



QuestStories - Quest and narrative, The role of the NPC in a mixed-initiative environment

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Abstract

This thesis contributes with finding the connection with the non-playable characters (NPC) roles and the effect it has on the narrative in a video game. This research uses a design research science methodology to create a NPC modification tool as an artifact in an evolutionary dungeon designer(EDD). This research will also present a quest analysis on three famous role playing games to support the creation of four generic NPC roles used in the creation of the artifact. The artifact is used to test what impact the NPCs have on the users appreciation of the narrative outside of gameplay. The results found in this paper is that the roles of the NPCs makes it easier for the user to create a narrative in the game the want to create. This paper also discusses the positive and negative effects of restricting/guiding the user while creating a game, and presents a way forward for future work on the artifact.

Abstract

Detta arbete bidrar med att hitta ett samband mellan NPCs (icke spelbara karaktärers) roller och den effekt rollerna har på det narrativa elementet i tv-spel. Denna forskningen är utförd med hjälp av en DRSM (design research science methodology) för att skapa ett NPC modifierings verktyg som en artifikat i en evolutionär dungeon designer (EDD). Denna forskningen kommer också att presentera en quest analys av tre kända rollspel titlar för att stödja skapandet av fyra generiska NPC roller, som sedan används i skapandet av artifakten. Denna artifikat har sedan använts i en användarstudie för att testa vilken påverkan NPC rollerna hade på testpersonernas uppskattning av det narrativa elementet som skapades i deras design. I detta arbete presenterar vi även resultat som visar på NPC rollernas påverkan på narrativet som slutanvändaren vill skapa i sitt spel. Vi diskuterar även dem positiva och negativa effekter som kan dyka upp när man restrikerar och guidar slutanvändaren när dem skapar ett spel, med detta presenterar vi en väg framåt för framtida utveckling av artefakten.

1 Introduction

A quest exists within movies, books, video games etc and are synonymous with words like journey, expedition, pursuit or adventure. The quests are often defined in literature [5] and in video games [10] as centering around a hero character that pursues some kind of end goal, and along the way embarks on a journey to attain that goal [10]. In video games the quests are often used as a vehicle through which the game tells a story to the player [11]. This use of quests to drive the games plot is most commonly used within the adventure-game and role playing games (RPG) genre [10]. The player is often presented with some kind of task that needs to be executed and in return the player gains some kind of reward and knowledge in the form of narrative presented to them [6].

This research discusses quests and narratives, with the focus on the narrative elements outside of game-play. For example a narrative element can be the plot, the setting, or the characters in the game. This thesis will focus on the characters or the so called non playable characters (NPCs), and how the use of the NPCs role can affect the narrative in a quest. The reason for choosing this particular element was because it was a non existing element in the EDDy system where the artifact was created in. This study has used support from previous research as well as findings in an analysis of quests in three famous RPG titles, this to find the answer to how to use the NPC character as a narrative element in EDDy. The findings of this research has been used to create an artifact called QuestStories. This artifact is developed as a NPC creation tool that can be used to create the overlapping relationship between quest, quest game and quest narrative described by Howard [10] in figure 1.

This thesis will follow a Design science research methodology (DSRM). DSRM is commonly focused on the development and performance of an artifact, the artifact is used to receive metrics that can be further evaluated [19]. The purpose of the artifact developed in this study is used to test how the NPCs role effect on a quests narrative in a game. The artifact is a further expansion of the quest creation tool QuestGram [16] existing within the Mixed-initiative tool EDDy [2]. This research intends to provide a comparison between QuestStories and QuestGram with help of a user study were the measured quality data is provided directly from the users testing the two artifacts. The goal is to test the impact of the NPCs role when creating simple quests and see if there is a difference in the narrative element being created.

The questions posed in this research are there to answer questions about the NPCs effect on the relationship between quests and narrative. The answer to RQ1 has given the support for the development of the artifact that has been used to answer RQ2:

RQ1: How can we use the NPCs and their role to tie the quest to a quest narrative?

RQ2: How can the implementation of roles for the NPCs affect the users appreciation on the narrative being created in a mixed-initiative environment?

2 Related Research

2.1 Quest, NPC & Narrative

When focusing on creating a narrative within a game the quests often serve a great tool to tell a story while at the same time giving the player exciting challenges. When you talk about a quest in a literary context it can be described as the journey for the hero towards a goal [5]. In video games quests have been similarly described by Howard [10] as completing challenges to achieve a meaningful goal, or as described by Doran & Parberry [6] as challenges found in RPG games for the player to complete in return for some reward. Whatever way you twist it the quest is often described as some type of journey for a hero character, and in video games the hero character being the Playable Character (PC). This journey works as a strong foundation to create a story and play a big part in giving a narrative to a reader of a book or the player of a video game. In literature one of the oldest journeys is the story of the knight in shining armor who sets out on a quest to rescue a princess [5]. This story is similar when looking at a lot of famous video game titles for example: The Legend of Zelda where the hero Link sets out on a quest to help princess Zelda or Super Mario where the hero Mario's goal is to rescue Princess Peach. While these examples have the narrative element as a part of the quest, it's not possible to claim that the narrative element has to be a part of the definition. Yu Et.al [11] makes a great attempt at trying to find a general definition with fifteen researches in mind, and find that the definitions vary a lot depending on the angle of the research and the requirements of the system being studied. Their findings make a great contribution by generalizing quests based on a selection of quest elements most commonly found, and narrative is one of them.

In the work of Jeff Howard [10], he shows a three term synergy in the structure of a quest: "Quest, Quest Narrative and Questgame", here the quest game is the game itself, the quest narrative is the story being presented and the quest as the action or task is taking place between the game and the narrative.

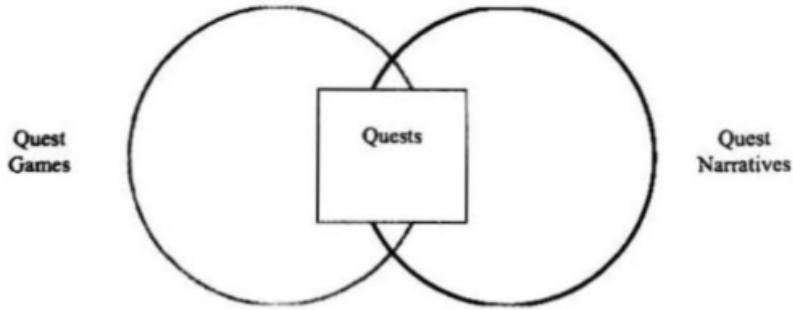


Figure 1: Relationship between quest game, quest narrative and quest

Figure 1 shows Howard’s overlapping relationship between the three terms and is a balanced way to describe how the quest game mechanics and the quest narrative are the two building blocks of a quest in a game. A contributing factor to the narrative in a quest is often provided by a motivation or backstory. This backstory for the quest is usually provided by NPCs within the game and are embedded in a piece of narrative that makes the set of actions make sense given the NPC and the current world state [4].

The NPC are the characters in a video game that are not operated by a player, they play a big part in many video games as some sort of population for the game world. The NPCs have a major role in upholding immersion of the computer game, where their behaviour creates immersive stories and exciting challenges Warpefelt[24]. NPCs in video games often have the same functions as extras in a movie, they have a role to populate the game world and make it believable. Howard [10] describes another use of NPCs featured in quest games, here the role is to interact with the player and provide the player with quests. Howard further describes these NPCs as existing solely to perform functions in relation to the player providing challenges for the player to complete. In World of Warcraft this type of NPC is frequently used, you can spot these quest-giving NPCs because of the conspicuous exclamation mark floating over their head [9]. These NPCs provide the player with a challenge but also provide a narrative element to the game with the help of the NPCs role in the game. A good example of this is made by Breault Et. al [4], where the authors talk about a NPC baker that runs out of bread and therefore asks the player to go and get him some wheat so he can bake some more bread. This way of giving the NPC a background explains why he provides the player with this specific task and that makes the NPC role more believable and the quest is provided with a simple narrative.

2.2 EDDy

EDDy is a mixed-initiative development tool used to create a dungeon game. EDDy allows the user to design 2D grid sized rooms and populate them by placing objects such as enemies, bosses, treasures, floors and walls. The rooms can be connected with the use of a door object and expand the dungeon with several rooms. EDDy presents two different possibilities to design and populate the dungeon, the first being to manually place the objects inside of the room and the second by choosing automatically generated rooms suggested by game design patterns, as seen in figure 2 and 3. Baldwin et. al [3] explains that the game design patterns are formed by a number of other patterns: micro, meso and macro patterns. Micro-patterns are described as “thin level slices in a 2D platform game” and exist as basic building blocks. A meso-pattern combines multiple micro-patterns to be applied on a larger structure. Macro-patterns are sequences of meso-patterns. Eddy uses micro and meso patterns to generate the room suggestions. Eddy’s micro-patterns are every existing object in the game and when combined, they create meso-patterns such as a guarded treasure or a chamber with a boss in the end.



Figure 2: Manually placing objects in EDDy

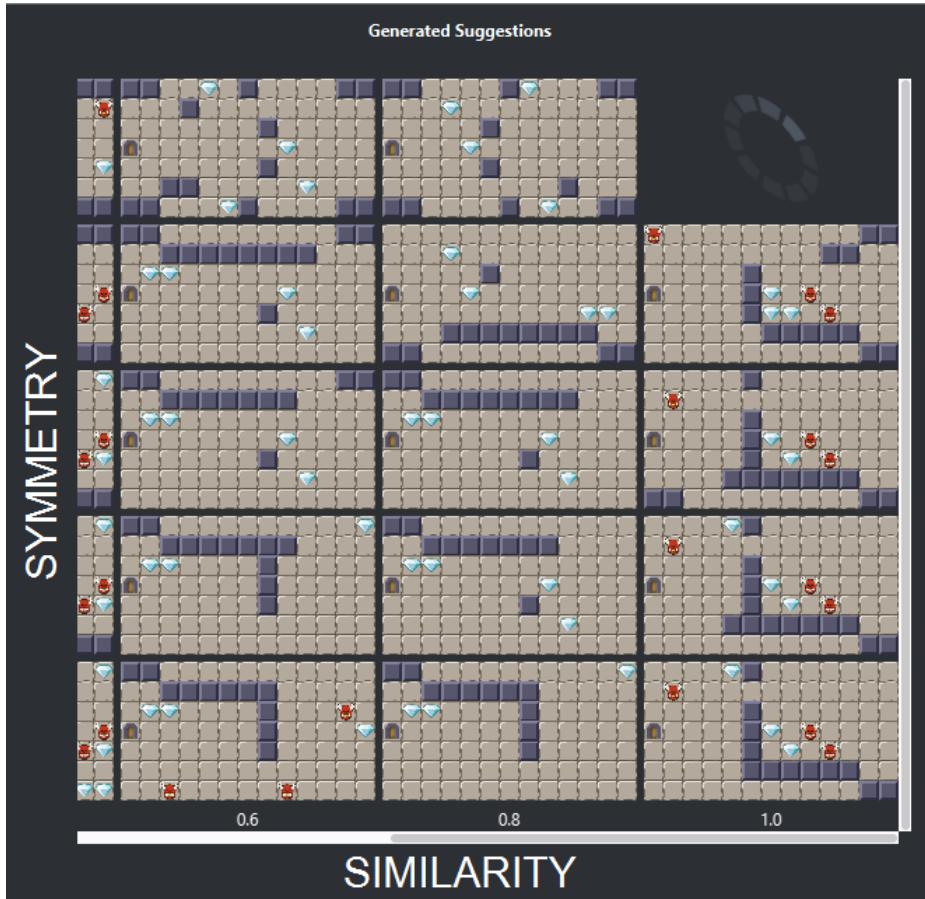


Figure 3: Generated rooms in EDDy

Alvarez et. al [2] states that EDDy's underlying evolutionary algorithm provides procedurally generated suggestions and is driven through the use of micro and meso patterns, can be seen in figure 2. The approach Alvarez et. al takes is named as “Interactive Constrained MAP-Elites”. The algorithm does not only provide the best suggestion but rather a map of good suggestions to pick from. The algorithm also keeps track of the manual changes made by the user and displays new suggestions continuously.

2.3 QuestGram

The artifact in this research is created as an expansion of a quest creation tool in EDDy called “QuestGram”. QuestGram is a Mixed-Initiative quest tool for the EDDy framework developed by Grevillius and Olsson [16]. QuestGram gives the user possibilities to create quest actions and chain these together when creating a level. The quest actions are based upon the atomic actions provided by Doran & Parberry [6] that use preconditions to define what action can be executed. The preconditions are used and modified to fit the EDDy system, table 1.

	Action	Pre-condition	Prerequisites in EDDy
1.	Capture	Somebody is there	A NPC or boss/enemy must be placed
2.	Damage	Somebody or something is there	An item or NPC must be placed
3.	Defend	Somebody or something is there	An item or NPC must be placed
4.	Escort	Somebody is there	A NPC must be placed
5.	Exchange	Somebody is there, they and you have something	A NPC and an item must be placed (requires two positions)
6.	Experiment	Something is there	An item must be placed
7.	Explore	None	An available floor tile
8.	Gather	Something is there	An item must be placed
9.	Give	Somebody is there, you have something	A NPC and an item must be placed (requires two positions)
10.	Goto	You know where to go and how to get there	An available floor tile
11.	Kill	Somebody is there	A boss/enemy must be placed
12.	Listen	Somebody is there	A NPC must be placed
13.	Read	Something is there	A NPC must be placed
14.	Repair	Something is there	An item must be placed
15.	Report	Somebody is there	A NPC must be placed
16.	Spy	Somebody or something is there	A NPC or boss/enemy must be placed
17.	Stealth	Somebody is there	A NPC or boss/enemy must be placed
18.	Take	Somebody is there, they have something	A NPC and an item must be placed (requires two positions)
19.	Use	There is something there	An item must be placed

Table 1: Olsson and Grevelius [16] atomic actions

The user has the possibility to pick from actions depending on if the object is existent in the game world. For example can the action “Kill” can only be picked if there is an existing enemy in the dungeon. After selecting a quest action it gets added into a quest sequence where the quest actions are added in the order they need to be executed.

