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A MEASURE OF THE EFFECTIVENESS OF TUTORIAL SYSTEMS IN VIDEO  
GAMES

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## **ABSTRACT**

As video games become increasingly complex, more development time is spent creating interactive tutorial sequences to guide users of a given game into the mechanics and strategy required to succeed at a game. However, unless designed carefully, these tutorials may have the opposite intended effect on users. Instead of teaching them, poor tutorials may in-fact drive users away from learning what was intended due to a variety of factors that this study hopes to reveal. While much research has been undertaken into the teaching ability of video games in general, as well as the subject of interface design for software – there has not been substantial research into the subject of interface and tutorial design in the realm of games, and even less on what exactly constitutes a good tutorial. This study, through a two-part research design, aims to explore what makes tutorials in video games effectively teach users how to perform the tasks within the context of their game-world.

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## Chapter 1

### Review of Literature

#### 1.1 – Computer Based Learning

The way students learn in a traditional classroom setting has drastically changed via introduction to the internet/computers/video games, but how the education system as a whole has not changed to meet their needs. Mark Prensky describes the rise of “Digital Natives”, or students who have grown up with access to computers and the internet (Prensky, 2005) and notes that their natural immersion in technology has altered the way they learn effectively.

Prensky argues that children's brains now are structured to accommodate multitasking due to the increased amount of information readily available for them to access at any given time (Prensky 2006). Their ability to leap around to multiple reference points quickly and naturally leads them to be more predisposed to “Random Access instead of Linear thinking”. Today's generation is in the process of blurring play and work via the emergence of computer games over the past 10 years. Since people approach new games with the same mindset that they would learning any other skill, as opposed to just sitting down in front of a television.

With the advent of these 'Digital Natives', there is emerging research into how to tailor the education of these new type of learners to optimize their education (Gee 2005). James Paul Gee hypothesized that video-games could be incredibly powerful teaching tools for the following reasons

*Learning by Co-Design* – Gee argues that people generally feel good when they feel like they have some sort of control over a given situation. Since games are interactive, they allow the player to exert some level of control over the game itself, and active engagement encourages motivation. In a classroom setting, perhaps lessons should be built around student input and reaction.

*Learning by customization* – Games that allow for multiple paths/solutions to in game problems allow for better learning of game mechanics. The hypothesis being: “People cannot be agents of their own learning if they cannot make decisions about how their learning will work” (Gee 2005).

Finally, Gee notes that successful game tutorials utilize simple problems to solve at the beginning of the game in which the answer forms the basis of solving more complicated problems later on (Gee 2005).

## **1.2 – Effective Learning Structure**

Elman argues that the most learning we do in our lives is done when we are toddlers – by learning a language. He notes that when learning language, that trying to learn a language with a fully developed neural network is much less effective than learning it from the ground up with a child's neural network. His reasoning is that with such a limited working memory, the learner is forced to learn the language one piece at a time, and by slowly building up this foundation, the learner is able to reach competency faster and with less frustration.

This method of learning structure can easily be applied to the realm of video-games. James Gee notes in *Learning by Design* that by structuring problems in game tutorials in a way that the player has to learn only one mechanic, or feature – and by using the answer to that problem to be the foundation for more complex problems, a game designer can guide a player to complete the game by always keeping them on the edge of their competency, making problems not too easy that the player gets bored, or too tough that the player will simply give up, which could motivate the player to play through until the end. (Gee 2005)

Current studies suggest that learning is most effective when it is “active, goal-oriented, and interesting”, (Schute 2011) and that 'educational games' – or games where the sole purpose is to teach the player some skill that can be applied outside of the game can help teaching



material to students in a classroom setting. However, the same can be extrapolated to 'noneducational/non-serious games' as both educational and non-educational games share the same basic structure when it comes to interactivity, just the end goal of the game is different. The most important factor in the effectiveness of games as a learning environment may be the notion of play itself. When the human mind starts 'playing' – a person will feel more at ease, feel like they can take some risks without possibility of really 'failing'. (Schute 2011);(Anderson 2005).

Video games have evolved greatly since their inception in terms of both scope and complexity. The lack of research/experience that instructors have within the field of games and their educational value has led to research comparing classroom environments to in-game environments.

Games, much like effective learning environments, are often social in nature, with the advent of massively multiplayer games that allow for thousands of players to interact with each other concurrently. Even in games where multiplayer interaction is not a focus could be a social environment, with players collaborating in person or over the internet in order to solve problems.

In order to solve in-game problems, players must research what they need to know in order to play any given game (Oblinger 2006). Before or shortly after starting a game, a player needs to have an understanding of what skills they need to learn/bring to the front of their mind in order to successfully complete the game. Problem solving in the context of a given game takes place both within and outside of a game's sphere of 'influence' (Oblinger 2006). In fact, problem solving within the context of a video game often involves communities collaborating outside of the game in order to share information and solutions. Games are also somewhat unique amongst learning tools since they also allow users to test their hypotheses and receive immediate

feedback, which greatly facilitates learning as there is no middleman between the user and feedback like there is in typical classroom settings, there exists only the student and the material.

### **1.3 - Studies on Software Tutorials**

Anderson et. al performed a study on the relative effectiveness of tutorials on 4 very different games of varying complexity (Anderson, 2012). Their findings were that tutorials increased playtime overall, especially in the more complex games, but noted that the increased playtime was not necessarily 'worth' the development time put into the game. The study they performed noted 4 different factors that were perceived to be measures of tutorial effectiveness:

1. Whether or not a tutorial was present in any given game, the Context-Sensitivity
  2. Whether the tutorial exists inside or outside the program itself, Freedom
  3. Whether or not a tutorial forces the user to utilize a certain function in-game
  4. Whether or not a game has an on-demand help button that users can press if they feel stuck.
- The authors tested whether or not tutorials were effective by having two groups of users play through a series of 4 games for a limited time. One group's games had tutorials added beforehand, while the other group's did not. The findings of this study implied that the addition of tutorials did increase playtime/progress made through any given game. However, the additional playtime was only noticeably increased on the most complex of the 4 games. It is possible that some users were already familiar with games similar to the less complex games used in the study, which could have made the tutorials less effective overall.

