

Evaluating creative imagination: A narrative enquiry on virtual reality content under the lens of practice-based and heuristic research

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Abstract

Interaction with art through digital technology is not a very recent research inquiry. In the mid-1960s, technology-based art emerged, and by 1980 onwards, experimental art and technology had grown remarkably. To bring practice and research closer to technology, art, and design, researchers have deepened their knowledge of the creative process in art and technology. On the other hand, to develop the technology blended practice required an educational base from the stage of schooling. Virtual reality (VR) is one of the platforms that could help to learn and explore new idea as well as create a new dimension for creativity practice. Inclusion of art teaching and learning VR technology required to verify and evaluate its usability. Heuristic research undertakes exploration of human experience in a qualitative manner. It is a systematic, organized method for investigating human lived experience. The VR content required a significant evaluation criteria on development of content and usability of content

This study focusing on the behavior of the VR content and its proximity towards practice and usability. The study following descriptive methodology to create a synergy within practice-based research, heuristic criteria, and activity system.

Keywords: Virtual reality, practice-based research, heuristic research, activity system, art and design,

1. Introduction

Emerging technology has two types of effects, one is to help or support people to make their work easy. The other is the impact of applying technology in a particular field and adopting the processes to use it and the economical affordances to maintain it. To achieve long-term positive effects technology application is required, but to make people become technology friendly is not so easy. First, techno-oriented work has some types of approaches, and its primary impact comes first on peoples' habits. For instance, teaching in classroom with blackboard and chalk requires a different kind of attitude of teacher but the attitude will be changed while teacher going to use computer or projector for classroom teaching. Second, people must know how to use the technology for the job. Wilson Clark's (2017) study describes early optimism of technology integration in education and its various aspects. In addition, he discusses the present web-based system that already implemented in school. S.K Howard and K Thompson (2016) describes the education system and dynamics and complexity in relation to technology integration. According to them technology integration is complex dynamic social practice within a social system of education. In this study, they demonstrated system approach to better understand the technology integration in teaching strategy. Marie K Heath (2017) discusses about teachers' self-efficiency and belief help to overcome the barriers of new learning and implementation.

In this study pointed out two dimension of creative practice research and its application. Developing a creative application for creativity learning, the educator needs to think about process of work and its validation. According to Candy and Edmond, technology-based artistic work that can be placed in two directions; one is to integrate technology into art or design to dictate the dialogue of the artist, work of art, and participant. The other is to adopt or reinvent the technology to suit the universal languages of artists (L. Candy & E. A. Edmonds, 2002). In this work, I, as an artist integrating the virtual reality technology to design an eclectic art education program for Indian schools. Here, it is essential to point out that I have created the work, not only from an artistic view but also from a catalyst perspective.

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2. Heuristic and practice-based research

Heuristic research undertakes exploration of human experience in a qualitative manner. It is a systematic, organized method for investigating human lived experience. According to Clark Moustakas heuristic enquiry is a self-illumination process that aims to discover self-inquiry and dialogue with others, which helps to illuminate the underlying meaning of important experience of human. It is also an open-ended, self-directed enquiry and immersion in active experience (Moustakas, 1990). Heuristic research methodology accomplishes a thoughtful, orderly way to become immersed within a study; key steps are 1. Identify the focus of inquiry, 2 self-dialogue, 3. Tacit knowledge, 4. Intuition, 5. Indwelling, 6. Frame of reference (Rumi, 2019). In addition to these phases there are six similar phases suggested by Graham Walla (1976). These are 1. initial engagement, 2. Immersion, 3. Incubation, 4. Illumination, 5. Explication and 6. Creative synthesis. This research procedure uncovers the value(s) within personal practice and invokes researcher’s unique perceived experience and captivating phenomena, which help to create meaning of internal and external discourse precisely.