2.3.1 Quest Motivations

In addition to the implementation of quest actions in QuestGram, Grevillius and Olsson [16] have also made use of the quest motivations mentioned by Doran and Parberry [6].

Motivation	Quests	Percent
Knowledge	138	18.3%
Comfort	12	1.6%
Reputation	49	6.5%
Serenity	103	13.7%
Protection	137	18.2%
Conquest	152	20.2%
Wealth	15	2.0%
Ability	8	1.1%
Equipment	139	18.5%

Table 2: Doran & Parberry [6] displays the percent of motivations that exist in the total amount of quests analyzed

Motivation	Description
Knowledge	Information known to a character
Comfort	Physical comfort
Reputation	How others perceive a character
Serenity	Peace of mind
Protection	Security against threats
Conquest	Desire to prevail over enemies
Wealth	Economic power
Ability	Character skills
Equipment	Usable assets

Table 3: Doran & Parberry [6] the description of the motivations

Motivation	Strategy	Sequence of Actions
Knowledge	Deliver item for study	<get> <goto> give
	Spy	<spy>
	Interview NPC	<goto> listen <goto> report
Comfort	Use an item in the field	<get> <goto> use <goto> <give>
	Obtain luxuries	<get> <goto> <give>
Reputation	Kill pests	<goto> damage <goto> report
	Obtain rare items	<get> <goto> <give>
	Kill enemies	<goto> <kill> <goto> report
Serenity	Visit a dangerous place	<goto> <goto> report
	Revenge, Justice	<goto> damage
	Capture Criminal(1)	<get> <goto> use <goto> <give>
	Capture Criminal(2)	<get> <goto> use capture <goto> <give>
	Check on NPC(1)	<goto> listen <goto> report
	Check on NPC(2)	<goto> take <goto> give
	Recover lost/stolen item	<get> <goto> <give>
Protection	Rescue captured NPC	<goto> damage escort <goto> report
	Attack threatening enteties	<goto> damage <goto> report
	Treat or repair(1)	<get> <goto> use
	Treat or repair(2)	<goto> repair
	Create Diversion	<get> <goto> use
	Create Diversion	<goto> damage
Conquest	Assemble fortification	<goto> repair
	Guard Entity	<goto> defend
Wealth	Attack enemy	<goto> damage
	Steal stuff	<goto> <steal> <goto> give
Ability	Gather raw materials	<goto> <get>
	Steal valuables for resale	<goto> <steal>
	Make valuables for resale	repair
	Assemble tool for new skill	repair use
Equipment	Obtain training materials	<get> use
	Use existing tools	use
	Practice combat	damage
	Practice skill	use
	Research a skill(1)	<get> use
	Research a skill(2)	<get> experiment
Equipment	Assemble	repair
	Delivier supplies	<get> <goto> <give>
	Steal supplies	<steal>
	Trade for supplies	<goto> exchange

Table 4: Explanation of motivations displayed by Doran and Parberry [6]

These quest motivations are discussed in Doran and Parberry's research [6] and can be seen in tables 2,3,4 . In table 3 they describe the origin of the quest motives and how they are categorized, in table 2 they show the distribution of the quest motives with a percentage based analysis of how many are distributed in the games analysed in their research [6]. In table 4 they show the strategies for each of the NPC motivations and how they can be combined with the actions. The implementations made by Grevillius and Olsson [16] make use of the motivations as a base when creating their 19 different quest actions in the QuestGram tool as seen below in table 5.

Production rules	Actions
knowledge*	[”<get>”, ”<goto>”, ”give”], [”<spy>”], [”<go_to>”, ”listen”, ”<go_to>”, ”report”], [”<get>”, ”<go_to>”, ”use”, ”<go_to>”, ”give”]
comfort*	[”<get>”, ”<go_to>”, ”give”], [”<go_to>”, ”damage”, ”<go_to>”, ”report”]
reputation*	[”<get>”, ”<go_to>”, ”give”], [”<go_to>”, ”<kill>”, ”<go_to>”, ”report”], [”<go_to>”, ”<go_to>”, ”report”]
serenity*	[”<go_to>”, ”damage”], [”<get>”, ”<go_to>”, ”use”, ”<go_to>”, ”give”], [”<get>”, ”<go_to>”, ”use”, ”capture”, ”<go_to>”, ”give”], [”<go_to>”, ”listen”, ”<go_to>”, ”report”], [”<go_to>”, ”take”, ”<go_to>”, ”give”], [”<get>”, ”<go_to>”, ”give”], [”<go_to>”, ”damage”, ”escort”, ”<go_to>”, ”report”]
protection*	[”<go_to>”, ”damage”, ”<go_to>”, ”report”], [”<get>”, ”<go_to>”, ”use”] [”<go_to>”, ”repair”] [”<get>”, ”<go_to>”, ”use”] [”<go_to>”, ”damage”] [”<go_to>”, ”repair”] [”<go_to>”, ”defend”]

Table 5: Description of how a quest can look like for these motivations explained by Doran and Parberry [6]

The motivations in table 5 are used as a starting point for the quest in the QuestGram tool, to decide what type of quest is being created. For example the motivation Knowledge would be used as the motivation for the quest that categorizes with a more passive action gaining knowledge, and the action such as killing an enemy would be associated with reputation.

3 Methodology

3.1 Research design

In this thesis we have made use of the Design Science Research Methodology (DSRM) [17]. This methodology includes the creation and evaluation of an artifact, alongside the research being made. This research aims at using NPC roles to find and evaluate a way to create the relationship between quest game and quest narrative described by Howard [10] in figure 1. These NPC roles will be implemented in the QuestStories tool that will be designed with the help of secondary data received from related work and by analysing the structure and design of the NPC roles in related games. The DSRM process for this thesis has followed six steps mentioned by Peffers Et. al [17]:

3.1.1 Problem identification and motivation

When studying the previous work [1,4,6,9–11,13] the implementation of a quest in video games often has a close relationship with a narrative element. The narrative element is an important contributor to make quests immersive and believable [1]. Also in the game analysis of three famous RPG titles done for this study, there is a clear pattern to tell a story to the player. This story is often told with the use of NPCs within the respected game titles. The intention for this study is to improve the QuestGram tool in the EDDy framework, and add the possibilities for the user to create quests with a simple narrative.

3.1.2 Define the objective for a solution

The artifact for this thesis is not designed for an in-game system but rather a game-designer system, therefore the elements used to solve the issue with the narrative creation exists outside of gameplay. Since the predecessor for QuestStories, the QuestGram tool has made use of the quest structure described by Doran & Parberry [6] the implementation of QuestStories follows a similar structure. The new version QuestStories has made use of the NPC object and the quest actions already existing within the system. The tool's intention is to give the user possibilities to create roles for the NPCs, these roles are tied to different quest actions depending on the role. This thesis creates and evaluates the user experience using QuestStories and compares it to the use of the QuestGram tool. The evaluation will be done with the help of human testing to see if the narrative element was existent in the new design.

3.1.3 Design and development

The design of this artifact has followed the same structure of implementation as the QuestGram tool and extended it with added possibilities for the user. The quest actions will follow a more structured path with use of the NPC as a quest giver. The quest actions will be dependent on the NPC role and restrict the user in order to create more cohesive quests. The restrictions surround the NPC where the "Listen" action functions as the player picking up a quest and the "Report" action as the player delivering a quest. The remaining quest actions are the core of the quest, what the player needs to do to be able to complete the quest. These quest actions belong to the quest motivations mentioned by Doran & Parberry [6] and are tied to a specific NPC quest giver.

3.1.4 Demonstration

The artifact will be used to perform a user study, an interview and a questionnaire regarding the QuestStorie and QuestGram tools. The user study will provide the research with necessary qualitative data corresponding with the measurement displayed in table 6

3.1.4.1 Measurement

To evaluate the QuestStories tool the focus was on the user experience, therefore the data that needed to be collected needed to be non-statistical and open-ended. The qualitative attributes used in this evaluation is displayed in table 6, and was used to compare the difference between the user experience using QuestStories and the previous version QuestGram.

Quality attributes	Explanation
Usability	How did the user perform using the different tools
Customizability	Was the user allowed to customize the quests as they wanted?
Appreciation	Did the user understand the difference of the two tools and did they appreciate the need of having QuestStories implemented.
Complexity	Is there a difference in the complexity of the quests created using the two different tools.
Creativity	How did the tools elements allowed the user to create the narrative they thought of in the game.

Table 6: Measuring data with an explanation of the quality attributes used in the user study.

3.1.4.2 Data Collection

The data collected to this research project has been collected by observing and interviewing the users testing the artifact.

- Observation - This step is intended to provide the research with qualitative data using a think-aloud method [19]. While the user is testing the QuestGram and QuestStories tools, they are recorded and encouraged to think out loud.
- Interviewing - This step is intended to collect complementary qualitative data. The interview has been semi structured with a set of questions with the option to deep dive for clarification if needed.
- Questionnaire - This step is intended to collect personal data about the test person.

3.1.4.3 User Study

To be able to evaluate the quality of the artifact created there first needs to be a collection of data that can be evaluated. In this case the data that needs to be collected concerns the use of the artifact QuestStories, this data needs to be both qualitative data and quantitative data and therefore a user study is to be preferred over an automated test for example.

The testing in this research was performed with a focus group aged 18-35, with five or more years of gaming experience to take part in this study, they also needed to know what a quest and an NPC was. The tests were mainly performed in person or in some cases by the use of Video Chat services. The reason behind some of the tests being performed over distance was caused by the Covid-19 pandemic and the recommendations by the Swedish Government.

Structure of the User study

- Consent: Firstly the test person has to agree to be recorded and that the data collected from the tape, interview and questionnaire can be used in the study.

- Questionnaire: The test person will have to fill out a questionnaire in google forms. The questions are put in place to get some information about the test person before they try out the artifact. The questions can be seen in the appendix, section A.
- Guided tour: The test person will be given a short preview of the two tools QuestGram and QuestStories. The test leader will show a quick preview where one of each possible tile type is placed in a room. Afterwards the test leader will show how to place quest actions in the room created and what the different menus does in the quest view seen in figure 24.
- The test start in Room View: The test person will be given a dungeon with three rooms. After that the test person creates doors however they want between the three rooms. After this they enters the room view and have the possibility to edit the room and place objects, enemies and NPCs as they see fit.
- Quest View: The test person is pleased with the amount of objects and characters in the rooms and enters the quest view and starts designing quest-chains. In this step it is very important that the person thinks out loud to give the observer a better understanding of what they are trying to create and why.
- Finishing up: The test person is pleased with what they have created and does presents a walk-through of how the quests are executed, every additional narration and imagination is encouraged. After the walk-through a snapshot of the dungeon they have created is taken by the observer for later study.
- Interview: The test person is afterwards interviewed by the observer following the semi structured interview with the possibilities to deep dive into questions about the test and why they did or said specific things when creating their quests. The questions can be seen in the appendix, section B.
- The End: The test ends and the recording stops.

3.1.4.4 Observation

In the testing of the artifact this study will use a think-aloud protocol to acquire more qualitative data while observing the users. The method is used to obtain data about the cognitive process [19] and it is important to focus on a small set of problems when testing. The focus will be on the testers' thought process such as when they create a quest, what they are trying to create? Why do they use a certain NPC?, how the system influences their creativity? and what kind of game and narrative have they created? The think-aloud process is also a great method when recording since it gives the opportunity to transcribe after the session without missing anything [19] and also to look back and analyse the test better over time.

3.1.4.5 Questionnaire

This questionnaire will follow the guidelines proposed by Gill Marshall [15] in her article on how to conduct and analyse a questionnaire. The questions have been divided into two parts: personal questions and questions regarding the test. The second part of the questions has been put into place to collect more quantified data as a complement to the qualitative data collected in the user study and the interview part. The questions in this section is regarding the test persons programming experience as well as their opinion on common RPG elements.

3.1.4.6 Interview

In this paper the semi structured interview is a fitting method because of the possibility to dig further

with some interviewees than others. Longhurst [14] describes that a semi structured interview should stay reasonably informal and has the possibility to be flexible in that they can be handled online or in person and can be used in conjunction with other methods. The researcher needs to formulate questions that are relevant to the theme that the interviewer wants to find answers to. Kvale [12] explains that the questions should be brief and simple. That the introductory question may concern a specific situation, e.g. “Whether the student remembered the first time she ever had any grades”. That was later followed up depending on the answer. In this paper this is an important interview point since the users might need further questioning to figure out why they said or did a specific thing during the think-aloud test.

3.1.5 Evaluation

The objectives provided in step two will be compared with the qualitative data found in step four, this to evaluate if there were improvements regarding the narrative created in the created artifact. The evaluation is done for each user with a combination of the think-aloud observation and the follow up interview. Each user will then be rated by the test-leaders on a scale from one to five for each quality attribute mentioned in section 6. After each test person from the user study is rated an average rating for each quality attribute is given to the two tools QuestGram and QuestStories

3.1.6 Communication

The artifact was created with the intention to answer the questions about how a simple narrative could be implemented into an EDD tool like EDDy. The Findings are discussed and reported in results 6 and discussion in 7 and can be used for future research and further development of the QuestStories tool.

