comfort zone while giving them an artificial power boost (which releases dopamine and makes the game fun) making the game an overall pleasurable experience.

Games outside the virtual-world are mostly skill-based. Think about sports and chess, to increase your performance you need to change yourself. This means applying outside pressure and constantly going beyond your comfort zone. Going beyond your comfort zone is NOT a pleasurable experience. Gamification needs more sports psychology and less positive psychology. The "pleasure revolution" the promise in gamification is simply not possible so most of their advice and consultancy practices are simply bullshit.

We've all experienced it. You can't become an athlete by simply doing walks around the park. The language of skill-based training says it all: “No pain no gain” “pain is

weakness leaving the body”

“*I hated every minute of training, but I said, 'Don't quit. Suffer now and live the rest of your life as a champion.*”
Muhammad Ali

The current promise of gamification is to make all skill acquisition pleasurable by applying game design principles. This can only work in the acquisition of tacit knowledge through implicit learning (which I explain in this work). The area of *deliberate practice* can't be pleasurable because it's basic principle is leaving your comfort zone. If this was possible sports would have already found a pleasurable training method. Have you heard of any? Neither have I. There's a fundamental difference in learning to love the grind and saying it's pleasurable like a fun casual game in your smart-phone!

The “gamification” community is confusing the game concept of *flow* with *deliberate practice* which K. Anders Ericsson himself explains aren't the same thing!

I'll explain these fallacies in more detail in other works. Currently you can find in Amazon my publications of *“Gamified” Player Types are a Scam and Grunt Work Will NEVER be fun.*

But the basic in this work is that I've looked into skill acquisition and engagement techniques for the most part in games inside reality, not virtual reality, all the while keeping an eye on the evolutionary purpose of games. From this I've developed two pedagogical methods:

Gamified Praxis: A loop between theory, play and reflection. It's to a large part based on how Grandmaster chess players gain complex cognitive skills. I'll introduce it in this work but will go into further details in the future.

Intrinsic Based Gamification: The core idea is that game-based learning is temporary. The evolutionary purpose of play is to develop problem solving brain circuity in individuals. As adults we like to solve problems that are similar to the type of games we played as children. This explains how to make children games that will turn professional careers like engineering into 2.0 versions of the games they've played and loved, creating an intrinsic love for their work without the need of designers to "gamify" their jobs in a condescending manner.

This is probably one of the most dry and boring works I've published but I believe that if you understand the principles in it it will help you avoid some of the many stupid design errors that are currently popular in game-based learning.

If you have any question or consultancy inquiries feel free to contact me.

eugenevsheely@gmail.com

GAMIFIED EDUCATION

I.

It tends to be a popular concept in our culture that play and work are two distinct things. And that work and learning are the same thing. Therefore it's simple logic to conclude that play can't be educational. This is in fact a mistake. Different fields of science are in agreement that the evolutionary purpose of play in both animals and humans is learning. Most learning from play however, happens at the

unconscious rather than the conscious level.

Lion cubs may play fight to learn survival and fighting skills that will be used as adults. Humans may roleplay as children, which improves their social skills and builds their identity. The reason these activities are fun is because they are rewarded by dopamine releases. These play activities develop skills beneficial to our survival. This is not just a hyphotesis but well established scientific fact.

The argument I'll make in this book is that our brains are evolutionarily hardwired to learn through play. Technology can be adopted to enhance this predisposition of our brains. But yet, education shouldn't be wholly designed as one big game. Certain game mechanics trigger certain areas of the brain, while traditional education accesses others. My work has been aimed to design an educational system that I shall call **“**whole-brain learning.**”**

II.

The idea that play can be educational seems odd to many people in the general public. Those who agree with the concept however tend to missunderstand how it is that play can be educational. Its not necessarily that it makes education fun and therefore keeps students

studying, it's far more complex. This mistake has also lead to rather ridiculous educational software that misses the evolutionary purpose of play. To be able to explain these fallacies I'll have to describe some terms:

Explicit Knowledge: This knowledge can be codefied and articulated. This is numbers, words, facts, images, etc. It can be passed down to one person to another in the form of books and oral language.

Tacit Knowledge: This knowledge can't be codefied. You can only gain this knowledge through experience or implicit learning.

I'll describe it with an example: You can verbally explain to a kid how to ride a bicicle, you can show the child images illustrating the step-by-step process it requires to ride a bicicle, but they'll never really know how to ride it until they've taken action and attempted to ride it. After much trial and error their tacit knowledge in the subconscious brain is built. It's when "it clicks" in their brain.