D. Hawthorne performed a study with the intent of teaching elderly people how to perform basic file management on a Windows environment (Hawthorne 2007). Hawthorne notes that one of the most important factors in whether or not a tutorial/interface is effective is whether

or not the subject is motivated to learn what the software is attempting to teach. While in this study, the participants were selected because they explicitly expressed a desire to learn, in this case file-management. Hawthorne also notes that many of the participants in his study would blame themselves for not understanding how a system works – and always defer to the designer of the system for help. Hawthorne points out that this is counter-productive to good interface design because the relationship between the developer and user is hierarchical as opposed to a partnership in which the user feels comfortable offering feedback to the developer.

This begs the question, wouldn't a tutorial system that motivates a player to learn as they were in the process of performing the tutorial be a more effective tutorial? While Anderson et. al. attempt to answer this question, they were testing to see whether or not the implementation of a tutorial increased general play time of the game and did not gather feedback from users. Their findings concluded that development time should not be used to develop tutorial levels. The authors also noted that due to their study's focus on puzzle games that it was unclear if tutorials would be more effective within other genres, such as action or role-playing games. Studying user thought processes as they play through various popular games of the last 15-20 years could yield valuable insight into design principles for tutorial systems in games.

## Chapter 2

### Methodology

For this study, I surveyed a group of anonymous users on their thought process as they play through the first 20 minutes of 4 games that were popular upon release. These users would be able to remote into my desktop computer during various windows of time that I will announce online and play through the tutorial sequences of those 4 games. This has the benefit of me being able to control what a user does when they remote in by setting up the environment so only the games may be played and users will not have access to any other files, folders or executables that are present on the system.

#### 2.1 Games Selected:

*Super Mario Bros.* (1985)

Although this game is 30 years old, the design and structure of *Super Mario Bros.* is still held to high regard amongst the gaming community for its simplicity and challenge (Various, 2015). This game was selected as one of the four for the study due to there being no implicit tutorial that instructs a user on how to play the game.

Rather, *Super Mario Bros.* relies on

immaculate level design (Portnow, 2014) to guide the user throughout the game and teach them what they can do before they attempt to do it. The player will be required to complete World 1-1 for this study.

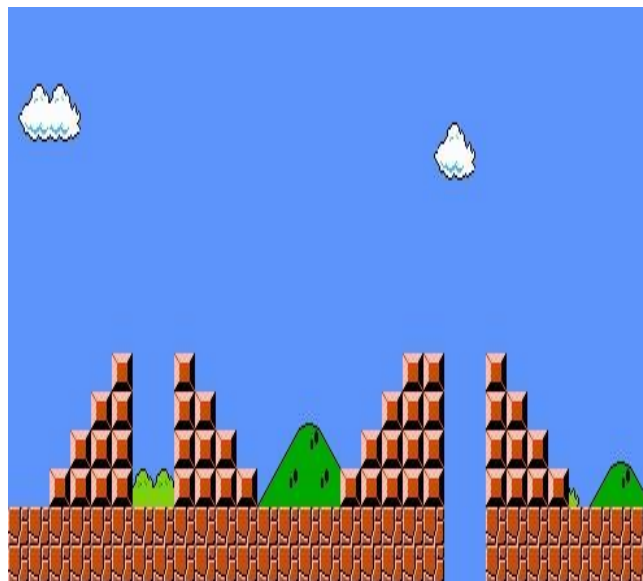


Illustration 1: Screenshot from *Super Mario Bros.*

### *Final Fantasy VIII (1999)*

*Final Fantasy VIII* was selected due to its regard as having a terrible tutorial (Teti, 2015), forcing users to view un-skippable segments where the game plays itself in order to attempt to teach users the game mechanics. I remember as a child that this tutorial caused me to roll my eyes since it allows you to figure out the game mechanics before forcing you to learn them. It will be interesting to see if other users have similar thoughts on this game. The player will need to complete the fire cave trial for this study.

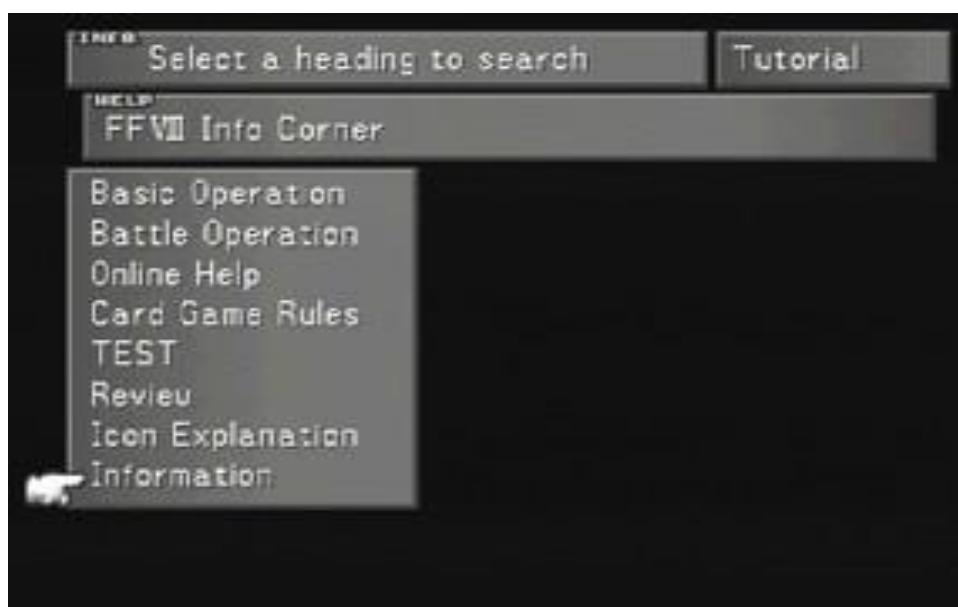


Illustration 2 Screenshot from Final Fantasy 8

### *Metroid Prime (2002)/(2009)*

*Metroid Prime* was selected because it takes the design principles of *Super Metroid* (Bille, 2012) and translates them to a three dimensional environment. *Metroid Prime* also has a distinct tutorial section that serves as the game's intro in which the player must investigate and subsequently escape a space station. This game serves as what I would expect a good tutorial to be, as it introduces every mechanic that is required to complete the rest of the game in sequence, while allowing the player to explore their options. This tutorial teaches mechanics by requiring