4 Game Analysis - NPC and Quest

This section of the research provides a quest analysis of three famous game titles that rely heavily on quests that make use of the NPCs as interactable “quest givers”. As seen in related work [1, 4, 6, 9–11, 13], the RPG genre is very commonly used when discussing quests. This analysis is done using three RPG titles that rely heavily on quests. The games used for this analysis are listed below:

- WoW (World of Warcraft) [8] - An MMORPG by blizzard entertainment where the player plays in an online environment for one of the two factions the Horde or the Alliance
- Skyrim [7] - A single player fantasy RPG by Bethesda studio, the fifth and one of the most popular games in the Elder Scroll series.
- AC Valhalla (Assassins Creed Valhalla) [18] - A single player RPG by Ubisoft, the twelfth major installment in the AC series, is a fictional story set during the viking invasion of Britain.

The three games chosen for this analysis have many similarities but also a few differences this is displayed in table 7.

The quests found in this analysis have been divided into four common category of quests, Action Quests, Magical Quests, Bounty Quests and Civilian Quests.

	World of Warcraft	Skyrim	Assassins Creed Valhalla
Developer	Blizzard	Bethesda Game Studios	Ubisoft
Year	2004	2011	2020
RPG genre	✓	✓	✓
Fictional environment	✓	✓	✓
Relies heavily on quests	✓	✓	✓
Singleplayer	✗	✓	✓
Multiplayer	✓	✓	✗
Class based	✓	✗	✗
Some sort of skill tree	✓	✓	✓
Players have choices in quests	✗	✓	✓

Table 7: Similarities and differences of the three analyzed games

A generalized quest definition was made by Yu. et al [11], and consists of a 4-tuple description of the in game mechanics for completing a quest. The authors use the four tuples (C,M,I,R) to analyse quest in the game Animal Crossing.

- C = Condition to complete quest task
- M = System monitoring the player progression
- I = Information given to the player about the task
- R = Reward received upon the quest completion

This four tuple model has been taken into consideration when creating a quest analysis template, this figure 4 is used to present the players progressions through a quest. The steps in figure 4 are used in this analysis for all four quest categories displayed in table 9.

- C = Step 1, the player is given the task with the condition of the quest

Action Quest	Conflict quest, eg. an encounter where fighting is involved.
Magical Quest	Conflict & non-conflict quest, eg. an encounter or task involves some magical feature.
Bounty Quest	Conflict quest, eg. the player has to kill something or get something back.
Civilian Quest	Non-conflict, eg. the player gets a mundane task by offering assistance.

Table 8: Quest categories explained

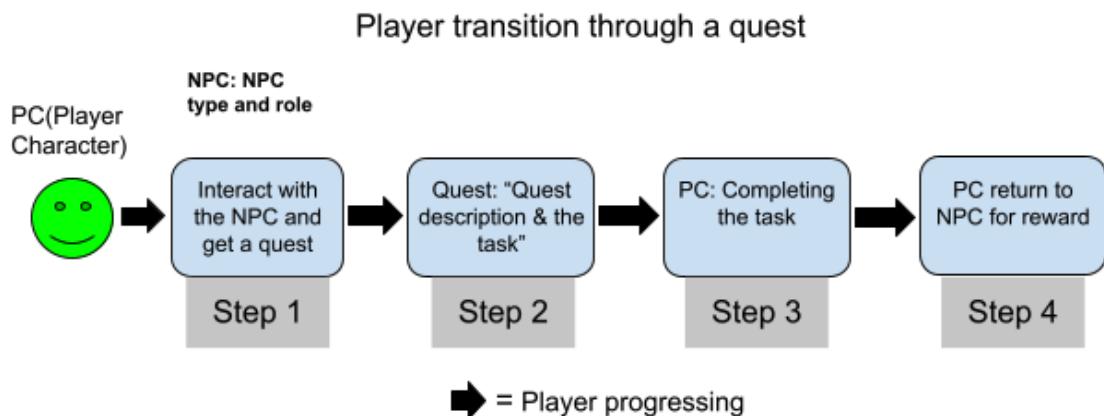


Figure 4: Quest Analysis Template

- M = Step 1-4, the system monitoring the player progression throughout the quest.
- I = Step 2, the information given to the player about the quest
- R = Step 4, the reward received upon the quests completion

In step one the player is given the task with a condition by the NPC. In step two the quest description is provided to the players quest log. In step three the Monitoring system has tracked the progression of the player so the player now has completed the condition of the quest and lastly in step 4 the player hands in the quest to receive the reward(R).

4.1 Action quests

An action quest is a general description of a quest that has a conflictive nature. The player has to execute some conflictive action eg. damage, defend, destroy or escort to complete the task. These types of quests are often given to the player by a soldier-like character within the games, the soldier is connected with a conflictive motive but with an honorable intent and the quests given will more than often follow that nature.

Example Wow: The player is given a mission by a soldier character called Forward Commander Kingston. He gives the player a quest to use an explosive item to damage a demon gate from which the enemy are receiving reinforcements. This is shown in figure 5.

Quest description: Disrupt their reinforcements

"Defeat enemies around Portal Grimh and Portal Kaalez to gather Demonic Rune Stones. Use Kingston's Primer inside Portal Grimh and Portal Kaalez to close it off. Return to Forward Commander Kingston with the remaining explosives."

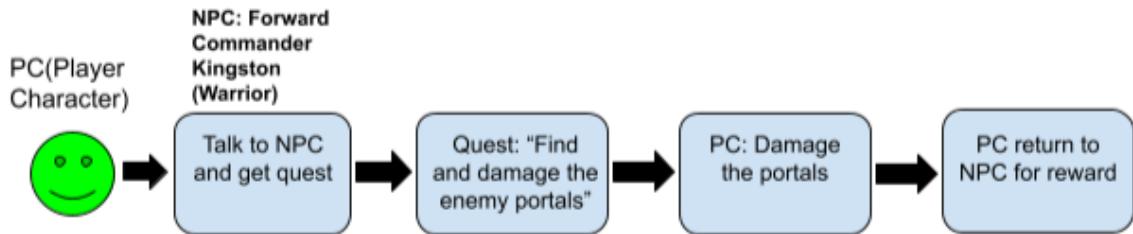


Figure 5: Quest steps for "Disrupt their reinforcements"

Example Skyrim: The player is given a quest by Skjor or Vilkas, two nord-warriors that tells the PC to rescue and escort some citizens back to their hometown. This is shown in figure 6.

Quest description: Rescue mission

"Either Vilkas or Skjor has received notice that someone has been kidnapped, and the Companions have been asked to attempt a rescue. He will send you to the location of the kidnapped individual and tell you to free them from the location and then escort them to their nearby home"

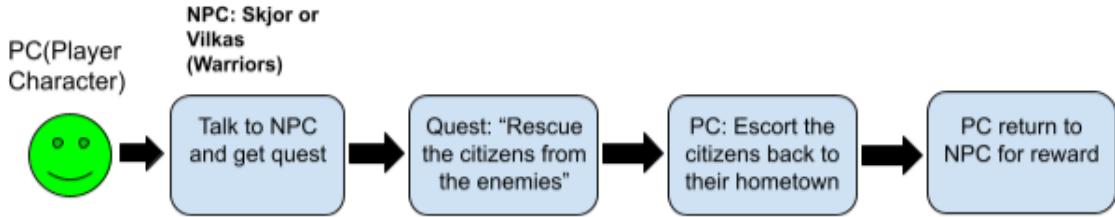


Figure 6: Quest steps for "Rescue mission"

Example AC Valhalla: The PC meets Björn, a Berserker Warrior; he asks the player to find his bear Njal and bring her back. The PC finds the bear and defends it and Björn against attacking soldiers. This is shown in figure 7.

Quest Description: The mysterious berserker

"Fish for bullhead trout (fish) for Njal after defending Njal from the attacking soldiers, after that return to Björn and defend him from the soldiers."

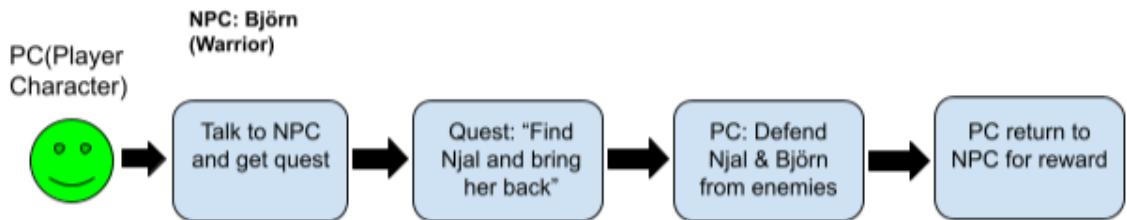


Figure 7: Quest Steps for "The mysterious berserker"



Figure 8: Quest givers of action quests, from left to right - Kingston(Wow), Vilkas and Skjor(Skyrim), Björn(AC)

4.2 Magic quests

In the fantasy RPG genre, magic is a common part of the world, characters and factions within the magical realm often operate in a more mystical part of the game. Therefore the quests given are of the supernatural nature. These quests are given to the PC by an NPC with magical abilities e.g warlock, wizard, shaman and enchanter. The quests can be action based, but unlike the quests given to the PC by the soldier, the magical quests are completed by performing magic or defending against a magical creature. A magical quest can also be a non conflict quest where the PC is asked to retrieve a magical item. The motive of the quests are more than often to give the player knowledge or skill within the magical trait of the quest giver.

Example Wow: The PC is given a quest by a warlock, a magical class within Wow. The quest is divided into two parts. The first part is about finding a magical item. The second part is about using the item to summon a magical creature "a voidwalker", if the PC kills the voidwalker, the PC will be able to learn how to summon a voidwalker of his own. This is shown in figure 9.

Quest description: Surena Caledon / The Binding

"I had a student named Surena Caledon. She stood where you stand now, eager to learn of warlock magic, and possessing no small bit of talent. The thieving wench ran off with one of the Defias, Erlan

Drudgemoor. While her loss is of little importance, I gifted her a bloodstone choker that I must have. By retrieving my choker and besting Surena, you've proven that you're at least as capable as she was. With that said, I can tell you're direly in need of training. You can manage the flows of magic, yes, but being a warlock is much more than that. Use the magic of this choker at the summoning circle below."

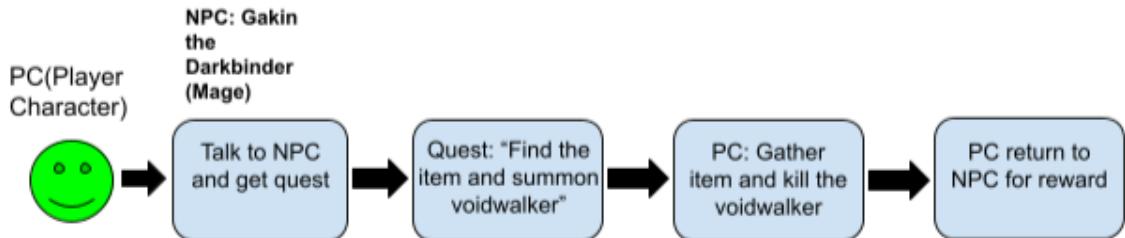


Figure 9: Quest Steps for "Surena Caledon / The Binding"

Example Skyrim: The player meets Urag gro-Shub, a member of the magic guild in Skyrim, and he asks the player to retrieve a couple of stolen magical books. This is shown in figure 10.

Quest Description: Hitting the books

"With Tolfdir still occupied in Saarthal, I need to speak to Mirabelle Ervine to find out about researching the discovery in Saarthal."

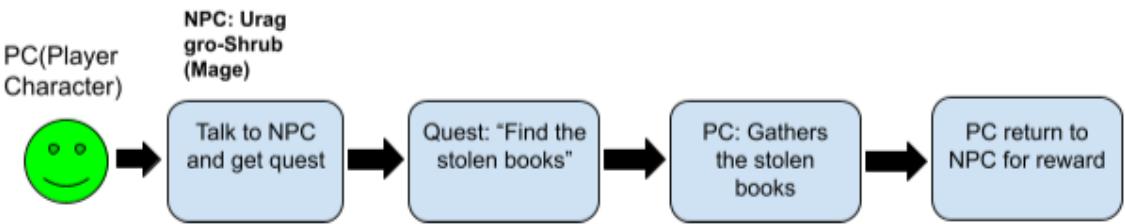


Figure 10: Quest Steps for "Hitting the books"

Example AC Valhalla: In Valhalla there are fewer magical characters than in the two other games, but there is a shaman character you talk to called Valka. The PC is asked to bring magical flowers for an elixir so the player can enter the realm of the gods. This is shown in figure 11.