Similarly, practice-based research is also qualitative and acknowledges reflective practice and experience. The term reflective practice was introduced by Donald Schon in 1983. He coined ‘Reflective practice’ as the work of the professional practitioner who thinks in action. Thinking and acting in the discipline of art and design relies on personal knowledge, intuitiveness, and improvisational activity. In such practice, ‘knowing-in-action’ is important in terms of ‘knowing’ by ‘how’. The reflective practice unites research and practice through action. This practice involves confined and spatial knowledge of practitioner. It also involves thinking procedures, doing, reshaping the work. Practitioners improvise the work by feeling response, analysis, and adjustment. This work is based on a wholistic experience of the researcher or practitioner (Gray & Malins, 2004). According to Robson (McCartan, 2016) research credibility and trustworthiness leans on the researcher’s ‘insider’ knowledge and experience and these two core areas must be verified by experts and peers. The validity of the research outcomes depends on the same criteria of credibility within the research context, and trustworthiness encompasses generalizability in which research findings are generally applicable to another research context.

Some similar factors can be observed heuristic and practice-based research. The process of perceiving experience is similar in each approach, as is the process of immersion and the use of intuition and tacit knowing of specialized area. In heuristic research, experiential intimate knowledge comes through the immersion and incubation into material. Practice-based research outcomes can be created using any form of artwork. According to Linda Candy the contribution of new knowledge is demonstrated by creative outcomes that may include any form of artefacts (Candy, 2006). In heuristic research, the creative synthesis develops the research outcome, which could be any form of artwork such as poem, images or song. The research outcome reflects researcher’s intuition, imagination, meaningful personal knowledge and essence of experience (Moustakas, 2001).

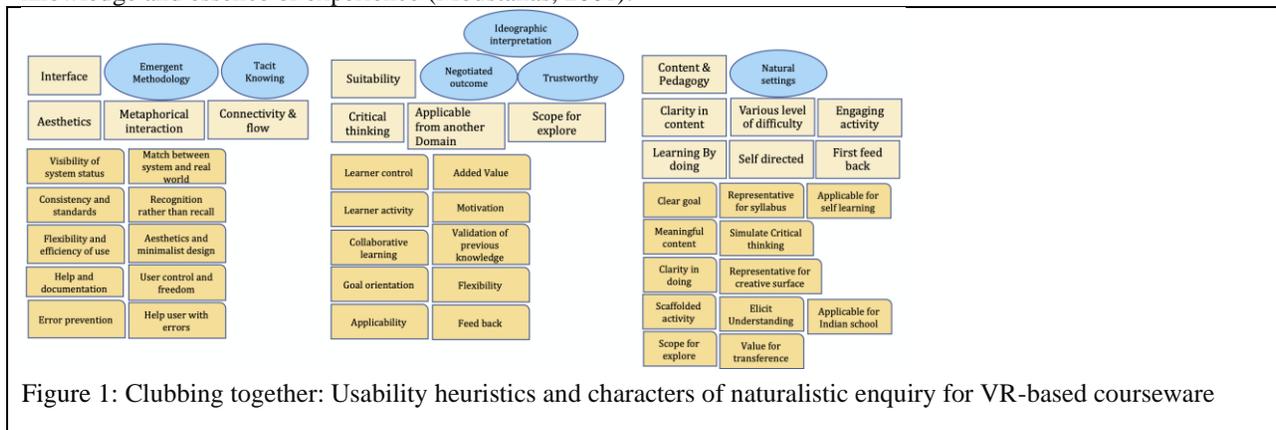


Figure 1: Clubbing together: Usability heuristics and characters of naturalistic enquiry for VR-based courseware

The diagram (Figure 1) maps the various elements that comprise the heuristic enquiry across VR creation, art and design and learning outcomes, and transposes these into a new, hybrid structure that integrates them within a single study.