Implicit Learning: This is the type of learning one gets without being aware of it.

Ever known someone who moved into a new city and found that after a couple of years their accent has changed? They didn't try to learn

it, they just did.

Implicit learning happens at a subconscious level and it manifests itself as tacit knowledge. This could be physical activities like playing sports, it might be social intelligence or domain specific cognitive abilities such as playing chess or understanding poetry. Narratives and social groups play a big part of this type of learning. It's how we humans understand complexity.

Long-term memory: Memories that are stored in our brain indefinetly. Can be either tacit or explicit knowledge.

Short-term memory: Memories that are held and manipulated in our heads for a few seconds.

A big part of our intelligence is the interaction of these two memories in both the explicit and tacit levels.

Implicit memory: memories we hold at a tacit level that we don't know that we know. They're not accesible to conciousness.

A lot of our conscious thinking depends heavily on implicit memory. Ever been talking in a group and have someone try to corner you in a conversation but one second later you come up with a witty remark

that defeats them? Think about rap battles or comedians poking fun at each other. A lot of what we say seems to come out of nowhere. In ancient times this phenomana was attributted to divine forces, during the 18th century is was secularized and called "genius." I'll talk a lot more about this further in the series.

Declarative memory: This is the type of memory that our brains have conscious access to. Facts, figures, etc. Everything explicit. This is what school is usually conerned with.

Learning can therefore happen in multiple ways. Different game mechanics (or lack of them) can access and train the brain areas responsible for these different types knowledge. Both the explicit and the tacit have to be combined, as I'll argue in this book.

III.

Human beings are pattern-recognition intelligences. Computers are information-processing intelligences. This is a big difference. Unlike computers, our brains work by organizing individual pieces of information into patterns. This process is called "chunking." Our brains function by finding relationships between content and creating

contexts. In fact, human beings are better at handling complexity at the unconscious level than computers and one of these reasons is due to this process of chunking (another is the theory in cognitive psycholgy called connectionism).

"When it comes to serial processing, computers win every competition between man and machine. They are quicker and less prone to error. But for complex tasks that resist resolution through an extensive series of rule applications, the human brain still takes the prize." Leslie Paul Thiele, Heart of Judgement

Chunking is significant because our short-term memory can only hold about 7 "units" of information at a time. But when your brain chunks these individual "units" into a single chain, that chunked chain becomes one "unit" and all the attached information in it becomes available to our working-memory (consciousness). Our mental eye can see deeper into the world.

It works like this: What if I asked you to remenber the sentence "Mary had a little lamb" after having you look at it written in a piece of paper for 3 seconds? You would probably be able to remember it a week from that day. There are 18 letters in that sentence. If I gave you 18 Chinese characters would you be able to

accuratly remember them by glancing them for 3 seconds also?

The reason the above sentence is so easy to remember, and the Chinese characters are not is because the sentence about Mary has been chunked in your long-term memory and your short-term memory has no problem accesing it. You've chunked the individual letters into words, assigned these individual words meaning, then combined them into the patter of a sentence that gave it it's own contextual meaning.

This phenomena happens in all cognitively complex tasks. One of the major reasons for chess grandmasters extraordinary ability is that they have about 50 thousand chess specific patterns in their heads. A novice and a grandmaster may have the same cognitive capacity for working-memory, and they both may perform about the same in general memory tests, but the grandmaster will outperform the novice in chess specific memory tests where pieces in a board must be recollected. The novice will become overburdened by a chess game since their working memory is overloaded because there is very little information from the lack of chess specific chunks. The grandaster can also only have 7 “units” in his working-memory, but these chunked units have a lot more information in them.

The areas of the brain being activated by the novice and the

grandmaster are also different. Experts tend to have less concious awareness of what they're doing since they rely heavily on tacit knowledge stored in their implicit memory. Remember Bruce Lee's explaination at the begining of the movie *Enter the Dragon:*

"A good martial artist doesn't get tense, but ready. Not thinking yet, not dreaming. Ready for whatever may come. When the opponent expands I contract. When he contracts I expand. And when there's an opportunity I do not hit (rising his fist), ***"it" hits all by itself!"***

The "it" Bruce Lee is talking about is tacit knowledge. New research in cognitive science reveal that grandmaster chess players operate on a semiconscious state much like Bruce Lee's description. Novices rely on conscious areas of the brain, which is very limited compared to the unconscious.