the user to complete minor puzzle scenarios that require the use of a given mechanic. The player will be required to escape the space station for this study.



Illustration 3 Screenshot from Metroid Prime

### *Far Cry 3 (2012)*

This game was selected due to it being a representation of modern tutorial design. *Far Cry 3* follows other Ubisoft “Open World” action games in being a giant sandbox where users are free to do more or less what they want in the context of the games mechanics. All of Ubisoft’s recent open world games (*Assassin’s Creed Series, Watch Dogs, Far Cry 3 and 4*) have shared the same tutorial structure which forces users to perform a given action before continuing. This tutorial structure lies in the middle of the *Final Fantasy 8* to *Metroid Prime* structure as it never takes the user out of gameplay but does force the user into performing a mechanic before continuing. The player will need to escape the prison camp for this study.



Illustration 4 Screenshot from Far Cry 3

## 2.2 Participants

Participants for this study were randomly selected from a population of Penn State students who responded to email/group facebook messages and who were involved in the following groups at Penn State:

1. Penn State College of Information Sciences and Technology (10 Responses)
2. Penn State Electronic Sports Club (18 Responses)
3. Penn State College of Engineering (4 responses)

Of the 32 responses to the initial messages, 20 were randomly selected to participate in the general survey, and 4 were selected to participate in a think-aloud. The reduction of sample size was to accommodate for the difficulty of organizing time for participants to play the games.

	IST	Engineering	E-Sports	Total
N Total	10	4	18	32
N Selected Survey	7	1	12	20
N Selected Think-Aloud	1	1	2	4
% Total	31.25%	12.5%	56.25%	
% Selected Survey	35%	5%	60%	
% Selected Think-Aloud	25%	25%	50%	

**Table 1 Study Participant Statistics.**

Of note is that 60 percent of the participants in the survey and 50 percent in the think-aloud Samples were members of the Penn-State Electronic Sports Club, an on-campus club that focuses on competitive video-game playing. This implies that the majority of the participants in both phases of the study have had prior video-game playing experience which may influence the results of the study.

### **2.3 General Survey:**

After completing the games, users were asked to complete a brief survey using Google surveys which will ask them about how they felt about the various tutorials they played through utilizing the following questions.

1. This tutorial prepared me for future trials in game
2. This tutorial restricted my freedom
3. This tutorial wasted my time
4. This tutorial felt like an organic part of the game world
5. This tutorial felt necessary
6. This tutorial forced me to perform certain actions.

Each question could be answered utilizing the following Likert scale (Likert, 1936) indicating level of agreement:



1: Strongly Disagree	2: Slightly Disagree	3: Neutral	4: Slightly Agree	5: Strongly Agree
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Figure 1 Survey Answer Likert Scale

After the data was gathered, the mean for each question was generated to possibly see if there was a potential correlation between any of the questions. Afterwards, a T-value test was performed on the difference of the means to see if there was any statistical significance between any of the values.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}}$$

Illustration 5 T-Value Test

## 2.4 Think-Aloud

In addition to the data gathered from this survey, I ran a think-aloud (Lewis, 1982) with 4 participants and recording their detailed thoughts about the four game's tutorial sequences. Users participating in this part of the study were asked to play through the same four games covered by the survey, but with me present, and simply voice their thoughts as they played through the tutorial sequences. These think-aloud sessions took place in my apartment's living room, and were recorded using a basic voice recorder for future review. The think-aloud protocol allows for the observer to view the whole process of task-completion, as opposed to just the end result.

Data acquired from this think-aloud will augment the data gathered from the general survey and allow me to more clearly see a relationship between how players perceive and learn the game world around them.

## Chapter 3

### Results

#### 3.1 – Preparedness

With averages ranging from 2.7 to 4.45 between the four games, “*This tutorial prepared me for future trials in game*” yielded some of the most consistent results between games.

*Metroid Prime* scored highest with an average of 4.45 over 20 responses, and *Far Cry 3* scored lowest with 2.7. *Super Mario Bros.* and *Final Fantasy 8* scored an average of 4.4 and 3.65 respectively. These averages suggest that at some level, all four games were successful in the eyes of the users participating in this study at preparing them for what they thought the game would end up turning into. T-Tests performed between the means of *Metroid Prime /Final Fantasy 8* and *Super Mario Bros./Far Cry 3* yielded P-values of 0.006 and <0.001 respectively, indicating statistically significant differences between the responses for the games.