Quest description: Find Flowers for Valka *"Collect the plants for Valka's potion. You'll need to find five Thistle to complete this objective. You can find two at the base of the waterfall, two on top of the waterfall, and a fifth Thistle halfway up the waterfall on the cliff. They'll be marked with the teal objective marker. Once you have all the Thistle you need, return to Valka. When you're ready, drink the potion she has just made for you and prepare for a vision."*

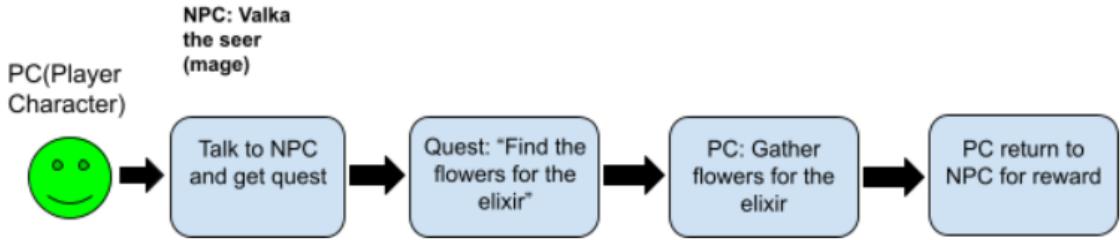


Figure 11: Quest Steps for "Find Flowers for Valka"

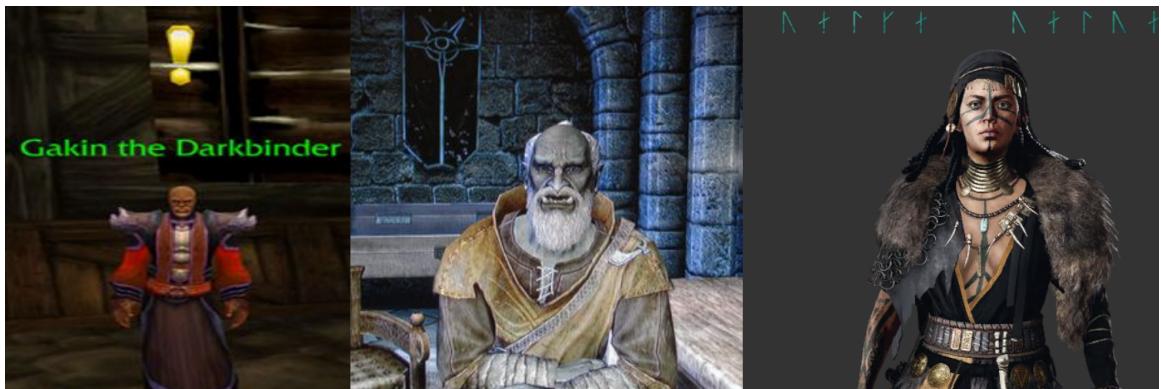


Figure 12: Quest givers of magic quests, from left to right - Gakin(Wow), Urag gro-Shub(Skyrim), Valka(AC)

4.3 Bounty quests

Bounty and collection quests are quite similar in terms of goals and missions. Players in both quests have to contact NPCs for information, then collect certain numbers of specific things by exploration, or defeat opponents [13]. These quests could be both action or collection based, and are given to the player by a Sheriff-like NPC or by a wanted poster on a so-called "bounty board".

Example WoW: In WoW the bounty quests are picked up by interacting with a bounty board in game. A well known low level bounty is the Hogger Bounty quest where the player is asked to find "Hogger", kill him and bring back proof. This is shown in figure 13.

Quest description: Wanted: "Hogger"

"A huge gnoll, Hogger, is prowling the woods in southwestern Elwynn. He has overpowered all attempts at his capture. The Stormwind Army has placed a generous bounty on the Gnoll. To earn the reward, bounty hunters should bring proof of Hogger's demise to Marshal Dughan in Goldshire."

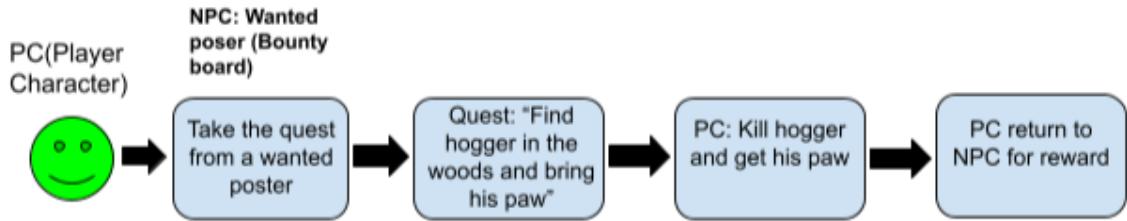


Figure 13: Quest Steps for Wanted: "Hogger"

Example Skyrim: In Elder-Scroll Skyrim the bounty quests are solely a kill quest, obtained by acquiring a bounty note. The most common way to acquire one of these notes would be to visit the local Jarl's steward that upholds the order in town. One of the notes tells the PC to find a dragon and kill it. This is shown in figure 14.

Quest description: Kill The Dragon

"To all the able bodied men and women. The dragon [...] has been harassing citizens and visitors. A reward shall be offered to anyone who kills it."

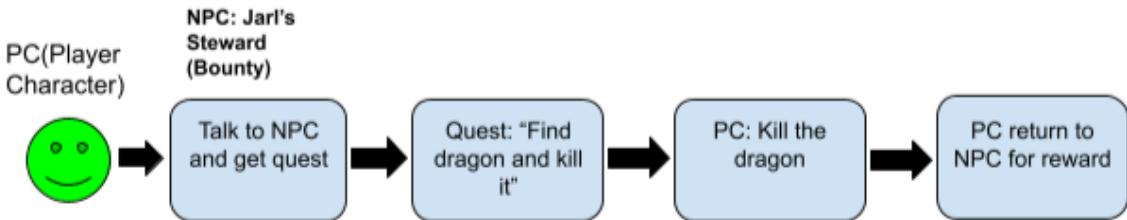


Figure 14: Quest Steps for "Kill The Dragon"

Example AC Valhalla: In Assassin's Creed the bounty system works a little differently from the two other games. The bounty system is a menu based bounty board within the game called Order Of The Ancients. In this menu the player can find the targets that need to be killed and also hints about how to gather clues to find undiscovered targets. This is shown in figure 15.

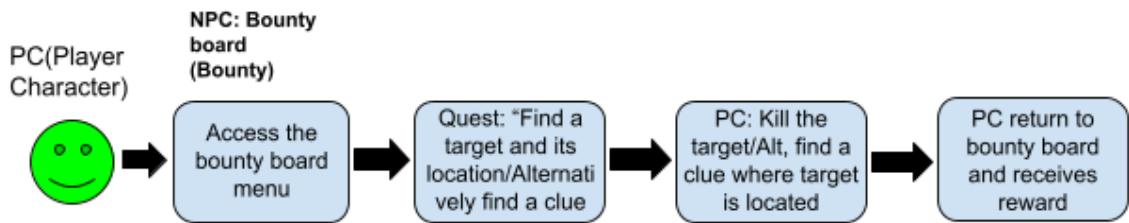


Figure 15: Quest Steps for picking up bounty quest in Assassins Creed

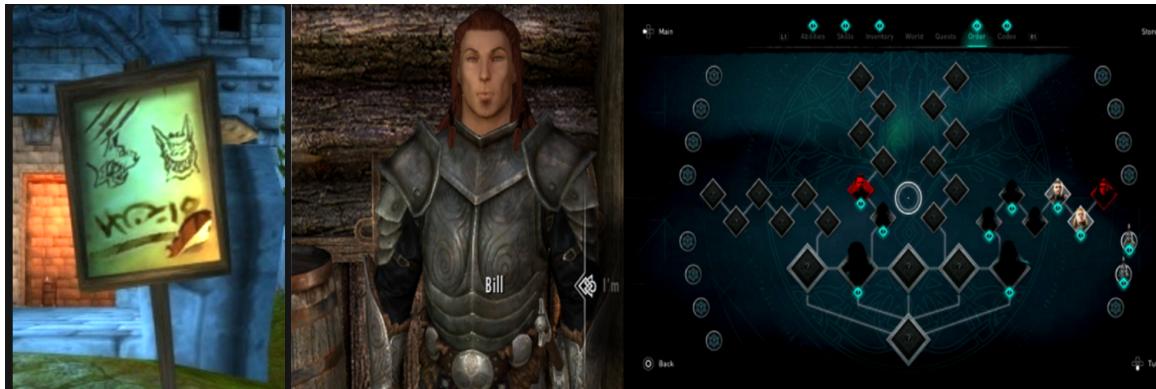


Figure 16: Quest givers of bounty quests, from left to right - Bounty board(Wow), Sheriff(Skyrim), Bounty system(AC)

4.4 Civilian quests

The quests given by civilians are often of the non conflictive nature, the player is asked to assist the civilian NPC with some mundane task for example: gather or repair something. The civilians can be both regular NPCs E.g a lonely woman or an old man just wandering the game and NPCs with a profession as a trait, E. g blacksmith or farmer.

Example WoW: The PC meets a farmer called Gerard Tiller. Gerard asks the player to get him some water so he can continue his farming work. This is shown in figure 17.

Quest description: Give Gerard a drink

"Farming is thirsty work, and I'm always looking for refreshing spring water. If you have any, then I'm willing to make a trade."

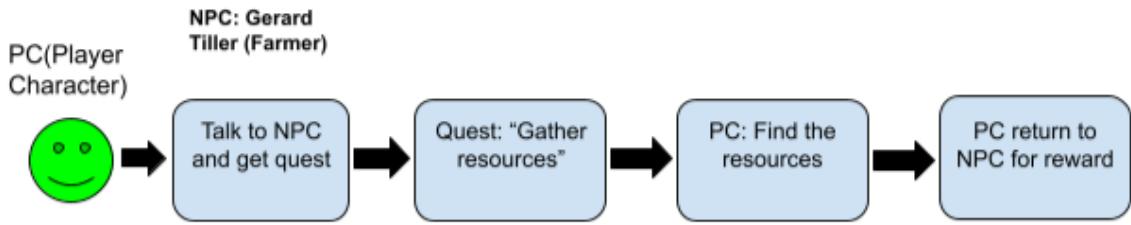


Figure 17: Quest Steps for "Give Gerard a drink"

Example WoW: The PC meets the kids Shawn and Nida on a bridge. They ask the player to collect Nida's necklace that she lost in the river. This is shown in figure 18.

Quest description: Nida's Necklace

"My friend Nida lost her necklace, and we can't find it. We've been fishing all day right here, and we looked around here already. The only thing I can think of is that it fell into the lake. Our parents don't want us to swim in the lake... my mom says there's some mean things underwater, but you look like you aren't scared of mean things. Could you find it for her, please?"

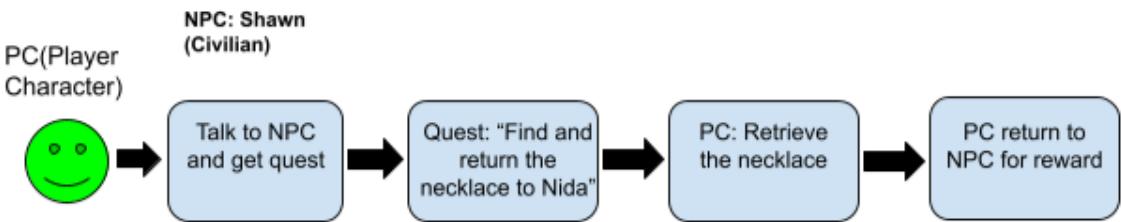


Figure 18: Quest Steps for "Nida's Necklace"

Example Skyrim: The PC meets the nord blacksmith Balimund. Balimund asks the player to find the resources for him to start up his forge. This is shown in figure 19.

Quest description: Stoking the flames

"If you speak to Balimund at his forge in the center of Riften and ask him about how proud he is of his work, he will tell you that the forge is not as good as it used to be. It is supposed to run on fire salts, but they seem to be wearing off. He estimates that he needs ten fire salts to get the forge back to its original strength."

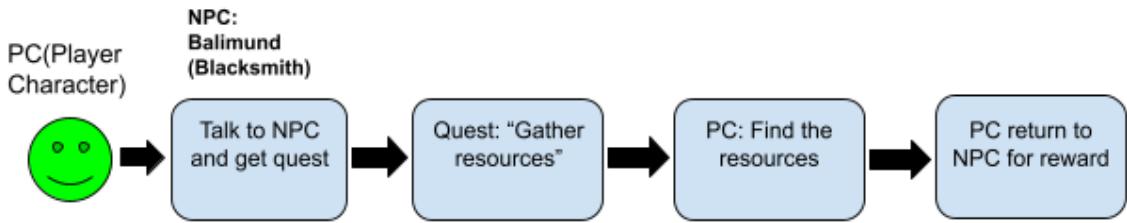


Figure 19: Quest Steps for "Stoking the flames"

Example AC Valhalla: The PC meets a girl by a pond who has lost her brother. She asks the player to help her find him. This is shown in figure 20.

Quest description: Fishing Lesson

"The girl asks the PC to help her search for her brother who magically has turned into a fish. The PC needs to fish to help the little girl."

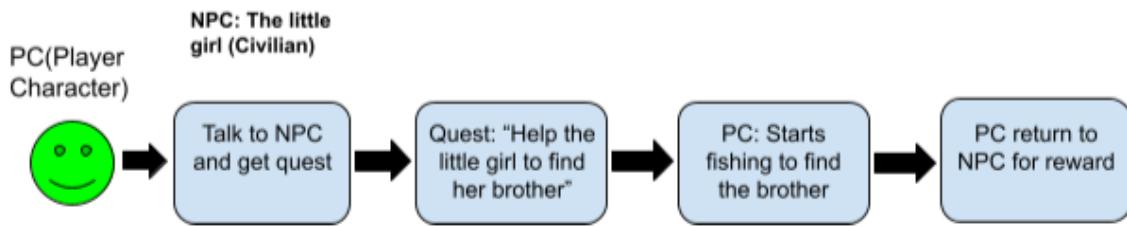


Figure 20: Quest Steps for "Fishing Lesson"

4.5 Quest Analysis Conclusion

This quest analysis is done on games developed across a fifteen year period so the quest system is varying between the games. A big difference with the more modern RPGs like Assassin's Creed Valhalla is the length and complexity with the possibility for the player to pick from multiple choice how they want to execute and respond during the quest.

This analysis shows the similarities in the structure of the different quest categories in the RPG titles, but also how the nature of the quest changes depending on the category. Another interesting conclusion to draw from the analysis is the usage of the different NPC characters depending on the category of the quest. For example: a quest where the player is asked to perform a conflict action for instance: defending a character or damaging an enemy are often given to the player by a soldier like character. With the use of NPC roles, the player is informed with what category the quest belongs to by just looking at the NPC, even before picking up the quest.