The Eastern interpretation of enlightment is an understanding of the world that can't be articulated (tacit knowledge). The Western idea of enlightment during the 18th century was the accumilation of explicit knoweldge and a drive to explain everything in this world with language or mathematics (explicit knowledge). Cognitive science shows that these two extreames have to be combined since they complement each other.

Once patterns are created in the subconscious level we can have our consciousness operate at a higher level of intelligence. When you first learned how to drive you had to pay very close attention, once you learned to drive, it became “second nature” (tacit), you were able to think about your day, listen to audiobooks or carry out conversations while driving.

IV.

The brain is composed of grey matter and white matter. Grey matter is your neurons, white matter is a fatty sheet called myelin that wraps itself around the neurons. The purpose of myelin is to improve the speed of comunication between neurological connections you've created (aka your memory chunks). One reason we get better with practice is that the continual use of these chunks means electrical signals are being fired which trigger the construction of myelin in these used neurlogical networks.

One of the core arguents behind the 10,000 hour rule for experteise is that myelin increases through something called *deliberate practice*. If you're not familiar with this rule yet, it holds the notion that ten thousand hours of deliberate practice will turn someone into a world class expert like Mozart. Deliberate practice is not simply doing

something, it's deliberatly trying to improve and it has its own process.

As I will explain latter, deliberate practice has its place in educational gamification, but deliberate practice is not a dopamine trigger (it's not fun). Game designer Raph Koster explains *that in a sense* games are "deliberate practice machines." He's right, in a sense they are since they do build some myelin, but the original research of Ericsson made a differenciation between play and deliberate practice, and deliberate practice was far more effective for building myelin than play. For my model of gamified learning this distinction must be made:

Deliberate practice: You divide a complex activity into small individualized activities. You repeat one of these activities (usually the one you're worse at) over and over again. You're pushing yourself to the limit, so it's not fun. You're highly engaged since you need to pay attention for mistakes and immediatly correct them. You're getting immediate feedback.

In activities like sports and chess deliberate practice is distinguished from play. A basketball player may spend hours in one single move trying to dunk the ball into the basket, but this isn't play. A chess

player may intensly study past games of grandmasters for hours, but this isn't play.

A key distiction must be made because there's different neurological effects between deliberate practice and play when learning. Deliberate practice will significantly amplify perforance in play, but won't give you the benefits of implicit learning which you get from play. Play alone won't allow you to correct and polish techniques, or scale your skills. They complement each other.

V.

One biological purpose of play is to build new neurological connections and strenghten them, another is to understand complexity through implicit learning. The world's complexities are understood through the relationships our brains make unconsciously through implicit learning and these relationships are amplified during play. Two main reasons for this is that implicit learning is amplified by dopamine (what makes something fun) and it requires a lack of mindfulness.

Studies show that mindfulness, that is paying attention to what you're doing, doesn't allow implicit learning to take place. Deliberate practice

and traditional education are all about mindfulness! Conscious learning and implicit learning compete through two distinct neurological pathways. You can't have both activated at the same time. So the obcession of our educational system for students to pay attention is damaging in certain contexts.

Play therefore isn't necessarily a tool for students to pay more attention to explicit knowledge; play is a tool for making connections at a tacit level. This tacit understanding is necessary for explicit understanding though:

"While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence all knowledge is either tacit or rooted on tacit knowledge. A wholly explicit knowledge is unthinkable." Michael Polanyi

Remember how much easier it is to remember the sentence "Mary had a little lamb" than the 18 Chinese characters. The implicit learning you gain through play will amplify any explicit knowledge you gain.

But don't be fooled into believing that play is a video game or a boardgame, etc. Professor Brian Boyd in his book *On the Origin of Stories: Evolution, Cognition, and Fiction* argues that art is concidered cognitive play with patterns. Through play over time patterns become

more complex. Art is a superstimulus of patterns. And stories give us patterns of social information.

The arts and humanities must reenter education as a teaching tool that accompanies other subjects. Gamification should not ignore stories and art either but assemble them as part of its toolkit. The main goal of gamification in education therefore should not be to make explicit learning fun by adding leaderboards and points systems, it should be to develop more and more complex patterns inside one's memory through play.