Summary of Preparedness Responses

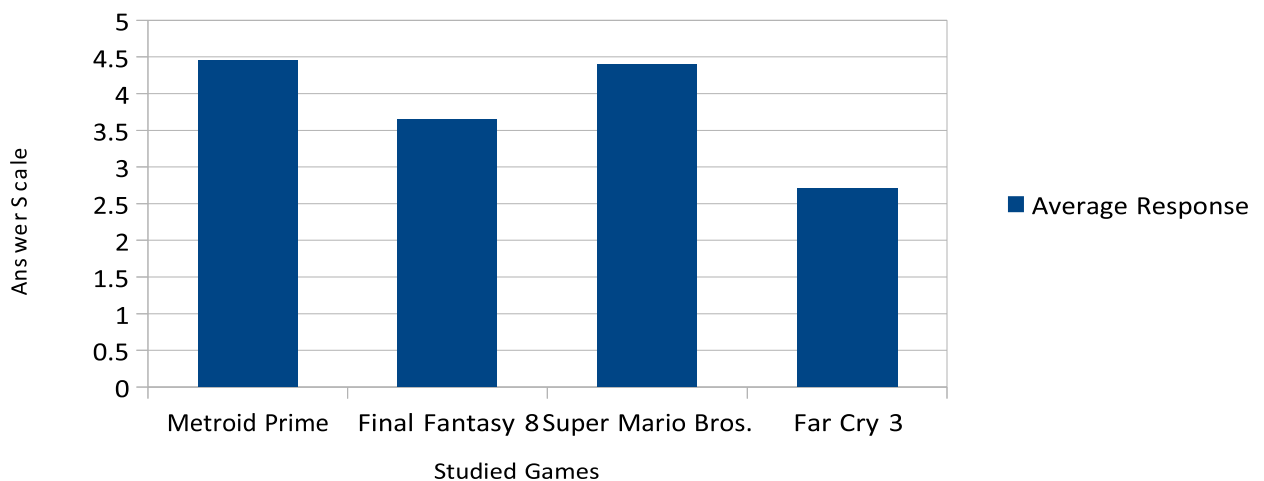
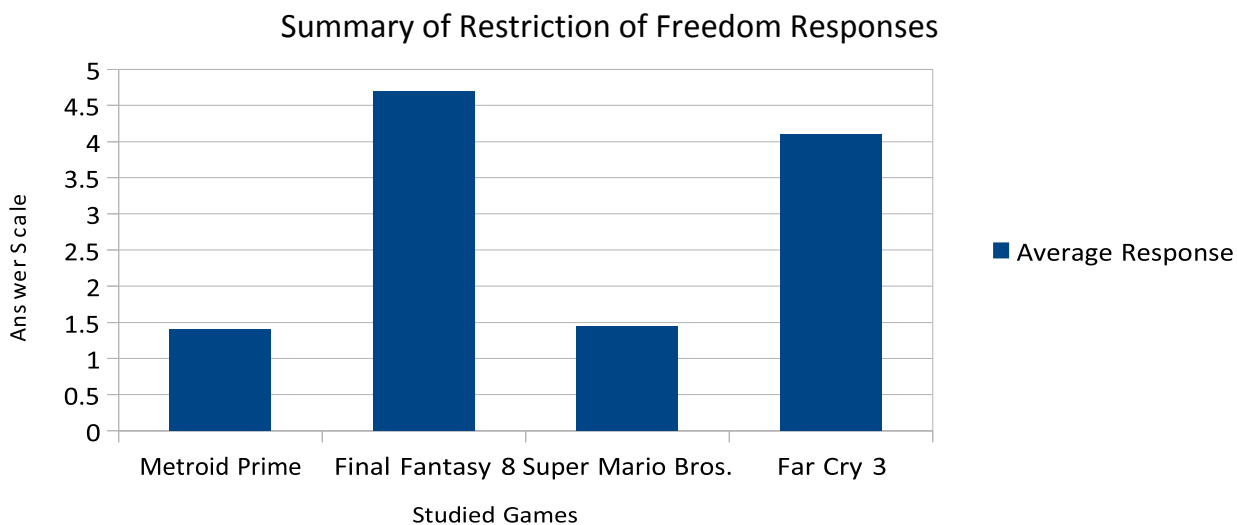


Figure 2 Summary of Preparedness Responses

### 3.2 – Restriction of Freedom

Conversely, the averages for the question “*This tutorial restricted my freedom*” ranged from 1.4 to 4.7, with none of the four games averaging in the middle of the answer scale. The highest scoring, or tutorial with the highest perceived restrictions on player freedom according to the survey sample was *Final Fantasy 8*, with a 4.7. *Far Cry 3* followed close behind with a 4.4. *Metroid Prime* scored lowest, representing the least perceived restrictions on player freedom, with a 1.4, with a similar score reported by *Super Mario Bros* with 1.45. Of note is that none of these averages were in the middle of the answer range (2.5-3.5), which shows a clear perception on the part of the users in this study of aspects of the games that either restrict or allow freedom within the game world.

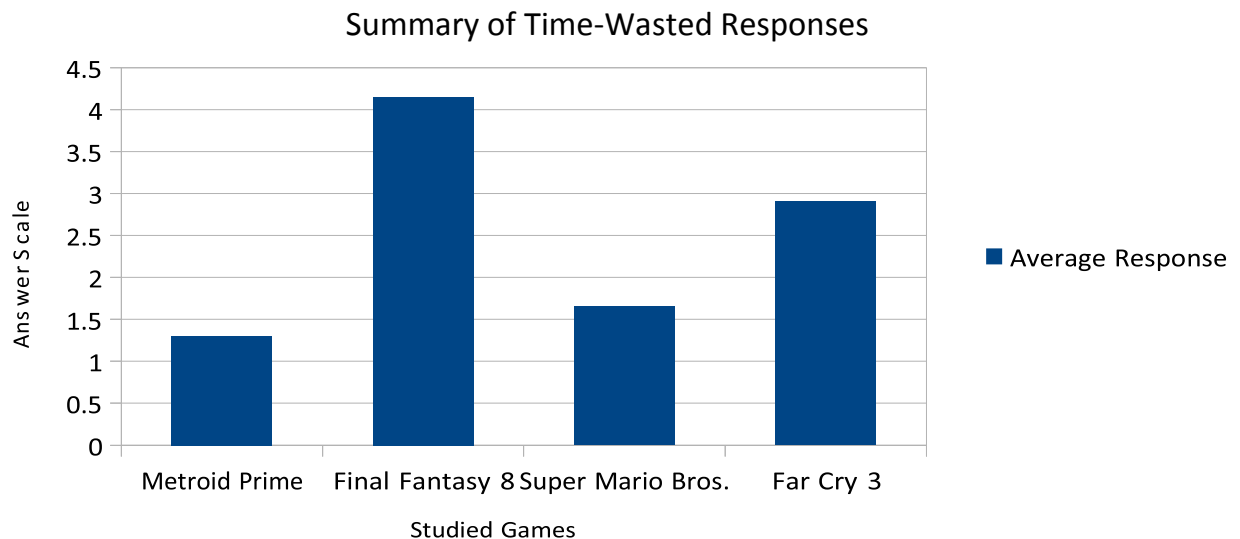
T-Tests performed between the means of *Metroid Prime* /*Final Fantasy 8* and *Super Mario Bros.* /*Far Cry 3* both yielded P-Values of less than 0.001, indicating extremely significant differences between the responses for the games.