Since this study focuses on NPC features that can be added to a system, but still effect the narrative aspects of a quest even before the game starts. With this conclusion this study presents the usage of generalized NPC quest giver roles, that can be combined with a specific quest category.



Figure 21: Quest givers of civilian quests, from left to right - Tiller(Wow), Shawn(Wow), Balimund(Skyrim), The little girl(AC)

All the games use the NPCs to provide the player with quests in all categories apart from the bounty category. The bounty quests are existent in all of the listed titles and there are similarities in the nature of the quest. The biggest difference is the way the player picks up the bounty quest. In the oldest of the games, WoW, the developers have made use of in-game objects called bounty boards or wanted posters where the player can pick up the quest. In Skyrim they instead make use of a sheriff-like NPC that provides the quest. But the biggest difference is the Assassin's Creed game where they have an accessible menu for the player, where they can get information about the different. Since the implementation done in this study is made with the use of NPC characters and not objects and menus, therefor the bounty quests will make use of a character.

4.6 NPC roles

The creation of the NPC roles is an important part to create believability [1] to the quests being given to the player. The believability becomes more significant when the NPC is given a role that is related with the task they give to the player, as mentioned in the example of the baker NPC asking the player to find more wheat [4]. The NPC roles given to each quest category is displayed in table 9 and is used in the implementation of QuestStories.

Quest type	NPC type
Action Quest	Soldier NPC
Magical Quest	Mage NPC
Bounty Quest	Bounty NPC
Civilian Quest	Civilian NPC

Table 9: The connection between quest types and NPC types

Role	Actions	Motives
Soldier	<ul style="list-style-type: none"> • Defend • Damage • Capture • Escort 	<ul style="list-style-type: none"> • Protection • Comfort • Serenity • Conquest
Mage	<ul style="list-style-type: none"> • Read • Damage • Use • Experiment 	<ul style="list-style-type: none"> • Knowledge • Comfort • Serenity • Conquest • Ability • Protection
Bounty	<ul style="list-style-type: none"> • Gather • Kill • Spy 	<ul style="list-style-type: none"> • Wealth • Reputation • Knowledge
Civilian	<ul style="list-style-type: none"> • Gather • Repair 	<ul style="list-style-type: none"> • Wealth • Equipment

Table 10: The roles combined with their motives and actions

In the quest analysis done for this thesis we found four common NPC types used as quest givers for each of the four quest categories displayed in table 9. The base system that QuestStories was built upon already made use of a set of quest actions taken from the sequence of actions column in table 4. This quest analysis was used to pair the respective motive and actions displayed in table 10, and pair them with the four NPC roles found in the analysis.

4.6.1 The Soldier

The Soldier is a common figure in RPG games, although the title can vary from game to game with various names like Knight, Grunt, Warrior and Berserker to mention a few. The role of this quest giving NPC is to hand out conflictive action quests, and was therefore paired up with the quest actions “Escort”, “Damage”, “Defend” and “Capture”. Based on the motives used by Doran & Parberry [6] the soldiers quest actions gave him the motives: “Protection”, “Comfort”, “Serenity” and “Conquest”.

4.6.2 The Mage

The Mage character is also a common figure found in RPG titles, the mage title is a more general name for the NPC type that can be found in games eg. Wizard, Warlock and Shaman. The role of this quest-giving NPC is to hand out conflictive and non conflictive actions quests, and was therefore paired up with the quest actions “Read”, “Damage”, “Use” and “Experiment”. Based on the motives used by Doran & Parberry [6] the mage quest actions gave him the motives: ”Protection”, “Comfort”, “Serenity”, “Knowledge”, “Ability” and “Conquest”. In some way the mage character is similar to the soldier but since the purpose found in the quest analysis often is more magical and mystical we divided them into two roles.

4.6.3 The Bounty Hunter

As found in the quest analysis of this thesis the bounty quests are something that are existent within most RPG games. The purpose of this quest is to gather or kill something in the game, and was therefore paired up with the quest actions “Gather”, ”Spy” and “Kill”. Based on the motives used by Doran & Parberry [6] the bounty quest giver has the motives: ”Wealth”, ”Reputation” and ”Knowledge”. The biggest difference from the other quests analysed in the quest analysis of this study is regarding the quest giver or the pickup method of the bounty quests that differ from game to game. Here the games vary between the use of an NPC character, Bounty board or even in some cases a menu to access these quests. This implementation will make use of an NPC for quest pickups, therefore the general bounty quest giver is an NPC character called bounty hunter.

4.6.4 The Civilian

The civilian quest giver is the general definition used for all noncombatant friendly characters in games. The role of the civilian NPC is to hand out non-conflictive quests where the player assists the friendly NPC. In bigger RPG titles the civilian NPCs can be divided into two groups, workers and bystanders and the purpose of these characters is to ask for the player’s assistance for example workers would ask the player to repair something or gather materials while the bystander would ask the player to collect or find something. Since the implementation was done in a smaller scale system for this thesis, the civilian character will be the generic type representing both bystanders and workers. Therefore the character is paired up with the quest actions “Gather” and “Repair”. Based on the motives used by Doran & Parberry [6] the Civilian quest giver has the motives: ”Wealth” and ”Equipment”.

5 Implementation

The implementation for this thesis is done using the Java programming language. The QuestStories implementation is made as an expansion of the EDDy system in Java. The version of EDDy used for this implementation is the QuestGram version, which works as a quest creation tool. QuestGram is created with a structure discussed by Doran & Parberry [6]. Therefore the design for QuestStories implementation has been focused on using the same structure used in QuestGram.

5.1 Artifact - QuestStories

QuestStories is a quest creation tool, the intention was to help the user to create quests that were tied to a simple narrative. Since the EDDy system is a creational tool and not a playable game,

the QuestStories development has focused on the elements outside of gameplay that can help with creating a narrative for the quests.

The design and structure used for this artifact was based on the EDDy design and with help from quest analysis and the study of related work, the tool created was focused on expanding the NPCs' functions in the already existing quest tool. The NPCs in QuestStories not only have extended functionalities but also an updated look displayed in figure 22 in order to create more immersion and believability mentioned by both Warpefeldt [20] and Aarseth [1].

In QuestStories the decision was made to start using the NPC character as a quest giving character, commonly found in RPG games. The use of the quest actions listen and report was implemented to start and end a quest. The player would start a quest by interacting with an NPC ("Listen") and finish by interacting again with the same NPC ("Report"). Therefore these quest actions have been taken out of the quest action pool Olsson and Grevelius used as seen in table 1. Other actions that were taken out of the quest action pool was "Stealth", "Goto", "Exchange", "Explore", "Take", "Give".

- Stealth - Removed since the quest action does not fit the game environment, but could be implemented in a playable version where it made sense.
- GoTo - This action seems redundant to have when creating a quest where you always point at a position anyway.
- Exchange - This action would have needed a more developed item system to have this action make sense in the game, could be implemented in future work.
- Explore - A common action in RPGs but this action is more fitting in an open world environment where the player would need the incentive to explore certain parts of the world to progress.
- Take - Removed because it is too similar to the gather action. This could also be implemented in future work, maybe in combination with the stealth action with a name such as "Steal".
- Give - Much like GoTo this seemed redundant since making a quest action like gather an item would have the user put a gather position and a report position. So report is basically completing the quest.

5.2 NPC roles

The QuestStories tool gives users the option of creating NPCs of four different roles (Soldier, Mage, Bounty Hunter, Civilian), each of these roles have been found with the use of a quest analysis done in section 4. When the user decides to create an NPC in the room they do so by placing an NPC tile in the room grid. These character tiles have been given an updated look to make the characters more believable and are displayed in figure 22. The NPC roles are put in place to help the users create more diverse quests depending on the type of NPC they want to use. The NPCs are connected with a specific set of quest actions depending on the role of the NPC, this is displayed in table 10. For instance: when a user creates an NPC of the type "Soldier" the available quest actions are within the boundaries of the soldier NPC. In this case the quest actions to choose from would be "damage", "defend", "capture" and "escort".



Figure 22: From left to right: Soldier, Mage, Bounty Hunter, Civilian

5.3 QuestStories UI

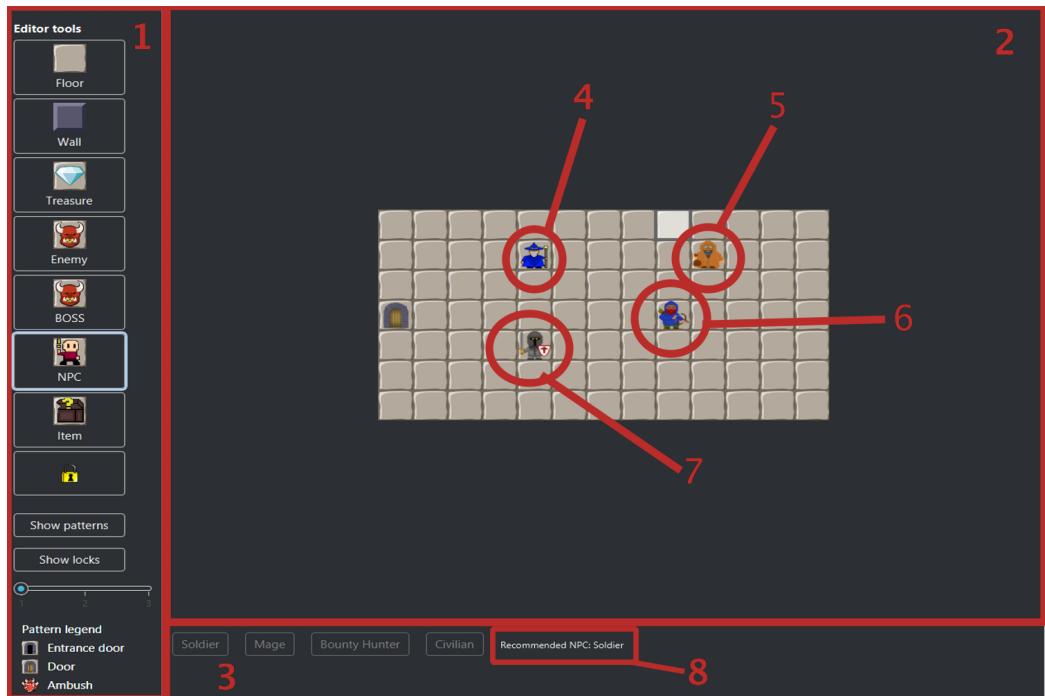


Figure 23: The room view UI, the user can design the room and place objects. The UI figure is numbered 1-8.

1. Object selection menu.
2. Current room view.
3. NPC selection menu.
4. The Mage.
5. The Civilian.
6. The Bounty hunter.
7. The Soldier.
8. Recommended NPC suggestion.

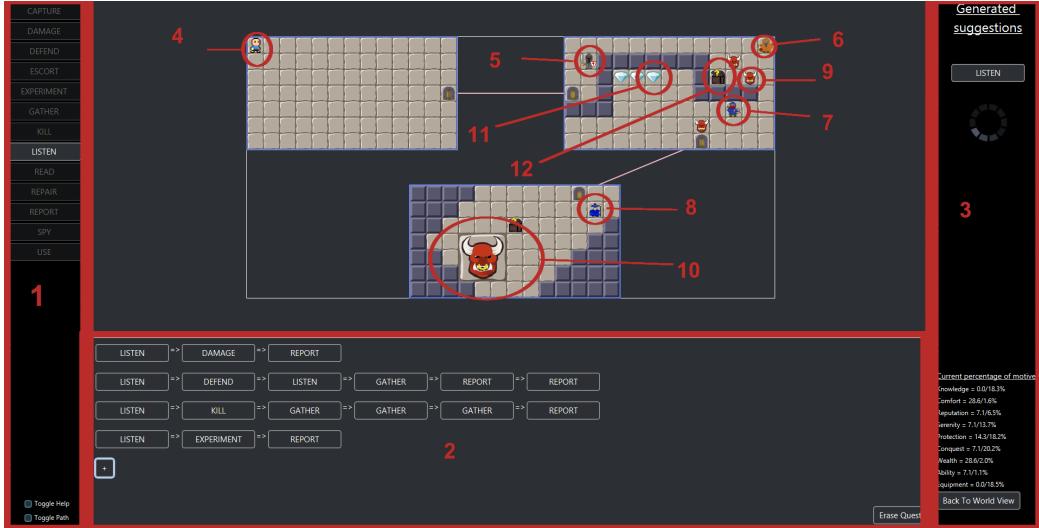


Figure 24: The quest view UI where the user can create quests for the dungeon

1. Quest actions.
2. The Quest-chain.
3. Quest Suggestions.
4. Player tile.
5. A Soldier tile.
6. A Civilian tile.
7. A Bounty-hunter tile.
8. A Mage tile.
9. A Enemy tile.
10. An Boss tile.
11. A Treasure tile.
12. An Item tile.