But explicit knowledge shouldn't be ignored through learning only in a gamified enviroment. Explicit knowledge amplifies tacit knowledge patterns as studies with chess players show, therefore books and lectures must not be ignored either. Reading in fact becomes even more valuable because once tacit understandings have been created, explicit knowledge seems to stick in these implicit chunks in the long-term memory of an individual. The more someone knows, the more they can remember from what they study. For every single increase in chess ranking from an intermediate player, a master gains seven.

This is the difference between humans who are pattern-based

intelligences and computers that are information-processing intelligences. While more information slows down a computer, it makes humans quicker and faster. If human intelligence is based on our memory (as many experts suggest) and we can learn how to supercharge patterns through gamification, we might literally be enhancing our species intelligence. So gamification is a serious matter when used appropriately!

VI.

Gamification therefore is a more complex way of learning that paradoxically makes learning easier through implicit learning. We have to create a system that combines explicit and implicit or tacit knowledge. This doesn't mean that we replace traditional education and turn education into a game either.

There must be combinations of that include instructor/mentor, book learning (or online communities) and play. The reason for this is the following:

1. All knowledge is tacit, or tacitly understood. Wholly explicit knowledge isn't possible.

2. Without explicit knowledge, your skills can't scale and you'll plateu.

Complex games like chess or *World of Warcraft* require players to read massive amounts of information in order to scale their perforance in these games. Reading was ranked the #1 activity for attaining a grandmaster level in chess since it creates larger and larger chunks in your long-term memory that can latter be accessed by your short-term memory in a competition. But at the same time, those who only read didn't advance, making reading without play pointless. Once the tacit chunks are made, explicit knowledge sticks to these chunks making them larger. This is the power of combining tacit knowledge with explicit knowledge.

Also, immediatly applying knowledge gained is linked to increased information reteantion. Playing alone will rapidlly increase skill in novices, but they'll plateu. Explicit knowledge is the only way to scale expertese. If we don't create a medium for the creation and absorption of explicit knowledge such as is done in MMO game online communities (such as World of Warcraft), we will probably fail in our educational gamification program/software (unless it's a casual game).

A wonderful example of how gamification is being used in this way is that of the company SCM Globe. The founder Michael Hugos has written a popular book for supply chain management (reported by

Amazon.com as the best selling supply chain book worldwide since 2004) and he is also developing a software application where students can play with a realistic supply chain simulator and develop their tacit knowledge. All the while the professor is instructing and helping out the students. This creates a powerful combination of tacit knowledge with explicit knowledge.

Take a lesson from sports: They're a game. Yet most of the activities during training are hard, boring and repetitive. Yet the training was indispensible for scaling our skills in the game. If you played sports you'll remember that training wasn't always fun, we wanted to quit many times, but the pain was worth it because training improved our skills in the game we loved!

View the engagement with the instructor in class and Michael Hugos' supply chain management book as deliberate practice, while the simulator, called SCM Globe, is a game where the students test theories they learn in the book. This process retains traditional education that promotes explicit knowledge while introducing a platform of play that promotes tacit knowledge. Adquiring explicit knowledge is not gamified, and these activities are done separatly.

From this I theorize that time with the instructor and books activates

our declarative memory neurological pathways, and play activates our implicit memory neurological pathways. Therefore gamifying the explicit knowledge aquisition may be counter-productive, but without a gamified platform we can't understand the explicit knowledge tacitly, making our time spent learning nearly pointless. Complex games like MMO's, chess and sports have naturally divided a players time into deliberate practice followed by play, this seems to be the winning combination for mastering complex tasks.

VII.

I'll describe a metaphore to explain this different view of gamified learning:

Eukaryotic cells are the most complex cells in biology. They're larger and filled with unique organelles, it's the type of cells we humans are made off. One of these organelles is the mitocondria whose role is to produce energy. It's believed that the mitocondria used to be an independent species of bacteria that was absorbed into the eukaryotic cells early in it's evolution. Let's use this as an analogy for how to combine gamification and explicit learning.

The use of gamification is a more complex pedagogy than lectures and books just like the example of the eukaryotic cell in biology. It's a step forward into a new evolutionary paradigm. Traditional education has it's place inside this new organism, just like the micondrion absorbed into the eukaryotic cell. They co-exist togheter creating a symbiotic relationship. Technology and gamification are here to stay and they will amplify the traditional classroom learning.