**Figure 3 Summary of Restriction of Freedom Responses**

### 3.3 – Time Wasted

The averages to “*This tutorial wasted my time*” also were fairly spread apart, ranging from 1.3 to 4.15. However, there was less distinction between the values. *Far Cry 3* for example scored a 2.9, placing squarely in the center of the answer scale. There may be several reasons for this which will be discussed in the next chapter. Aside from this somewhat unexpected result, the other three games reported averages roughly on either side of the spectrum, with *Final Fantasy 8* scoring highest at 4.15, representing the highest collective perceived time wasted by the users who participated in the survey, while *Metroid Prime* and *Super Mario Bros.* Scoring 1.3 and 1.65 respectively, indicating that in general, users did not feel that those two games wasted their time. T-Tests performed between the means of *Metroid Prime* /*Final Fantasy 8* and *Super Mario Bros./Far Cry 3* again yielded P-Values of less than 0.001, indicating extremely significant differences between the responses for the games.



**Figure 4 Summary of Time-Wasted Responses**

### 3.4 – Context-Sensitivity

Context-sensitivity is the measure of how organic the tutorial was presented within the context of the game world. That is, are the tasks the game is trying to teach the user taught inside the game world as opposed to outside (Having a character in-game explain how to perform a given task as opposed to having a pop-up window or other non-diegetic information relay the rules of the game to the user). This is a somewhat abstract concept, but given that the data gathered from the survey matched expectations (high 4s for *Metroid Prime* and *Super Mario Bros.*, and a 1.7 for *Final Fantasy 8* – as well as an in-between value for *Far Cry 3*), implies that users understood both the question and the game world they were exploring. *Far Cry 3* is of note because of the 3.25 score it received, once again placing the answers in the middle of the scale. This is consistent with the expected results, since *Far Cry 3* employs a mixture of in-context instructions relayed by other characters within the game world – as well as pop-up button prompts to guide the user through the game's introduction. T-Tests performed between the means of *Metroid Prime* /*Final Fantasy 8* and *Super Mario Bros.*/*Far Cry 3* again yielded P-Values of less than 0.001, indicating extremely significant differences between the responses for the games.

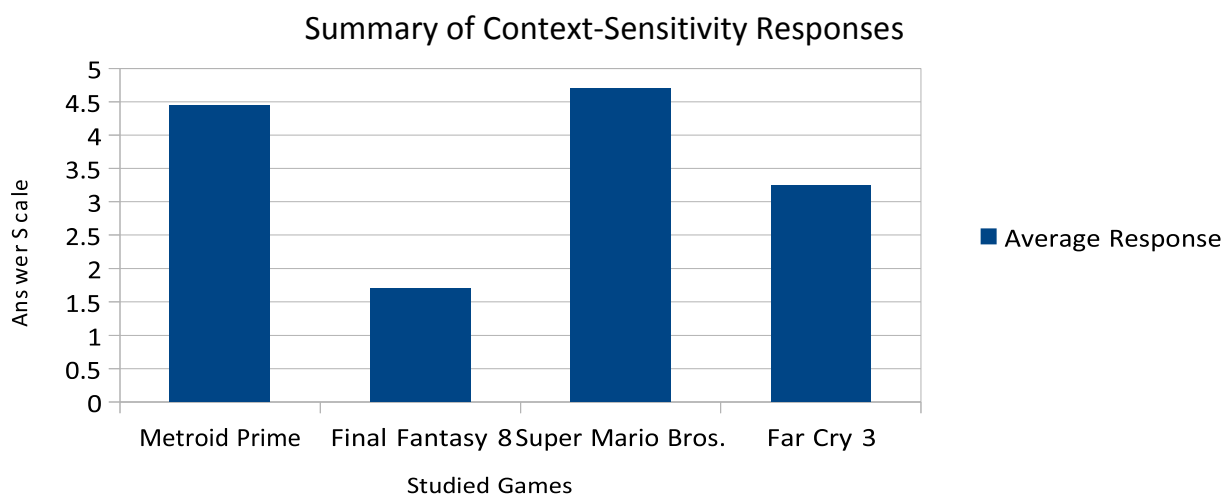
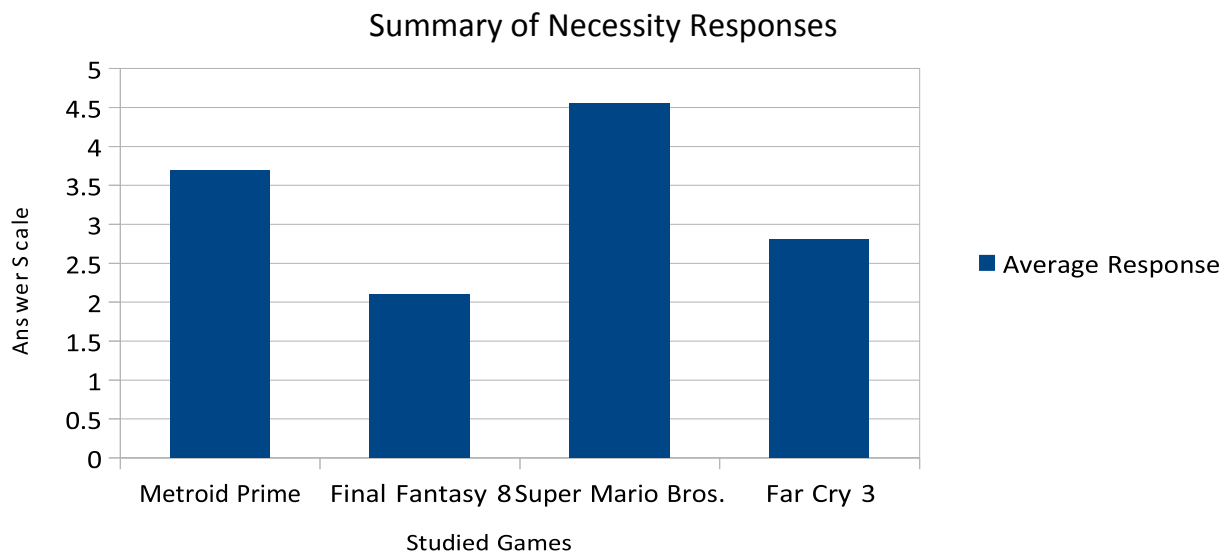