5.4 Recommended algorithm

There are two active recommendations in QuestStories that make use of the Doran and Parberry quest motive balance as seen in table 2, this balance of motives are used as the perfect balance in QuestStories. The first user recommendation applies to the room view, and can be seen in section 8 in figure 23. Here the system uses the equation 1, where n being the number of NPCs inside the room and y being the quest motives tied with each of the NPCs and their respective role. This part of the equation is used for each room the user is editing, and calculates the percentage for each motive in Doran & Parberrys model, seen in table 2. After this calculation the system uses equation 2, where q being the number of quest motives represented by one specific NPC and p being the perfect balance percentage number of each quest motive as displayed in table 2. This calculation is done on all NPCs in the room to evaluate which NPC role would be most ideal in order to come closer to the motive balance seen in table 2. The NPC role that is recommended by the system will be the role whose respective motives are furthest away from the balance in table 2.

$$x_n = \frac{\sum_{i=1}^n y_i}{n} \quad (1)$$

$$w_n = \sum_{i=1}^q p_i - x_i \quad (2)$$

For example: The user chooses the first NPC to be a soldier which represent the motives Protection, Serenity, Conquest and Comfort. At the current state of the room these motives each represent 25% of the total amount of motives (amount of each motive divided by the total amount of motives in the room). Now the system looks at all different types of NPC and calculates how their respective motives have been affected in comparison with the perfect balance of each motive. This is done by subtracting the values of each perfect motive balance percentage with the respective existing motive percentage. For example the protection motive will now be weighted as 0.182 (perfect motive balance) - 0.25 (existing motive balance), this equals a differentiating weight -0.068. This calculation is done with each of the NPC's motives, adding these weights together to a total weight. For this example, with one soldier placed in the room the current total weight of each NPC is as followed: Soldier: -0.46, Mage: -0.20, Bounty Hunter: 0.27, Civilian: 0.10. This would result in the Bounty Hunter being the recommended NPC since its current total weight is the highest. The reason for this is that this character consists of the motives that are the furthest away from the perfect balance.

The second recommendation evaluation in QuestStories happens in the quest view seen in figure 24, here the user sees suggested quest actions as seen in figure 24 section 3. This recommendation algorithm works in a similar fashion to the previous one, the difference being that this calculation is done on the quest actions currently existing in the game and calculate the weight of the quest actions' respective motives. The quest actions and quest motives are paired together with the use of the study done by Doran & Parberry [6] and can be seen in table 11. The suggestions given to the user in both the room view and quest view follow the "perfect balance" seen in table 2, this suggestion system is put in place to help the user create a balanced chain of quests based on Doran & Parberry's quest analysis.

Motives	Actions
Knowledge	Spy Read Use
Comfort	Damage
Reputation	Kill
Serenity	Capture Damage Escort Use
Protection	Damage Defend Use
Conquest	Damage
Wealth	Gather Repair
Ability	Experiment Use
Equipment	Repair

Table 11: Explanation of actions tied to motives and sequence of actions in QuestStories

5.5 User Flow QuestStories

The user flow of the QuestStories tool is displayed in figure 25. Starting from the top of the figure the user enters the room view window, in this window the user has the possibility to add objects to the room they are currently editing. The object available for the user can be seen in section 1 in figure 23. The QuestStories tool gives the user the ability to modify the type of NPC they placed in the room. This is done by selecting the NPC they want to edit and with the use of the menu, as can be seen in section 3 in figure 23 the user can give the NPC one of four roles. This choice can be done manually or by following the recommendation seen in figure 23 section 8. Once the user is happy with the amount of objects and NPCs placed in the room they move on to the next window. This window is called the "Quest View" and here the user has the possibility to create quest-chains in the game, this window is displayed in figure 24. The QuestStories tool makes use of the NPCs placed in the previous room view window as quest giver and as a start and endpoint for the quests they want to create. The user will use the sidebar menu in section 1 in figure 24, where they have a selection of quest actions that become available dependant of the NPC "quest givers" they have placed in the dungeon. The user begins by selecting the "Listen" action that acts as the starts of a new quest-chain. After a Listen action has been selected on a specific NPC more quest actions become available in the sidebar menu to the left of the screen. The actions that become available are dependant on the NPC that has been selected. The user is also given the opportunity to select the following quest actions by following the suggestions given to them in the right sidebar menu in section 3 in figure 24. Once the user is happy with a quest-chain they created the user then selects the quest action "Report" and the NPC that started the quest-chain. If the user runs out of quest actions that means that they have run out of quest objects or quest giving NPCs and they have to return to the previous room view window and add more.

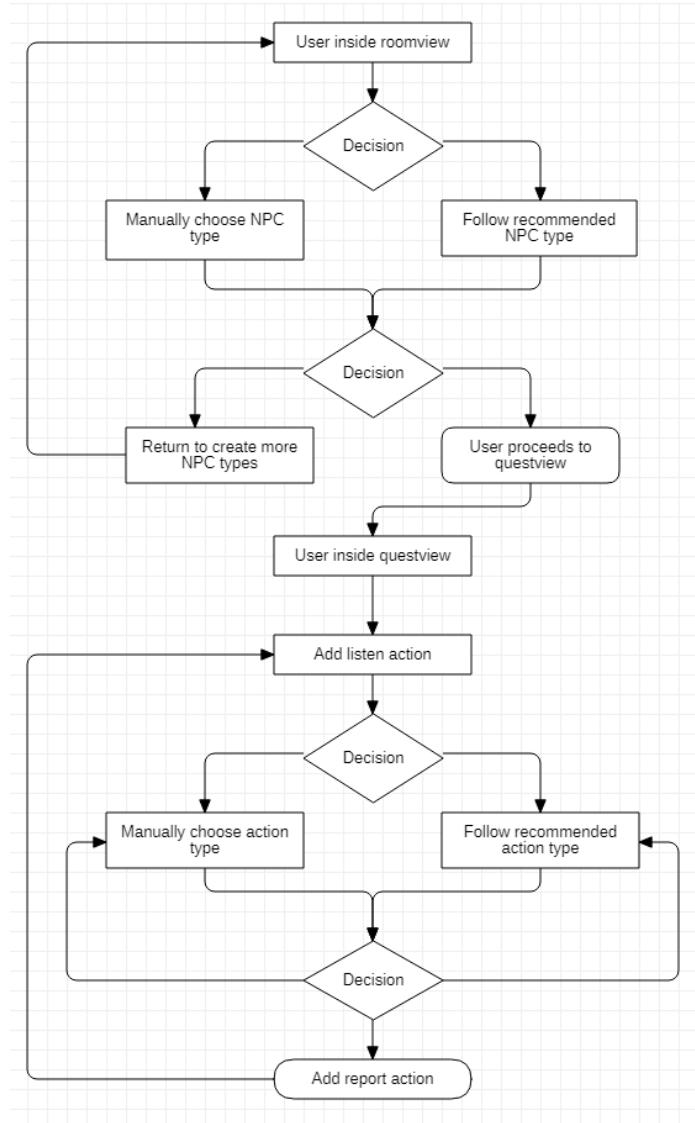


Figure 25: User flow of the QuestStories tool

6 Results

This section is dedicated to the result found in the user-study performed on the artifact QuestStories in comparison to QuestGram. The quantitative data presented in this section is recovered from a questionnaire performed before the start of the 12 testers. The qualitative data is collected through the transcription of the think-aloud testing and also an interview with each test person. Extra quantitative data has also been recovered from analysing the dungeons & quests created by the test persons and their usage of the different tools.

6.1 Quantitative results

The quantitative data in this section was collected from a questionnaire given to each person in the user study. The questions in this questionnaire were used to answer questions about the individual users in the user test. The questions were aimed towards the users experience within the RPG genre and their understanding and appreciation of the narrative element but also to check if and how much programming experience each user had. These answers helped the evaluation of each test person during the think-aloud testing of the artifact.

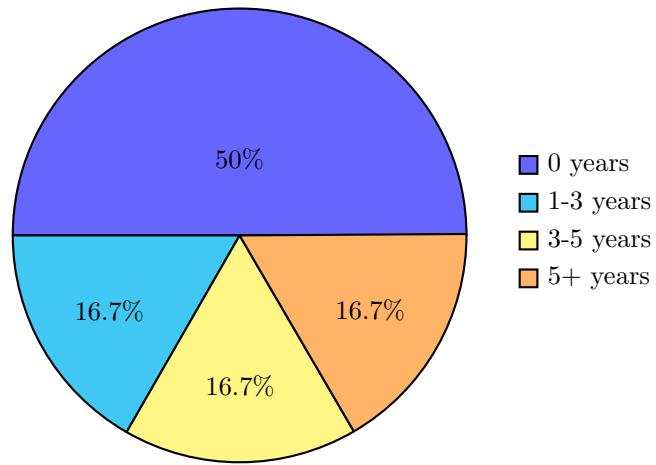


Figure 26: QA: How much programming experience do you have?

This question was put in place to find out if and how much programming experience the users in the focus group had. The group was evenly divided in programmers and non programmers.

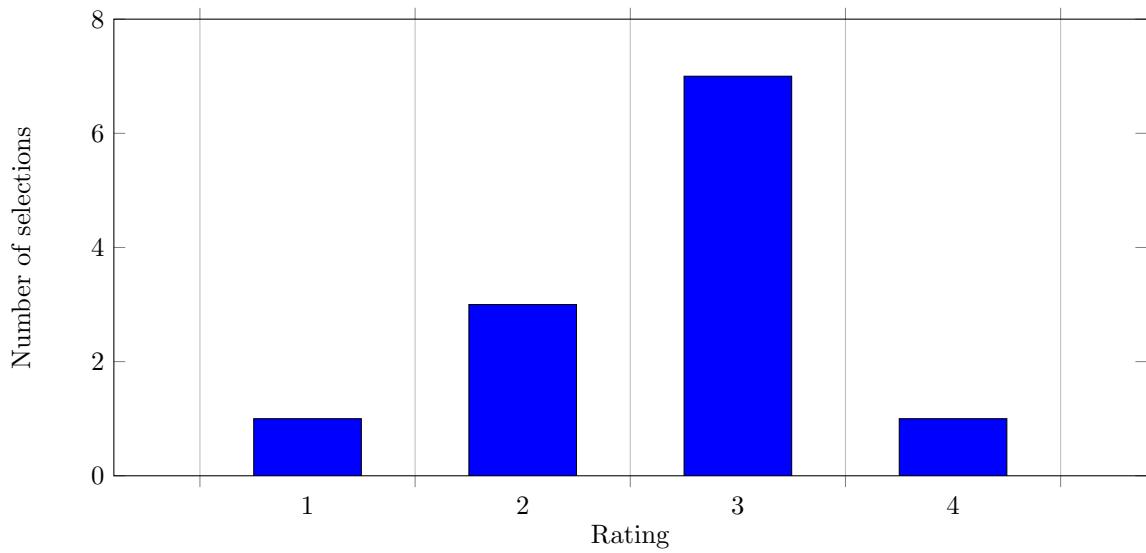


Figure 27: QA: How important is the narrative/story in a game for you?

The goal of this question was to find out how much narrative played an importance in a game. The user could select a rating between one to four, one being very little next to none and four being very important. The answers displayed in the figure shows that the majority of the focus group found the narrative element to be a fairly important part of a game.

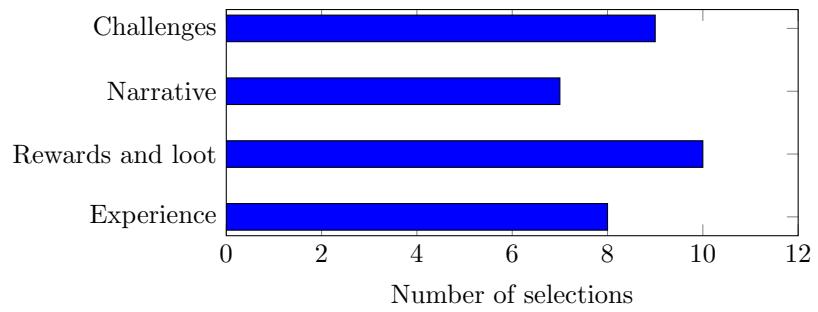


Figure 28: QA: Why do you complete the quests in an RPG?

This question was put in place to check if the players had a similar or very different reason for completing quests in RPGs. The focus group ended up being almost evenly distributed across the answers, this would show that all of the reasons had a close to equal importance to the users in this test

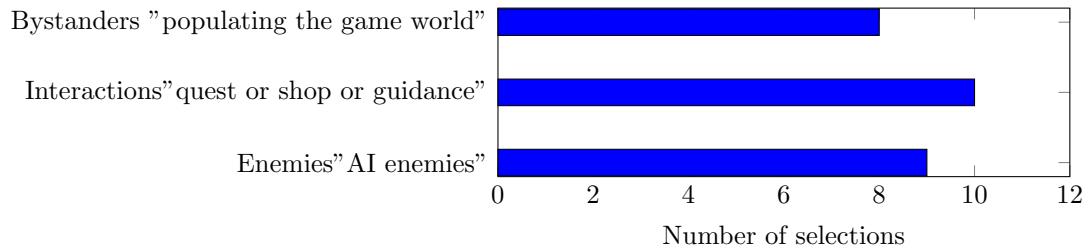


Figure 29: QA: How do you view the NPCs in a RPG? (What is the NPCs role?)

This question was put in place to see if the focus group had a deeper understanding of the different roles the NPCs can play within the RPG genre

	Amount of different quest actions used / user	Amount of NPCs used / user
QuestGram	5.75	3
QuestStories	5.58	3.9

Table 12: Quantitative data collected from the created dungeons by the users

This table shows how vastly the users explored the two tools in the user study. QuestGram had a slight edge in different actions used for every player on average. While the users made use of more NPCs on average in QuestStories

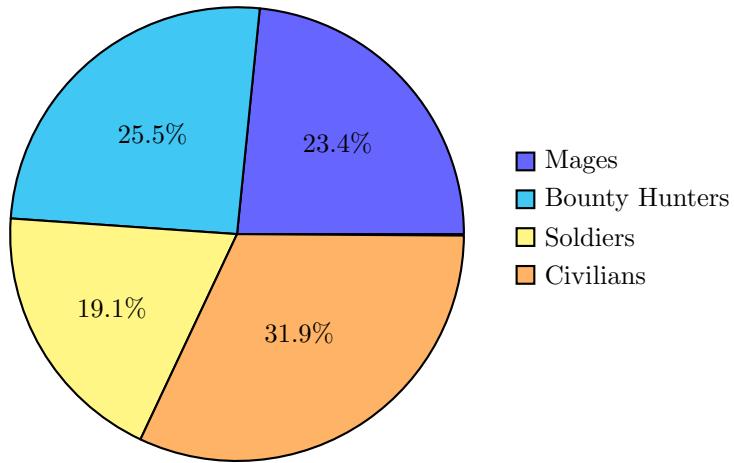


Figure 30: The percentage of each NPC role used in QuestStories test. Total NPC used = 47
This result shows how popular the different NPC roles were during the user study. The civilian was a popular character often used for rescuing or even as a bystander. The Bounty-hunter was also a popular choice because of the quest action "KILL".