The classroom shouldn't necesarily be turned into a game, but just as MMO's motivate players to spend hours reading and writing about the games online (studies suggest these texts require college level reading) educational games also have to motivate students to gain explicit knowledge outside of gameplay. Not all activities can be happy and releasing dopamine, but the fun experience of games will motivate players to go through deliberate practice. The role of a teacher and mentor must not be replaced, instead the role of the teacher is enhanced through gamification.
Another possibility is peer-to-peer learning which I'll mention latter.

VIII.

The role of linking explicit knowledge into a game has added benefits beyond the knowing of facts. Online

communities not only give gamers knowlege, but also teach them critical thinking skills. Accourding to Constance Steinkuehler MMO players engaged in these communities develop:

Collective Problem Solving: Players organize themselves as guilds and need to strategize how to accoplish their goals with their current resources. They learn to choose options such as fight a dragon, fight another guild, or build a trade relationship to obtain specific items they want or to recruit and train new players, etc. This is exactly the kind of skills we need in the corporate world! IBM studies show that players who are leaders in these MMO games show increased capacity to lead geographically disperse teams in which they use technology, instead of face-to-face meetings in order to carry out their projects.

Digital Literacy: This means teams of MMO players know how to analyze, create and find information on the internet.

Scientific Habits of Mind: When present in a discussion, experienced MMO players showed very high critical thinking capacities in order to debunk other players arguments and make their own.

Computational Literacy: MMO players tend to create complicated spreedsheets on Exel to map out their progress. Lots of them have developed software applications just for this reason. Their desire to improve in the game leads them

to perform complicated math. In fact all types of games are usually math with a narrative on top.

Reciprocal Apprenticeship: The team members of a guild constantly learn from one another. Teaching others is proven to be the best way to learn a subject since it requires organizing the content in your head. Professor Matthew Lieberman says in his book *Social: Why Our Brains Are Wired to Connect,* that if we learn something with the intention to teach someone else, it opens different learning paths in our brains which helps us understand the content better.

Notice that these are tacit skills for how to manipulate explicit knowledge. It's not only what players know that helps them in a game, but how they use what they know. We have to accept that the human brain evolved to cooperate and compete in social settings. Thus we learn in social settings. John Seely Brown explains that knowledge is socially constructed, that is to say, the individuals of a group add context to content through social interactions.

I've read about people designing employee training seminar courses that they say use gamification because they've assigned points to courses and they don't allow access to other courses unless students attended previous ones. They explain it's a game because students have to “level up” by taking the basic courses that gives them access to the latter ones. This isn't play, it's still a seminar where you sit

passively. These same designers stress that social learning is fun, so they sent their employees as a group to learn. Sitting passively in a seminar that they probably don't want to take isn't social learning!

This “gamification” of training would be meaningful if the students had to immediatly apply the knowledge from the training in some way. There has to be an opportinity to immediatly play with the explicit information given in an educational setting for it to be effective. This doesn't necessarily mean creating a simulation or a game to play, the training knowledge can be applied to real world projects as well.

IX.

Therefore the real benefits from play are the skills and understandings one adquires at a tacit level but these tacit skills are amplified by explicit knowledge. If you developed a proper game, you shouldn't worry about gamifying the explicit knowledge adquisition part. Instead apply elements for community management from games-as-a-service that will encourage learning. By this I mean the emotional hooks described by Raph Koster and a platform for communicating with new media as described in the book *A New Culture Of Learning* by Douglas Thomas and John Seely Brown.

Simply said, explicit knowledge will be seeked by players through emotional hooks, not points, badges and leaderboards (explicit knowledge can be gamified though, I'll talk about this in another book but there's no tacit advantage to it). Raph Koster explains that these emotional hooks are:

- **Guilt:** You feel guilty if you abandon a game (like not watering your virtual crops). This is connected to conscientiousness.
- **Love:** You love the community! The game is a hobby. You love what you've created in it (think about minecraft has an artistic expression, players love it for what they've made in it).
- **Obligation:** The feeling that they must support their friends. Also there's the psychological phenoma of the commitment fallacy where if an individual explicitly agree's that he or she will do something, they tend to do it because they believe they're obligated to do it. (Raph explains that it's stupid but we do it anyways, it's not conscious).
- **Pride and anger:** Defeating a level or opponent in a game becomes personal. Raph explains (and I entirely agree!) that a big feature of games comes from the desire to rise in a social hirarchy. Pride and anger are very strong motiators in gameplay. The idea that a game can be all love and happiness is fallacious idealism that limits a gamification design.
- **Security:** Players can escape reality through the game. Raph gives

the example of a mother wanting to stay away from screaming children for 10 minutes. I've come across studies that show that this is the main reason why casual games are mostly played by middle class professionals with a bachelors degree or higher. They provide a little relaxation from stressful jobs. .