Figure 5 Summary of Context-Sensitivity Responses

### 3.5 – Necessity

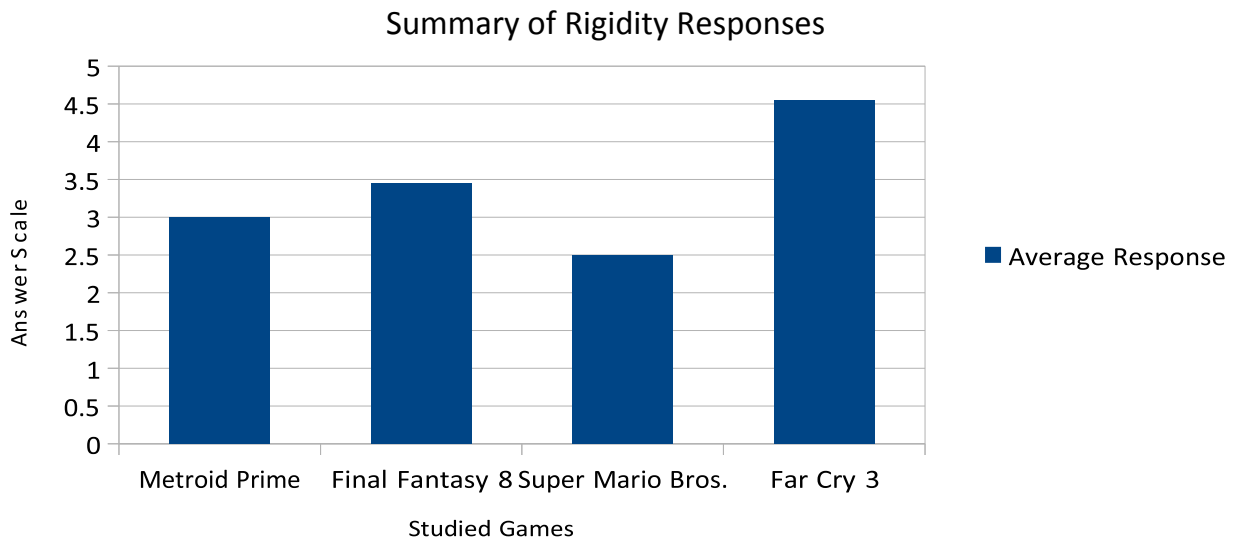
Perceived necessity of a given tutorial is a measure of how necessary the tutorial felt to the user playing the game. This is largely subjective from user to user, but may have some interesting relationship with one of the other values recorded. Participants overwhelmingly showed that according to the sample group, *Super Mario Bros.* had the most necessary tutorial of the four games with an average response value of 4.55. *Metroid Prime* came in second, with a 3.7, while *Far Cry 3* and *Final Fantasy 8* were deemed the least necessary by users with respective scores of 2.8 and 2.1. Users seemed to generally find at least some usefulness in all of the games' tutorials due to the absence of scores below 2. This could perhaps be due to the users' unfamiliarity with the games in general, or the tutorials at least being moderately successful at teaching the users at least some of the skills required for their respective games. T-Tests performed between the means of *Metroid Prime* /*Final Fantasy 8* and *Super Mario Bros.*/*Far Cry 3* again yielded P-Values of less than 0.001, indicating extremely significant differences between the responses for the games.



**Figure 6 Summary of Necessity Responses**

### 3.6 – Rigidity

Rigidity is a measure of how much a given game's tutorial forced users to perform a given action before proceeding as opposed to letting them figure it out on their own. This differs from *Restriction of Freedom* because *Restriction of Freedom* doesn't require a tutorial to force users to perform actions, but rather limit their freedom in any fashion. Rigidity specifically refers to tutorials where the game is effectively paused, and the user *must* perform the correct action in order to continue. Of all the tutorial aspects that were measured, the data gathered from the users were the most neutral. Scores ranged from 2.5 to 4.45, but three of the four games (*Metroid Prime*, *Final Fantasy 8*, *Super Mario Bros.*) all reported values within +/- 1 of each other (3,3.45,2.5) suggesting that the question was possibly poorly worded and was difficult to parse on the user's end, or perhaps the tutorials were designed in a vague/fluid manner in which the user couldn't really tell if they were being forced to perform a given action per se. *Far Cry 3* did report a value of 4.45, an overwhelmingly high number compared to the other three games. Users taking the survey seemed to all agree that this game in particular did stop the action and force them to do something. T-Tests performed between the means of *Metroid Prime* /*Final Fantasy 8* returned a P-Value of .2176 indicating no statistically significant difference between the two samples. *Super Mario Bros.*/*Far Cry 3* On the other hand yielded a P-Value of less than 0.001, indicating extremely significant differences between the responses for the games.