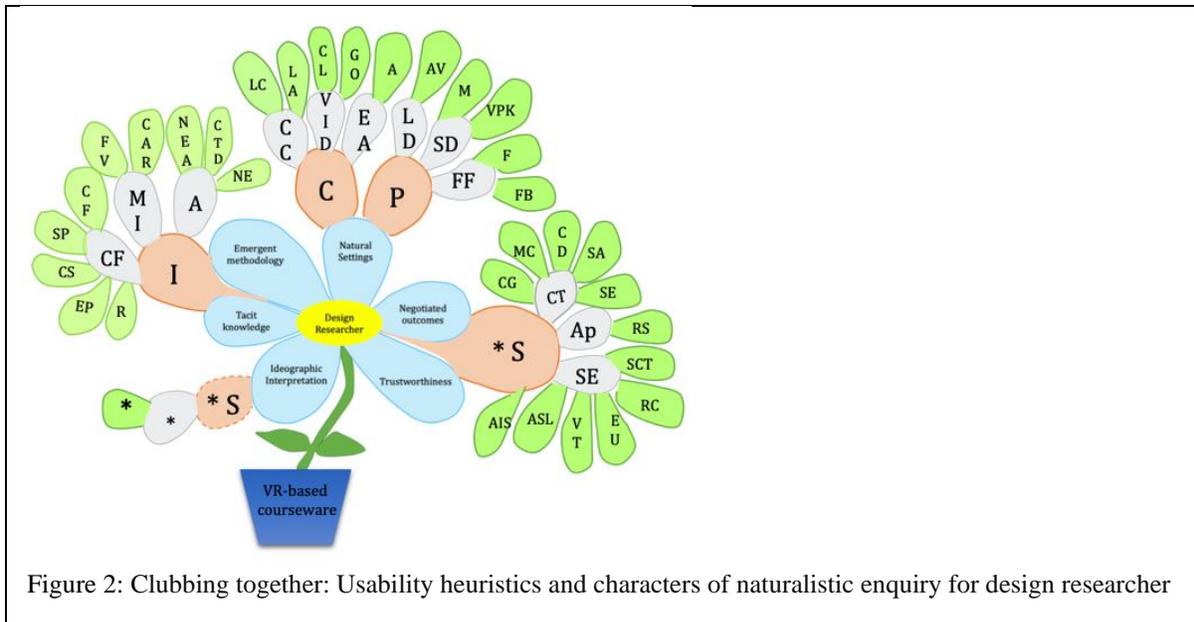


Figure 2: Clubbing together: Usability heuristics and characters of naturalistic enquiry for design researcher

The three sets of heuristics that shows the possibility to develop the connectivity with Bunnells' naturalistic research approach (Figure 2) The six flower petals that indicates the six phase of design approach. Such as tacit knowledge, emergent methodology, natural settings, negotiated outcomes, trustworthiness, Ideographic Interpretation. These six components useful for digital courseware development research. For instance, the interface heuristics connected with tacit knowledge and emergent methodology. The Interface heuristics are looking through the three types of lenses of visual aesthetics, metaphorical interaction, and connective flow. The three lens consist ten main components of interface heuristics (Molich, 1990). Simultaneously, suitability heuristics connected to negotiated outcomes, trustworthiness, and ideographic interpretation. These are metaphor of space, time and people relation (Dewey, 1971) in terms of usability of courseware. The suitability factors seen through the critical thinking, applicability of other domain and scope for explore. The three factor consists ten components (Petri, 2006). Likewise, content, and pedagogical heuristics connected to natural settings and there are six lens to check the reliability of technology driven educational content. The six main factors of pedagogical heuristics consist twelve points that is derived from Albion's twenty eight prescribed heuristics (Albion, 1999).

3. Heuristics on virtual reality-based courseware

Heuristic research is used as a quality assessment in the domain of human computer interactive platform (Santos, Silva, Quintino Ferreira, & Dias, 2017). In this specific area of user interface development usability heuristic evaluation works effectively. As heuristic research explores human experience in qualitative manner, this research strategy is used to evaluate the convenience and usefulness of virtual reality-based platform for developing a courseware. The heuristic evaluation is one of the most effective methods of evaluation, and results in problem reports that appear to be predictors of end user problem (Molich, 1990). It usually involves small number of evaluators who are assigned to inspect the system according to guidelines relevant to the developed system (Hasiyah Mohamed, 2010). Usability analysis of digital learning material is intended to identify appropriate applications for the right target groups of students.