- **Curiosity:** Wanting to know what happens next (big aspect of "emergent design" I'll talk about in the complexity section of this book).

Therefore it could be said that MMO's aren't necessarily designed for fun, but fun is an oblique strategy to attract groups of people who will then develop emotional hooks which will build a community around the game. Seth Godin explained in his book *Tribes* that we now live in an age of communities where emotional connections are key to our success as an organization or social movement. Done propery gamification could be a great tool for this.

Raph Koster gives the metaphore of casual games (those you play for a few minutes at a time, like Tetris) are like developing fun one-time dates. Games-as-a-service are about creating relationships with the players, so it's more like a marriege. This is a crusial distinction I think gamification should adopt! In a marketing sense you might want to create relationships and emotional hooks with your customers in order to rise brand loyalty. In education you want to build life-long

habits of learning in students. In employee's you want to build a devoted and effective community who believe they're making the world a better place, etc.

In this context gamification shouldn't be about creating a fun process that leads to “addiction” to dopamine that will seduce people to go perform work or educational process that's otherwise boring. Instead gamification is the aplication of fun elements in the attempt to build a tribe! Gamification is best used to develop a learning community where a member's value and status in this community is based on the knowledge and expertese they offer. This creates an upward spiral of learning through peer-to-peer communication, cooperatation and rivalry.

X.

One can also apply political theories to this game-as-a-service anology:

Atomism is a view that humans are individuals with fixed personalities and identities that gather togheter due to self-interest as a cost-benefit strategy, at the cost of individual freedoms. The name comes from comparing human beings to atoms (meaning they have fixed personalities), who gather togheter to make molecules. This is

the general view in social sciences like sociology.

Comunitarianism is the view that people find meaning and self-identity through the relationships they build with other people. I tend to lean more towards communitarianism based on my understanding in cognitive science. This view is held more in philosophy.

Therefore an educational gamified program shouldn't be about trying to insert content into a students head by "tricking" the student through attempting to make it fun (this can work in some situations though), it should be about the creation of a community where social status is achieved by gaining information and sharing that knowledge. This is how MMO communities already work.

John Seely Brown has a very interesting anology for what he percieves 21st century education should look like. He explains that so far, traditional education has assumed knowledge is a substance that has to be introduced inside a persons brain. Much of the educational gamification design I see is operating on this model. I've like some games that follow this path, others seem like bad design. Good design is based on context. What I'm expressing here is that there are other ways that may be superior for learning explicitly:

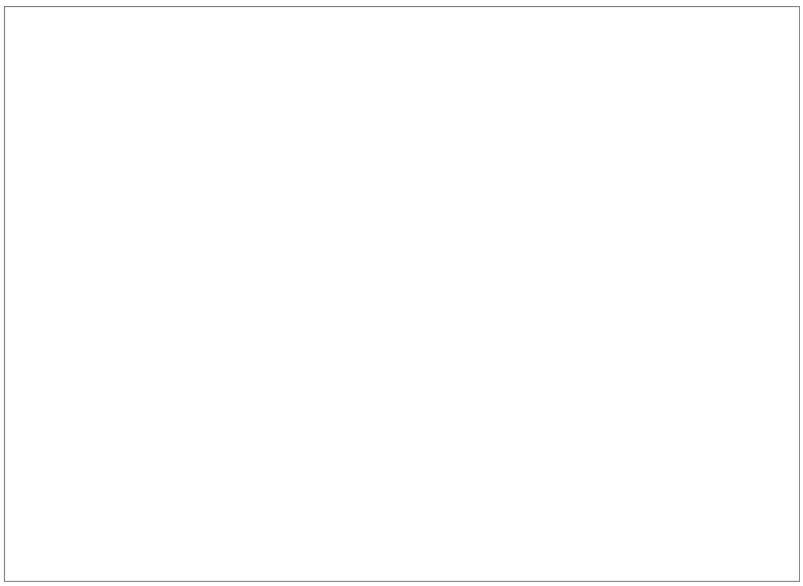

Figure. 1: This figure was shared with the permission of John Seely Brown

Instead of trying to transfer knowledge in this way we could also be adopting the pedagogy used by MMO players.