**Figure 7 Summary of Rigidity Responses**

### 3.7 T-Value Test Results to find Potential Relationships between Survey Responses

Potential relationships between the values of Preparedness and Time-Wasted, as well as between Context-Sensitivity and Necessity called for further analysis into the data. T-Value tests were performed on the differences between each of the variables in the relationships and the neutral response (3). This tests to see if there is a statistically significant agreement or disagreement in the responses from the survey – if the P-value is less than 0.05, then the value is deemed significantly different than the neutral response with 95% confidence. The only variables that did not significantly differ from the neutral response were the context-sensitivity and necessity averages for Far Cry 3. All other data showed a clear, significant agreement or disagreement amongst the users on various tutorial design aspects.

	Metroid Prime	Final Fantasy 8	Super Mario Bros.	Far Cry 3.
Preparedness	P < 0.0001	P < 0.0001	P < 0.0001	P < 0.0001
Restriction	P < 0.0001	P < 0.0001	P < 0.0001	P < 0.0001
Context-Sensitivity	P < 0.0001	P < 0.0001	P < 0.0001	P = 0.1966
Necessity	P = 0.0004	P < 0.0001	P < 0.0001	P = 0.4233

**Table 2 P-Values of Survey Means compared to Neutral Response**



### 3.8 – Think-Aloud Results

Many of the think-aloud responses confirmed the data from the general survey.

Comments by the subjects on *Metroid Prime* correlated with the high contextsensitivity/preparedness values the game received. For example, one user commented “*The scan visor is really nifty, it adds a lot of atmosphere*” (Subject 3 – Noting the context-sensitive method of gathering information from the environment), while another noted that “*I bet later in the game, I'm gonna have to fight space pirates that aren't crippled by whatever horrible thing happened on this station*” (Subject 2 – On the subject of preparedness for the future, as well as the organic nature of the tutorial). Subject 3's comment implies a perceived notion that the tutorial is teaching them about what the game has planned further down the road by placing them in an environment where it is natural that they would encounter weakened versions of major adversaries later on. Other users mentioned the effective atmosphere of the tutorial “*This Space Station is Terrifying*” (Subject 4).

The responses for *Final Fantasy 8* also noted some level of context-sensitivity within the tutorial - “*Having the tutorial placed within the desks of the school the game takes place in is pretty nifty thematically*” (Subject 2), however, several comments complained about the lack of freedom and/or questioned the necessity of the tutorial in the first place - “*I know this already, why is the game making me watch this*” (Subject 1 - on the unskippable tutorial dialogs that pop up throughout the introduction), “*Was there an option to skip this that I missed?*” (Subject 2 - on the same dialogs). One user in particular refused to play further after reaching a series of unskippable tutorials, “*Another one of these, I'm done*” (Subject 4).

Most of the subjects had already played *Super Mario Bros.* Before at some point in their lives, and as the game has no dedicated tutorial – many of the comments during the think aloud did not grant much insight into the players' thoughts with regard to tutorial design. However,

there was one user who noted a very important design point, potentially unintentionally - *“Why is this wall here? Is it to make sure I know how to jump?”* (User 3). The part of the level that User 3 is referring to happens early on, before any hazards appear that can end the game for an unsuspecting player, which allows the user to figure out how to proceed without fear of failure. By placing a wall that must be jumped over to continue ensures that the player understands the game mechanics required to jump in game, which will give them the information they need when they are required to jump over hazardous objects in-game.

The think-aloud responses for *Far Cry 3* seemed to focus on the apparent thematic inconsistency between what the game advertised itself to be, and how the game teaches you how to play it. For example, *“This is supposed to be an Open-World game, correct? I feel like I’m just on a roller coaster being moved from one set piece to another”* (Subject 1 – On the game's opening sequence being incredibly linear compared to how the rest of the game is laid out). Other comments criticized the rigidity of the game, *“Thanks game, for telling me I can press forward to move forward”* (Subject 2). Most of the responses for this particular game, however, were criticisms on the narrative the players were placed in, *“I guess this would be tense if any of these characters were remotely likeable”* (Subject 4), *“Am I supposed to care about any of these guys?”* (Subject 1) and not the design of the tutorial.

## Chapter 4

### Conclusions and Recommendations

#### 4.1 – Results Summary

Table 2 summarizes the findings from Chapter 3. The means are shown, arranged by their respective game's results, while P-values are listed underneath pairs of games to indicate which means were tested using a T-Value test. All P-values except for Rigidity between *Final Fantasy 8* and *Far Cry 3* were shown to be statistically significant due to them being less than 0.005.

	Metroid Prime	Final Fantasy 8	Super Mario Bros.	Far Cry 3
Preparedness	4.45	3.65	4.4	2.7
	P = 0.0006		P < 0.0001	
Restriction	1.4	4.7	1.45	4.1
	P < 0.0001		P < 0.0001	
Time-Wasted	1.3	4.15	1.65	2.9
	P < 0.0001		P < 0.0001	
Context-Sens.	4.45	1.7	4.6	3.25
	P < 0.0001		P < 0.0001	
Necessity	3.7	2.1	4.55	2.8
	P < 0.0001		P < 0.0001	
Rigidity	3	3.45	2.5	4.45
	P < 0.2176		P < 0.0001	

**Table 3 Summary of General Survey Values**

Table 3 Summarizes the P-values found from performing T-Value tests between certain survey results and the neutral value (3). All were found to be statistically significant except for the relationship between Context-Sensitivity v. Necessity in *Far Cry 3*. Reasons for this discrepancy are discussed in 4.3.