Petri Nokelainen suggested pedagogical usability heuristics for digitalized learning systems. The components are; 1. Learner control, 2. Learner activity, 3. Collaborative learning, 4. Goal orientation, 5. Applicability, 6. Added value, 7. Motivation, 8. Validation of previous knowledge, 9. Flexibility and 10. Feedback (Petri, 2006). The prescribed attribution is developed based on Nielsen's classification of technical usability digital device for education and those ten attributes attached with learning effectiveness. On the other hand, Nielsen considered heuristic evaluation a valuable means for evaluating interfaces during exploratory phases when user study is premature (Molich, 1990). He has described ten heuristics to evaluate digital interface. They are; 1. Visibility of system status, 2. Match between system and real world, 3. User control and freedom, 4. Consistency and standards, 5. Recognition rather than recall, 6. Error prevention, 7. Flexibility and efficiency of use, 8. Aesthetics and minimalist design, 9. Help user with errors, 10. Help and documentation. The intent of this evaluation method is to evaluate a user interface by observing and

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providing opinion in an essence of expert review (Privitera, 2019). By using Nielsen's heuristic framework, VR interfaces could be developed with need sensitive reforms and changes of elements.

According to Albion P. R there it is axiomatic that any type of software should meet minimum criteria of usability standard (Albion, 1999). Albion suggested twenty-eight heuristics for compilation of content and interface of educational software. These heuristics are mainly adopted from Nielsen's framework with some changes implemented explicitly for non-technical background evaluators. He describes three sets of heuristics; 1. Interface design heuristics, 2. Educational design suitability heuristics, and 3. Content heuristics.

After a rigorous observation, three set of heuristics have been defined for this study; 1. Interface, 2. Educational suitability, and 3. Content and pedagogy. These three heuristics are seen through the lens of activity system (Bozalek et al., 2015) and narrative experience (Clandinin, 2006) by experts or end user.

Three sets of listed heuristics

Courseware usability Heuristics: **Interface**

- The uses of space, color and text are according to the principles of screen design.
- Maximizes consistency and matches standards.
- The uses of text, color and font follow the principles of readability.
- Use aesthetics and minimal design.
- Accurate latency (interaction and feedback)
- The quality of multimedia elements, such as text, image, animation, video and sound used is acceptable.
- The interactivity of the courseware is suitable to learners/student's level.
- Understand the individual differences.
- Provide specific and self- identified key for specific task (exit, glossary, main, objective).
- User control and freedom.
- Flexibility and ease of use

Courseware usability Heuristics: **Pedagogy and content**

- Medium for learning by doing
- The activities are interesting and engaging
- Can be used as self- directed learning tools.
- Performance should be an outcome-based
- Reliable content with correct flow.
- The design and the contents are reliable and proven.
- Clear and understandable structure of contents
- Correct and fast feedbacks
- Offers the ability to select the level of difficulty
- User friendly and attractive tutorials
- Relevance to professional practice (As an art practitioner it could be useful)
- Presentation of recourses

Courseware usability Heuristics: **Suitability**

- Clear goals and objective
- Activity scaffolded
- Elicit learner understanding
- Stimulate critical thinking of student
- The value of learning and application
- Suitable for every state's schooling
- Representative the prescribed syllabus.
- Scope for explore and experiment with various visual
- Value for transference and acquiring 'self-learning' skills.
- Representative of creative surface.
- Applicable for Indian school classroom

4. Judgement of heuristics with activity system

In the context of VR based pedagogy and its design and development suggest considering eight components that is prescribed as activity system. The eight components are subjects, tools, objects, division of labour, community, rules, mediated artefacts and outcome (Bozalek et al., 2015). These eight components are used to analyze teaching, learning and design potentials of VR aided content. Some components are closely related to pedagogical usability heuristics (Petri, 2006) such as tools according to need and availability, subject; who and how the action will be taken, Division of labour; the mode of responsibility (self or teacher driven), rules considering the way of doing and what tools and resources are need and available. Some activity system are related to interface usability system (Molich, 1990) those are what are the mediated artefacts are needed, what tools are needed, what will be generated as an object and what will be the expected outcome. Likewise, The suitability of educational software that carries some usability standard (Albion, 1999) that are related to activity system such as division of labour that says who are responsible for the activity, for what community members are interacting with the activity and finally what are the suitable rules that can guide the activity. These all components could be shown in the lens of John Dewey’s experiential philosophy temporal, relational and situational.