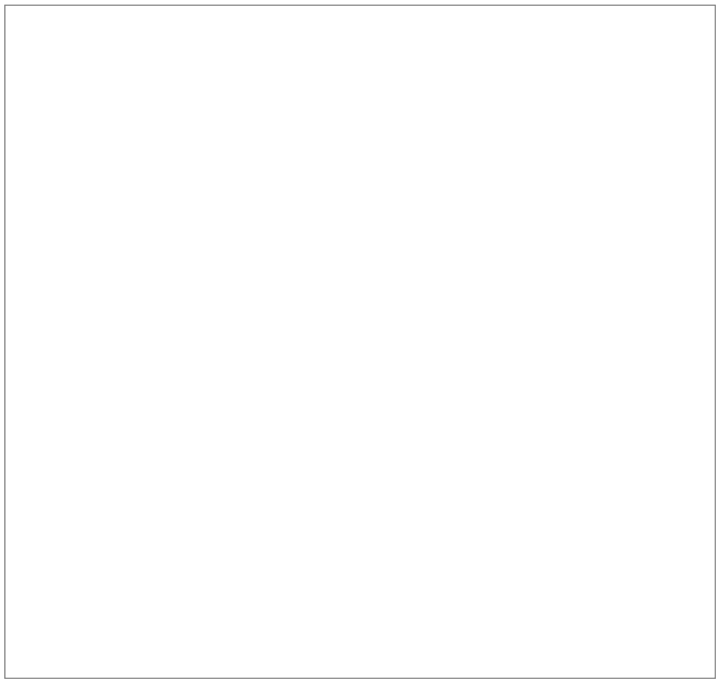

Figure. 2: This figure was shared with the permission of John Seely Brown

Not only is content better understood in a social context, but we also

gain several other advantages at a tacit level, of which some were mentioned when talking about the Constance Seinkuehler research. These habits of mind not only allow students to apply the explicit knowledge content they adquire in the real-world, but also allow them to make sense and keep learning after they've left the classroom. And ofcourse, they develop the emotional hooks already mentioned.

Studies from Harvard show that the number one predictor of a student doing well at Harvard is his or her ability to join, or better yet create study groups. Social learning is not some abstract theory I've linked from games to the real world, but has the most practical value to offer for education.

XI.

All these different elements can be wrapped into a process called Praxis. Praxis is a pedagogy that has been advocated from Aristotle to Karl Marx. I first came across the definition through Dave Snowden, who explains that cognitive science has proven that it is a process of learning both explicit and tacit knowledge that reconstructs the brain and enables people to perform complex tasks. He sites a study on taxi drivers from London, where one can literally see structural changes in the part of the brain called the hippocampus, after 2-3 years of

training. The hippocampus in these London taxi drivers became dramatically larger due to their training.

London is the second largest city in the world in the number of streets. To be able to pass the test and become a taxi driver in the city of London, an individual needs to name all the streets they would take and the major landmarks they would pass on a journey between two randomly picked locations in the city. They need to do this entirely by memory. These successful taxi drivers train by driving around the city with a map in front of them on their own time until the content sticks.

This Praxis process seemed very familiar to me based on my knowledge on the gaining of expertise as a chess player. I went back to the academic studies on chess expertese with a fresh outlook and developed a sort of “gamified” version of Praxis. I'll briefly introduce it in this book but will publish a more detailed manual on it in the future.

XII.

Gamified Praxis is a loop between theory, action and reflection. Each of these sections in the loop combines elements of deliberate practice

and play. For example:

Theory: This is the aquisition of explicit knowledge. This in turn can manifest itself in either deliberate practice or play.

- Deliberate Practice in Theory: In this form it might manifest as a how-to book or going to a lecture. You're clearly pushing yourself and trying to find answers.

- Play in Theory: This may manifest itself as reading an engaging story or having pleasant conversations with aquantances. You're gaining an understanding of how the world works, but it's pleasurable and implicit learning is handling most of the job.

Action: As the name implies this means doing something! The same process applies here:

- Deliberate Practice in Action: As mentioned before, you isolate complex activities into small ones, repeat them again and again while concentrating on mistakes and immediatly correcting your mistakes (immediate feedback is key!). The purpose of this is to build myelin around the neural connections that contain the specific memory chunks while you perfect a technique. Once you perform it in the real-world, this particular activity is perfected and

coordinated with your whole performance.