	Metroid Prime	Final Fantasy 8	Super Mario Bros.	Far Cry 3
Prepared. v. Time-Wasted	P1 < 0.0001 P2 < 0.0001	P1 < 0.0001 P2 < 0.0001	P1 < 0.0001 P2 < 0.0001	P1 < 0.0001 P2 < 0.0001
Context-Sens. v. Necessity	P1 < 0.0001 P2 = 0.0004	P1 < 0.0001 P2 < 0.0001	P1 < 0.0001 P2 < 0.0001	P1 = 0.1966 P2 = 0.4233

Table 4 Summary of Inter-Variable Relationship Values

#### 4.2 – Tutorials that Restrict Freedom Waste Time

The results shown in Table 2 and Table 3 show a clear relationship between tutorials that restrict freedom heavily are perceived to waste users' time. Based on this data, it appears that tutorials that place fewer restrictions on player action (*Metroid Prime* and *Super Mario Bros.*) are regarded by users as preparing them better for future in-game trials. This may be due to users feeling patronized when playing through a tutorial that heavily restricts freedom because they might feel they already know the material that the game is trying to teach them. *Final Fantasy 8* and *Far Cry 3* both appear to place heavier restrictions on player freedom in their tutorials, as suggested by the survey data and have a much more neutral Preparedness response value. This suggests that this relationship is not a 1 to 1 inverse relationship, as there was no strong negative response to preparedness in either of those two games, but it appears that tutorials that gave players more freedom prepared players *better* than tutorials that restricted freedom to a greater degree.

### 4.3 – Tutorials that have High Context-Sensitivity may be Perceived as More Necessary

The relationship between Context-Sensitivity and Necessity yielded unexpected results. It appears from the data gathered from the T-Value tests that there is a statistically significant correlation between the two values indicating that tutorials that present their information in a highly organic way in the context of the game world are perceived as being more necessary by the end users. In the case of *Metroid Prime*, it is possible that since the users were immersed in the game's atmosphere that the experience felt less game-like and more immersive as a result. This is supported by comments made in the think-aloud by users praising the game's atmosphere. (subject 2 and Subject 3) By being immersive, a tutorial may be perceived as more necessary simply because the game makes learning an active experience within the context of the game world as opposed to a passive experience where the user absorbs information from traditional pop-up windows. *Final Fantasy 8*, for example, features a tutorial that consists of almost nothing but pop-up windows that interrupt gameplay, and the data shows both low Context-Sensitivity and Necessity values. *Super Mario Bros.* features no dedicated tutorial level, instead using the first level of the game to subtly guide users to an understanding of the game's mechanics, so it is not a surprise to see a high context-sensitivity value recorded for this game. *Super Mario Bros.*' high necessity value also supports the hypothesized relationship between the two values. *Far Cry 3* was an anomaly in the data analysis, as none of the response means were significantly different than the neutral response, indicating either that users found the questions worded vaguely and were unable to really gauge how to answer, or more likely considering the strong differences found in the other games' responses, found the tutorial designed in a strange way. *Far Cry 3*'s tutorial focuses a lot more on narrative and on shuffling the player from set-piece to set-piece. The middling context-sensitive response is likely attributed to the first level being very heavily set in the established game world, but at the same time interrupting the game with popup

windows. So on one hand you have this narrative focused level based on escaping from an island prison, but instead of allowing the player to explore the setting and figure out how to escape by themselves the affair is reduced to a linear corridor that is interrupted by pop-up windows every 2 minutes. The necessity value for *Far Cry 3* was also very neutral, at least showing that there appears to be a direct, more or less 1 to 1 relationship between context sensitivity and necessity.

#### **4.4 – Rigidity Seems to be a Non-Factor in Tutorial Design**

The data gathered from this study seems to suggest that rigidity seems to not effect whether or not a given user finds a tutorial effective or not. The values for each of the games averaged roughly in the middle of the answer scale, implying either that users did not find any of the tutorials all that rigid in structure, or, a more likely scenario, the question they were asked to answer (“This tutorial forced me to perform certain actions”) was phrased in a way that was confusing, causing a mixed and muddled set of data. It is easy to see how users could interpret this question several different ways based on how they interpreted “forced”. As it stands, the only game that scored a significantly non-neutral value for 'Rigidity' was *Far Cry 3*, and while there was a think-aloud comment on how the tutorial for this game was very linear and did force users to perform some actions, most of the comments for this game focused on how the narrative was presented within the game's introduction, and therefore no strong conclusion can be found linking Rigidity with effective tutorial design.

#### **4.5 – Recommendations for the Future**

If further research is to be done into this field, it would be recommended to look more deeply into the relationships between 'Restriction of Freedom' and 'Time-Wasted' as well as 'Context-Sensitivity' and 'Necessity' as they pertain to video game tutorials. The data gained from this study has shown that there is a correlation between those values in certain cases, and it would be informative to know what causes that relationship to be there in the first place.

A study on a different sample population could be beneficial as well, as more than half of the participants in this study had prior game playing experience, which may have made them less tolerant of learning material that other, similar games they may have played had already taught them.

Appendix A **Blank****General Survey****Metroid Prime Tutorial Design Survey**

Answer to the best of your ability

**This Tutorial Prepared Me for Future Trials in Game.**

Agree or Disagree?

1 2 3 4 5

Strongly Disagree      Strongly Agree**This Tutorial Restricted My Freedom**

Agree or Disagree?

1 2 3 4 5

Strongly Disagree      Strongly Agree**This Tutorial Wasted My Time**

Agree or Disagree?

1 2 3 4 5

Strongly Disagree      Strongly Agree**This Tutorial Felt Like An Organic Part of the Game World**

Agree or Disagree?

1 2 3 4 5

Strongly Disagree      Strongly Agree**This Tutorial Felt Necessary**

Agree or Disagree?

1 2 3 4 5

Strongly Disagree      Strongly Agree**This Tutorial Forced Me to Perform Certain Actions**

Agree or Disagree?

1 2 3 4 5

Strongly Disagree      Strongly Agree



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