6.1.1 Analysis quantitative result

The results provided by the questionnaire shows that the focus group testing the tool had a similar view on how the quests and NPCs function in an RPG environment, which is displayed by the answers in figures 27, 28 & 29. This was also shown by the majority of the users referring to famous RPG titles when creating quests in the two tools. The biggest difference between the testers would be the programming experience as displayed in figure 26. The programming experience provided the user study with some interesting results. The testers with the longest programming experience had the clearest goal of what they wanted to create in the room view seen in figure 23 before entering the quest view seen in figure 24. The two testers with the most programming experience were also the ones to point out that "if you did not break the quest loop" when using QuestGram "you were technically not creating quests but telling the PC where to move". They both shared the opinion that "this was not the right way", if you visioned creating RPG quests. "The player should be more free in the order they wanted to complete quest activities in the game".

The data collected from the dungeons the testers created can be seen in table 12, we can see that the usage of different quest actions did not vary too much on average between the two tools. This is quite interesting since many of the testers commented on the freedom they had in QuestGram with complete freedom of choice of quest actions, but in the end they made use of a similar amount

in the two tools. Also seen in table 12 QuestStories had the advantage in the use of NPCs with a 3.9 average per tester. This was not too surprising given the tool makes use of the NPCs to be able to create quests. When using QuestStories the users had a lower variance between them than in QuestGram. In QuestStories the tester with the lowest use of NPCs made use of three and the one with the highest made use of seven. QuestGram on the other hand, the test person with the lowest number of NPCs made use of zero and the one with the highest nine. The test person who had nine NPCs only made use of three of the NPCs actively in his quest-chain, the rest were used as bystanders without any interactive functions.

We also collected data about the usage of the different NPC roles when using QuestStories, this is displayed in figure 30. This shows that the civilian character was a popular one to use both as a victim that needed to be rescued by the player, but some testers wanted to use the civilian as some form of guide that gave information to the player. When studying the usage of either tool we discovered that the most popular quest action to use was the "Kill" action. Therefore the second most popular character was the bounty-hunter in QuestStories as seen in figure 30.

6.2 Qualitative results

The qualitative data in this section was collected from the think-aloud testing of the artifact and the follow up interview with each person. The Qualitative attributes rated for each test can be found in table 6, and the interview questions for each quality attributes is shown in the appendix, section B.1 - B.5. Each Qualitative attribute has been rated from one to five for each test person by the test leaders and is summarized into an average rating for each tool and is displayed in figure 31. The motivations for the scoring and the rating system is displayed in table 13. The qualitative results in this section is presented together with an analysis for each quality attribute.

6.2.1 Think-Aloud

The think-aloud testing was put in place to compare if the narrative creativeness was increased when using a system with NPC roles as compared to a system without. It was also a good way to test the qualitative attributes found in table 6. The think-aloud process gave the test leader feedback directly from the user's reaction when interacting with the system, it also helped to ask better follow-up questions in the interview after each test. The think-aloud testing went smoothly and the majority of the users' stories were interesting and complex. The most reoccurring narrative revolved around a fantasy themed story where a civilian character needed rescuing from the end boss of the dungeon.

Even if the majority of testers found it easy to run wild with their imagination, there were some users that struggled a bit more. One problem in particular seemed to be that all of the in-game objects were generic. The users that struggled, found it difficult to use their imagination to create a story surrounding these generic game objects and would most likely had an easier time having more specific choices of game objects.

One takeaway from the test with either system was that none in the user study wanted to use the quest suggestion given to them by the system. Every test person had a similar opinion on this part of the system, that this was for people that did not want to create anything on their own because they lacked imagination.

Another thing implied by eight of the twelve testers when using the QuestStories tool were comments on the looks of the player character and how the PC looked weak or not belonging in the environment. This had a surprisingly big impact both on the quests the users wanted to create and on the

perspective of the PC as a character that needed to get help with every mission.

Quality attributes	Rating 1	Rating 5
Usability	The user has a poor understanding of how to use the tool and needs a lot of help	The user is able to use the tool without any extra guidance and makes informed decisions
Customizability	The user feels very restricted and cannot create what they want	The system gives the user the tools to create exactly what they want
Appreciation	The user has no understanding of how the tool is intended to be used	The user has fully understood how the tool is intended to be used and why it is implemented
Complexity	The quest created by the user has no complexity and is made from a very narrow part of the system	The quest created is complex and makes use of a wide range of the system
Creativity	The users creativity is not helped by the system or negated by the system	The users creativity blossoms and the system helps the user to come up with a lot of new ideas during creation

Table 13: Rating system for the measuring data during user test

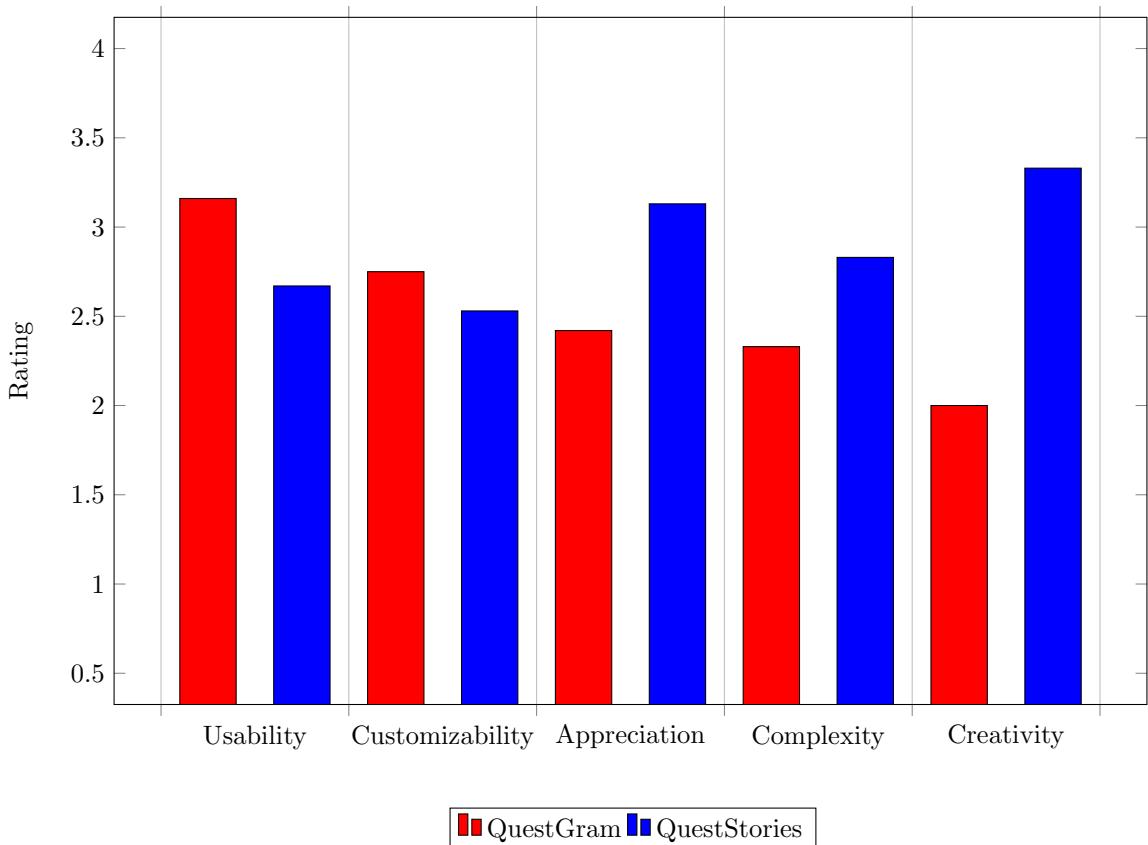


Figure 31: The average rating of qualitative measurements for QuestStories and QuestGram

6.2.2 Usability

This section is related to Appendix section B.2

A majority of the users had problems navigating the menus when creating quests and also had a hard time to see indications and pop-up information boxes that were shown to them. One of the biggest problems was the three steps to add a new action to the quest sequence, where the users did not understand the right order of mouse interactions to add an action(action -*i* available highlighted tile -*i* plus sign). The three steps that needed to create a quest action was stated as "over complicated" by many users. The instructions for how to create quest actions had to be repeated over and over by the test leader, this was the case for both of the tools.

When comparing the usability for the two tools it resulted in a slight advantage for QuestGram. The lack of rules within QuestGram let the user do exactly what they wanted without blocking any ways of usage, this made it easier to use and harder to fail. There were a lot of users during the test of QuestStories that stated "they lack information about the quest possibilities for each NPC when designing the dungeon". This left the usability of QuestStories lacking and the users needed more explanation to be able to use the tool properly. A request that was noted was that an informative menu would have helped QuestStories a lot in this department.

6.2.3 Customizability

This section is related to Appendix section B.3

The customizability turned out to be one of the harder ones to judge since it depended a lot on the test person's fantasy and imagination before entering the quest view. A person that had less of a plan before entering the quest view was harder to judge since they did not have any real thought of what they wanted to create when they designed the dungeon. The two tools are very different in terms of what is demanded of the user to create, this resulted in a slight advantage for the QuestGram system that allowed the users to do whatever they wanted.

While it was identified that the majority of users had an easier time to create a sequence of actions in QuestGram, it was harder to judge how the game-loop would play out in QuestGram, a common theme for the sequence of actions in QuestGram was that it was hard to define when the quests started and ended. Cases where there was difficulty pinpointing the start and end can be seen in the example in figures 32, 34 and 36. In figures 32, 34 and 36 the test person created a sequence of actions that reminded more about AI movement. You could make the argument that maybe the quest ends by escorting the npc out of the dungeon, the problem was that this was not how the test person described it. Therefore the customizability was hard to pinpoint for QuestGram since the majority of the users never explained their creation as a quest. QuestStories was lacking in the customizability when it came to the amount of NPCs and the number of actions for each NPC. This created a problem for the user when they went from creating the dungeon to creating quests, many of the testers had a plan but had to change it upon realizing what actions they were restricted to using. A solution to this problem would have been to return and edit the NPC role they had chosen, but even if the testers had that option the majority decided not to do so.

6.2.4 Appreciation

This section is related to Appendix section B.1

The appreciation of the differences in the two systems resulted in a better result for the QuestStories system. The users had an easier time to understand what they were doing in QuestStories, and stick to the goal of creating quests. But when using QuestGram there seemed to be a lot of confusion and there were only three testers who somewhat successfully made a chain of quests, whereas the rest of the users thought they designed an AI or a push to play system.

Appreciation for the two systems gave the edge to QuestStories. The goal for the two systems was to create quest-chains for the dungeon, but all of the users apart from one failed to use the QuestGram system in that way. The most common way to use QuestGram was to create some kind of movement through the dungeon instead of missions to complete. The users also explained their quest-chain in a way that made you think that they did not want to use the system for creating quests, but rather as some kind of a checkpoint game towards winning see figures 32, 34 and 36. A common description of one of these quest chains was using the actions as movement for the player. For example test person eight described his quest-chain: "Go to this enemy and kill him, then I go to this enemy and kill him, then I go to the NPC and bring him with me" as can be seen in figure 32.

QuestStories on the other hand was more complex and restricted with a more forced structure. The quests had a set beginning and end with the majority of users grasping how to use it and why it was implemented. All of the users also appreciated the implementation of having the quest-chain broken up into multiple quests displayed in figures 33, 35 and 37, this gave the users the possibilities of creating multiple quest-chains that contributed to more interesting narrative storytelling. The multiple quest-chain concept was even commented by two of the most experienced game programmers, "positive if your intent is to create RPG-like quests since it gives the player the freedom of what they want to do within the game".

6.2.5 Complexity

This section is related to Appendix section B.4

The complexity of the quests created for the two systems were judged upon how vastly the usage differed depending on the user, but the summarized result gave QuestStories a better rating as displayed in figure 31. In this system some users even managed to create main quests and sub quests within the dungeon. The negative points for QuestGram were caused by the same things mentioned in section 6.2.4, the users had a hard time to create some kind of a quest story, instead they often drifted to start creating a step by step description of how the level was played.

The complexity of the quests being created for the two systems were judged on how well the users could put the possible features to use in the quest-chains they created. This resulted in a slight advantage for the QuestStories tool, principally because the users made use of more different actions as they put out NPCs with different possibilities. Interestingly enough the users made use of less varied actions in the QuestGram tool even if they had all actions available at all times. An example of this is displayed in figures 32, 34 and 36 where the user only made use of three different actions.

6.2.6 Creativity

This section is related to Appendix section B.5

The creativity of the two systems were judged on how well the systems could help the users with their creativity when designing quests. The systems had to in some way give the users new ideas and complement their own fantasy and imagination. The QuestStories tool had a clear advantage when it came to creating a story in the game. The majority of users had an easier time coming up with a story for each character and the storytelling element was noticeable upon reenacting the quests and story they had created.