- Play in Action: This is the general sense of the word play. The fun and social bondings of play will create emotional hooks that motivate players to go through the pain of deliberate practice in order to enhance performance, or belong to a community. Play destroys mindfulness which allows implicit learning to happen (which we've mentioned before) while dopamine (which creates the sensation of fun) enhances implicit learning.

Reflection: The role of reflection is to organize the content inside your long-term memory (sometimes making larger chunks) or to study something deeply. Just having to explain the content to someone else will help you achieve this section of the loop.

- Deliberate Practice in Reflection: chessplayers look deeply look at games performed by grandmasters. They're trying to find patterns, to see what the master saw. This is crusial for gaining expertese. Look at the world as deeply has possible. Surfers and skaters record their performance and analyse it carefully.

- Play in Reflection: Einstein said that play was the greatest form of research. He would take bubble baths and openly admit to play with them. He's said to have discovered the theory of special

relativity by daydreaming. He dreamed he held onto a beam of light and circled the universe. He latter did the math to prove his vision from the daydream and found it to be true.

A lot of innovation comes by playing with our thoughts this way. If we accept that play is an evolutionary activity that supercharges the creation of new patterns in our brain it's no accident that play is connected to making new discoveries by linking ideas together and finding patters in the real world.

"I would often amuse myself at daydreaming, in order afterwards to measure my dreams with the calipers of reason" -Napoleon Bonaparte

XIII.

Our gamified educational programs often lack an understanding of tacit knowledge and implicit learning. We humans are pattern-based intelligences and social games like MMO's are about building communities and we need to design gamified programs that that tap

into this human potential.

Fun is a necessary but not a sufficient element in a gamified educational program. Designing for “happiness” is ideological, sports training doesn't shy away from creating pain (as in the common saying “No pain, no gain.”). Human beings are not one-dimentional. We need to better understand the complexities of learning about the world and design accourdingly. Gamification is about amplifying real-world performance, not adding fun as a luxury or an ideological beliefs.

A life of simple pleasures has its appeal in the short run, but it will render us soft and that will ultimatly make us miserable. All great literature is about surmounting great obstacles, or embracing a glorious end with pride. So are great games!

“What is happiness? The feeling that power is increasing, that resistence has been overcome” - Friedrich Nietzsche

Ultimatly a greater satisfaction in life is had not from living in a world of dopamine triggers, but by going through suffering for the sake of knowledge and self-development and delighting in our victories. And even if we fail, our life can still be a worthy story to tell.

XIV.

Praxis is ultimatly a process that has intuitevely emerged in several different fields that are highly complex and competitive. It appeared in chess and MMO's. It's described (although not by name) by many Asian martial artists. Praxis has been followed by many men of action in history.

There's a quote by the Prussian King Fredrick the Great that I enjoy has the best illustration of Praxis being applied in the real-world. It's taken from the book *Frederick The Great On The Art Of War* by Jay Luvaas. In this quote pay attention to the combination of knowledge, action and reflection in order to elevate our talents. The quote is a response to senior officers who were complaining to Frederick about the promotion of younger men over them even though they had more years of experience. Frederick's response reflects a saying in business used to disprove the relience on experiece reflecting skill: **"**His 20 years of experience were but one year repeated 20 times.**"** Fredrick said:

"What is the use of life if one merely vegetates? What is the point of seeing if one only crams facts into his memory? In brief,

what good is experience if it is not directed by reflection. Vegetius stated that war must be a study and peace an exercise, and he is right.

Experience deserves to be investigated, for it is only after repeated examination of what one has done that the artists succeed in understanding principles and in moments of leisure, in times of rest, that new material is prepared for experiment. Such investigations are the products of an applied mind, but this diligence is rare and, on the contrary, it is common to see men who have used all of their limbs without once in their lives having utilized their minds. Thought, the faculty of combining ideas, is what distinguishes man from a beast of burden. A mule who has carried a pack for ten campaigns under Prince Eugene will be no better tactician for it, and it must be confessed, to the disgrace of humanity, that many men grow old in an otherwise respectable profession without making any greater progress than this mule.

To follow the routine of the service, to become occupied with the care of its fodder and lodging, to march when the army marches, camp when it camps, fight when it fights–for the great majority of officers this is what is meant by having served, campaigned, grown gray in the harness. For this reason one sees so many soldiers

occupied with trifling matters and rusted by gross ignorance. Instead of soaring audaciously among the clouds, such men know only how to crawl methodically in the mire. They are never perplexed and will never know the causes of their triumphs or defeats."