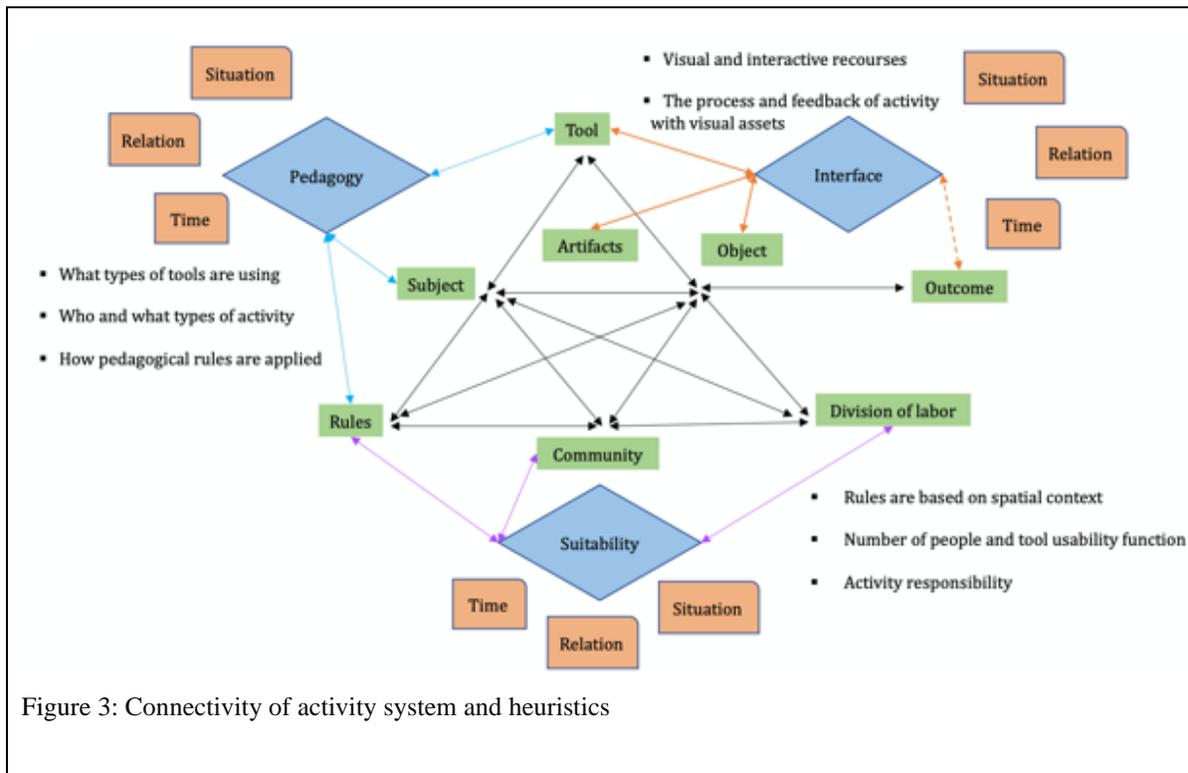


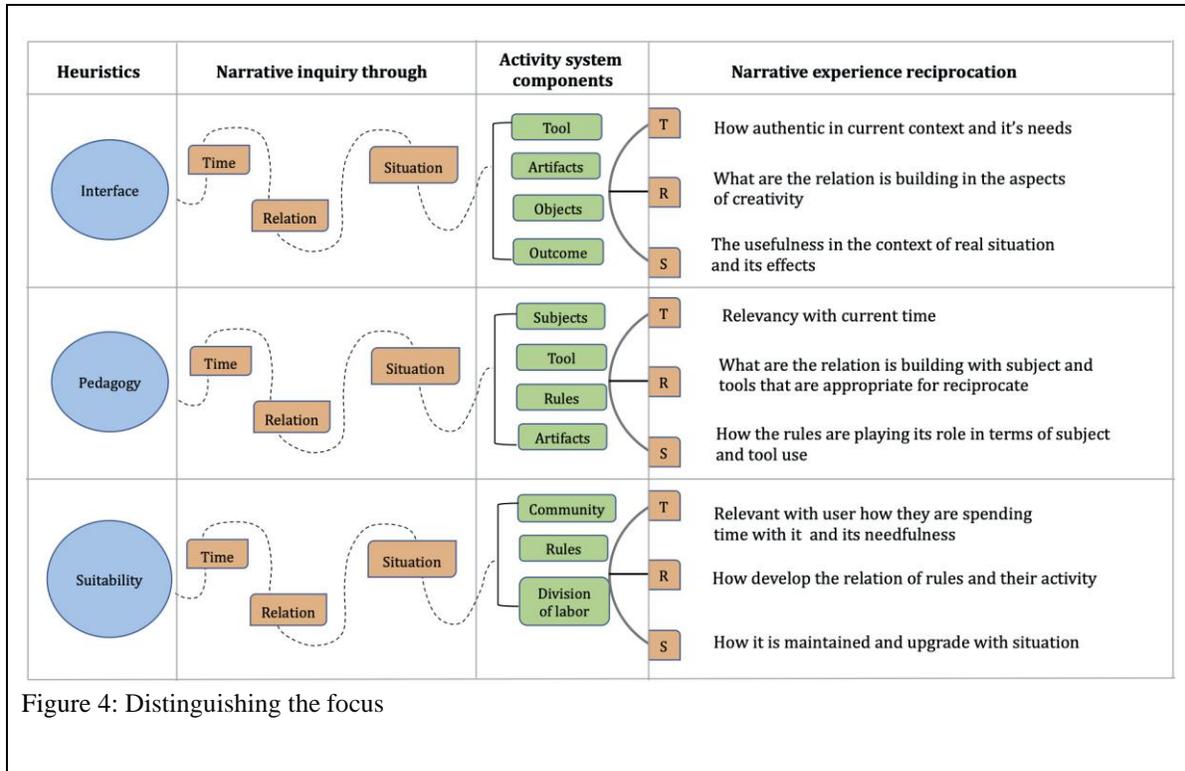
Figure 3: Connectivity of activity system and heuristics

The interface heuristic largely connected with activity system components of tool, artifacts, objects and outcome. These components are seeing through time, relation and situation based narrative experience. In the temporal context it is majorly seeing the tool, artifacts, objects and outcome how it is authentic in current context and its needs. In the relational context it is finding out what are the relation is building in terms of creativity aspects, and in the situational context it is finding out the usefulness and effectiveness.

The pedagogical heuristics mainly connected with subject, tools, rules and artifacts. While seeing through the narrative experiences, the temporal factor is relevant with current time subject, tool using, rules for activity and types of artifacts. The relational factors are bonded with subject and tool usability and finally in the situational context how rules need to manifest in terms of subjectivity and tool usage.

The Suitability heuristics are aligned with community, rules, and division of labour. By seeing through the narrative experience time is relevant with people or community how they are spending time with the system, In relational factor how the relation of rules and activity. In the situational context how, it is maintained and upgrade with the space.

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5. Conclusions

Throughout they study it is very evident that the virtual reality-based creative practice is two folded. It is satisfying the educators creative growth as well as it is developing the efficacy of teaching. To develop a creative courseware is require a profound clarification on its usability and outcome factors. This study is emphasizing the proximity of interface, pedagogy, and suitability heuristics and activity components. These two sets of VR measuring criteria is beneficial while it is applying on the practice. The research, which is based on the creative practice that must contain an explanatory frame in which researcher/ practitioner could scaffold the complete process and evaluate the system and its effectiveness.

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