In the usage of both tools it was identified that the creativity attribute differed the most for the users. The testers were asked to think-aloud while creating the quest chains and also narrate what was happening for the PC in the game. It was clear that the creativity blossomed with the role change for the NPCs and the user had an easier time to use the NPCs as part of their storytelling. When using QuestGram the users didn't reflect to much on the NPC's part of the story and the NPC functioned as a checkpoint or guidance in the dungeon. When asking the users about the generic NPCs there was only one that imagined a backstory for these NPCs. This test person created two generic NPCs and imagined two different purposes in the game, one as a guard and one as a civilian.



Figure 32: Test user 8 with his questchain and dungeon in QuestGram



Figure 33: Test user 8 with his questchain and dungeon in QuestStories

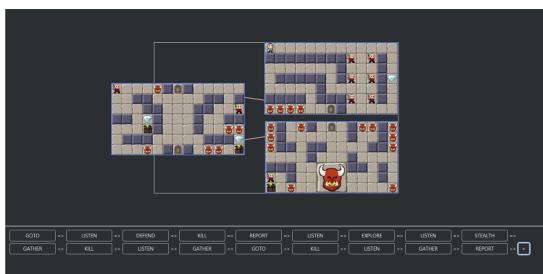


Figure 34: Test user 10 with his questchain and dungeon in QuestGram



Figure 35: Test user 10 with his questchain and dungeon in QuestStories

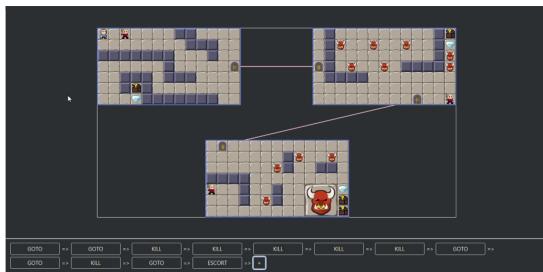


Figure 36: Test user 5 with his questchain and dungeon in QuestGram

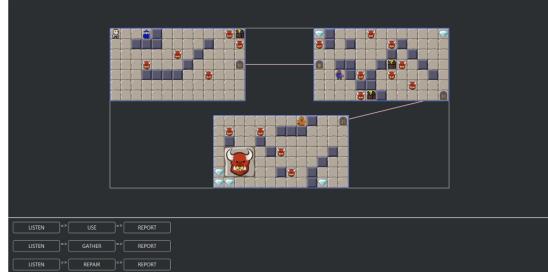


Figure 37: Test user 5 with his questchain and dungeon in QuestStories

7 Discussion

This section is dedicated to discussing the results in relevance to our research questions. RQ1 was answered in the quest analysis displayed in section 4. The answer retrieved from the quest analysis helped out to create the blueprint for the implementation of the four NPC roles for QuestStories and is displayed in figure 22. This implementation was used to answer RQ2 and test what effect the NPC roles had on the narrative element and how it affected the users creativity and imagination in the user-study.

7.1 Npc roles & the narrative

In the search to answer the RQ about the NPC roles effect on the narrative, we discovered through our quest analysis 4 that the type of the NPC had a big effect on what quest the PC received in RPGs. Even if the games that were analysed came from different eras and had different storylines, the narratives were in the majority of cases driven by the NPC (quest-givers). The encounters with NPC characters within the RPG titles we analysed are more than often the point where the player receives information about the game world in the format of storytelling through quests. The issue that we encountered in this study was the fact that the system we were trying to create a narrative element in, did not have a playable version. Therefore the narrative element in the artifact had to be created outside of the actual game-loop, and instead happen when the game is created. The decision was made to use four generic NPC roles found through the quest analysis 4 and pair them up with respective quest motives displayed in 10. The intention for pairing the NPCs with motives was to give each NPC role a purpose and make it easier for the user to come up with a narrative for the game they created. Through the user study we found signs that the users felt restricted by the selection of actions they could choose from, but even if that was the case they immediately became more creative with the story for the game.

Another very interesting thing was that as many as five of the twelve testers using QuestStories commented on that the PC looked "weak" or even "not belonging" when the other NPCs had an updated look. It would seem that a lot of them thought of the PC character as a civilian character and the quest they created surrounded the PC searching for help by the more powerful NPCs (Soldier, Bounty Hunter and Mage). There was even a case of one person who wanted to transform the character through the quest to become the quest-giving NPC to "gain his powers".

Even if the NPC roles gave the users a creative spark, the system was lacking information about what actions belonged to which NPC role. This created unnecessary confusion that could have been solved with more informative UI for the NPCs when they were created.

7.2 The Artifact

QuestStories was intended to function as a expansion of QuestGram, with the goal of bring in a narrative element when creating quests. The Artifact had a mixed initiative element with quest suggestion for the user, and also an implemented balancing system to help the user create a more balanced quest system in the game world. Unfortunately the suggestion and balance system were not easy to judge how well the implementation was made, since the testers decided not to use it. The response we got from interviewing the users was that they did not want help from the system. The argument could also be made that the users did not properly understand how the suggestion system worked and that they were therefore poorly informed about these features in the system. Another issue the users had using QuestStories was as mentioned the lack of information about the availability of the quest actions for each NPC role. This unfortunately resulted in some confusion

and in some cases the test person did not create the quest they wanted even if it was available using another NPC. For instance, the users wanted to kill an enemy and listened to a soldier but the soldier did not have the kill action since it was only available for the Bounty Hunter. The lack of UI information created some frustration for the users since they did not immediately understand what and how to use the NPC to create the quest that they wanted. But when users understood what quest actions were available to which character they managed to create several quest-chains and even describing them as a main-quest with side-quests. For example as seen in figures 33, 35 and 37, these users created a main quest first, kill the boss and then collect an item guarded by the boss. Afterwards they created sub-quests that may or may not be completed before the main quest. In these cases the game described by the user became more free for the player without a linear set of actions that needed to be completed to win the game.

In a few cases there were some difficulties to understand or define the quest actions, especially confusions about the quest action "Listen". Some of the users wanted to use the "Listen" action as an informative action were the NPC told the PC something. This issue could have been solved by for example having an action named "Talk To" that was not singularly appointed to any of the NPC roles but for all, this could have worked as that informative step. The use of a quest loop where the PC picks up quest at one point and delivers it back when complete had a positive reception by the users. In some cases though the quest-actions for starting and ending a quest ("Listen" and "Report"), needed some explanation to the users. For the system to work even better we believe that the start and end quest actions should have been clearer, for example "begin quest" and "end quest". This would also have been a nice way to start a quest loop not only on an NPC, but also by picking up a quest when for example finding an item or by killing a certain enemy. This would have made the tool and the creation of a quest loop more customizable and diverse for the user.

8 Conclusion

The results provided from the quest analysis in section 4 and the test performed on our artifact provided us with the conclusion on our two research questions:

RQ1: How can we use the NPCs and their role to tie the quest to a quest narrative?

RQ2: How can the implementation of roles for the NPCs affect the users appreciation on the narrative being created in a mixed-initiative environment?

8.1 The use of the NPC role in quests

The quest analysis provided us with the conclusion that the NPC in an RPG environment works as an important part when providing the PC with quests to perform in the game. It also showed us that the nature of a quest is closely dependant on the role of the NPC providing the quest. The NPC role creates a backstory for the quest given to the PC outside of actual game-play, in addition to the look and feel of the NPC, that gives the user a idea of what type of quest they are about to get. This analysis gave us the support for creating NPCs with an updated look to match the four roles in QuestStories displayed in figure 22. The quest analysis together with the previous usage of the quest motives found in related work were paired up as displayed in table 10. We used this to support the implementation to also restrict the available quest actions for each NPC. The conclusion of this implementation was that was difficult to implement a good pairing of actions since the quest motives provided by Doran & Parberry displayed in table 1 was given by studying four very big RPG games, and is therefore difficult to apply to a smaller set of characters. One solution to this problem

could be to remove the smaller percentage motives and only keep the bigger ones and separate the motives between the characters more.

Another option would be to explore a deeper quest analysis section and find more NPCs that could fit each motive, the characters found in the quest analysis for this thesis are very generalized and could be divided into more specific roles. For example the action Repair that is now given by the civilian could maybe be even more fitting if it was given to the PC by a civilian worker like a blacksmith. With more specific NPC roles the motives would be more divided could be divided between multiple NPCs with more specific motives for each of them. For example the mage character could have been divided into a shaman, warlock, wizard, druid and so on.

8.2 The user appreciation of the implementation in QuestStories

The reasoning for discussing the results found in the user testing of QuestStories and QuestGram regarding the user appreciation of the two systems, is that both are set in a mixed initiative environment. Therefore it was important to evaluate the users understanding of the two systems, this involved comparing the usability of the two systems but also that the users understood why we had implemented the mixed initiative in a different way. The first difference in appreciation was regarding freedom when creating quests in the two tools. This came as no surprise since the QuestGram tool gives the user almost complete freedom without any restrictions.

The result regarding the creativity of the users in the two systems provided us with the conclusion that even if the user felt more free using QuestGram they had a hard time to create any specific quests with a clear quest loop with a beginning and an end. This resulted in the user drifting away to create more of a step-by-step guide on how to move through a level. Whereas in QuestStories the majority of users felt like they were creating multiple quests with a more RPG-like structure. The conclusion of this observation is that it depends on what type of game you are trying to create but the majority of users enjoyed having a clear structure from start to finish with each quest, without the quests being tied together.

The user tests also gave us the results that the users sometimes wanted to begin a quest not only via an NPC but also through an item or even when passing through a door. This gave us the conclusion that even if the users appreciated the different NPC roles and how they were involved in different quest actions, it is not always the case that you want the quest to begin with talking to an NPC but also with use of items and events happening at certain points in the dungeon.

A major flaw with the artifact was the UI implementation that was next to none, the users had a very hard time to maneuver through the different views, room view 23 and quest view 24. This made it complicated when they wanted to go back and forth editing the room and then moving back to edit the quest. Another problem with the UI in QuestStories was that the users felt like there should have been more information regarding each NPC role and what quest actions they had available in the room view. The conclusion here is that the users would have been able to use the artifact more efficiently had they known beforehand what the NPCs could do.

8.3 Future Work

This thesis has given the possibility to create quests in a more structured way in the EDDy system. The implementations and the results gathered show us that this is a tool that has a foundation to create quests like an RPG. However we found that the tool needs further implementation to be used as intended. Conclusions can be drawn that the system needs a lot of work on the UI and that further testing is a good way to find out how this should be properly implemented. An obvious UI implementation would be the information for the NPC roles and their available quest actions, but

also that the way the quests are added in the quest view needs work to avoid confusion for the users. The quest loop we created with the beginning and end being placed on the quest-giving NPC should probably have been implemented in a freer way. One solution to this problem would be to have a non-quest-action button for starting and ending a quest chain. This solution would give the users a lot more choices on how they want to begin and end a quest, for example the user might want to start a quest on an item they found that leads them to listen to the NPC that has its available actions presented to the player. This implementation would let the user create a longer quest chain with more options to progress from item to character to another character without breaking the current quest-loop.

Another feature that could have been worked on for future work would be the NPCs in the game. We believe that in this tool we have created four very broad and general roles for the game. This could be expanded up on in future work, where a more specific quest analysis could be done where the authors could deep dive into the usage of different types of NPCs within the generalized roles that we have created. As mentioned in section 8.1 the different character roles we have created can be subdivided into more specific NPCs with more specific motives and actions available. Another future work addition would be to work on the usage of the quest suggestion menu. In the user-testing of both QuestStories and QuestGram we had a hard time to get the users to use the suggestion menu. One suggestion here would be to implement so as to give the user a full quest from start to finish instead of just giving them one suggested action. This implementation could prove to be more useful when running out of ideas when designing, or when you are designing a bigger game with more rooms to save time.

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Appendices

A Questionnaire

1. How much programming experience do you have?
 - (a) <1 year
 - (b) 1-3 years
 - (c) 3-5 years
 - (d) 5 years +
2. What is your Video Game experience?
 - (a) <5 years
 - (b) 5-7 years
 - (c) 7-10 years
 - (d) 10 years +
3. What is your age?
 - (a) 18-20
 - (b) 21-24
 - (c) 25-29
 - (d) 30-35
4. What role playing game titles have you played?
 - (a) World of Warcraft
 - (b) Elder Scrolls series
 - (c) Everquest
 - (d) Assassins creed
 - (e) The Witcher
 - (f) Final Fantasy
 - (g) Diablo
 - (h) Other
5. How important is the narrative/story in a game for you?
 - (a) 1 (Not important)
 - (b) 2
 - (c) 3

(d) 4 (Very important)

6. Why do you complete the quests in an RPG?

- (a) Experience
- (b) Rewards and loot
- (c) Narrative and storytelling
- (d) Challenges
- (e) Other

7. How do you view the NPCs in an RPG? (What is the NPCs role?)

- (a) Enemies (AI enemies)
- (b) Interactions (Quests, shop, guidance)
- (c) Bystanders (populating the game world)
- (d) Other

B Interview

- **B.1 Appreciation**

- Did you understand the difference between the two systems?
- Why do you think that there are two different systems?
- What is the difference?

- **B.2 Usability**

- Did you find any particular part of the two systems difficult to use?
- Did you find any particular part of the two systems easy to use?

- **B.3 Customizability**

- Were you able to create quests in the way you intended?
- Did you feel restricted by any part of the system?

- **B.4 Complexity**

- Was there a difference in the complexity of the quests you could create?
- If so, what was the difference in what you created and what allowed you to do so?

- **B.5 Creativity**

- Did you have a plan of what quests you wanted to create?
- Did the system help you create what you wanted?
 - * If not, why?
 - * if yes, what part of the system did help you?
- Did any part of the system help you with your creativity and new ideas?
- Did you see the recommendations and did you understand how they worked?
 - * If not, why didn't you use them?
 - * if yes, why did you use the recommendations?
 - * if yes, Did they help you with your creativity and how?