

Conceptualization of a Behavior Modification Tool for University Systems and Doctoral Students

N. Kavita, Mary Mathew

Department of Management Studies, Indian Institute of Science, Bangalore, Karnataka - India

Abstract—This paper describes a university based system relevant to doctoral students who have problems with themselves, their peers and research supervisors. Doctoral students have various challenges to solve and these challenges contribute to delays in their thesis submission. This tool aims at helping them think through their problem in a pre-counseling stage. The tool uses narratives and hypothetical stories to walk a doctoral student through options of responses he or she can make given the situation in the narrative. Narratives were developed after a preliminary survey (n=57) of doctoral students. The survey indicated that problems they experienced were: busy supervisors, negative competition from peers and laziness with self. The narrative scenarios in the tool prompt self-reflection and provide for options to choose from leading to the next scenario that will ensue. The different stages of the stimulus-response cycles are designed based on Thomas-Kilmann conflict resolution techniques (collaboration and avoidance). Each stimulus-response cycle has a score attached that reflects the student's ability to judge a collaborative approach. At the end of all the stages a scorecard is generated indicating either a progressive or regressive outcome of thesis submission.

I. INTRODUCTION

This paper describes the design and development of a software tool that navigates a user through scenarios related to behavior maladjustments in academic contexts. The scenarios used in the tool are narratives based on experiences of doctoral students in a university setting. Doctoral students take up challenging research topics and are often faced with behavioral adjustment problems during their tenure as students. The institutional infrastructure created to solve this problem relies on students visiting the counselor, reflect upon their behaviors, emotions and find answers to their problems. Meeting a counselor can be referred to as therapeutic counseling and is one of the traditional methods suggested by academic institutions (universities and research organizations) for students to solve their behavioral adjustment problems. A face to face dialog with a counselor facilitates a doctoral student to find answers and manage adjustment issues. While most students working under enormous amounts of pressure cultivate a self uplifting style to overcome failed behavioral situations, others succumb to the pressure.

The rapid growth of technology has prompted the use of ICT tools for different health related interventions; ICT tools such as serious games for the betterment of mental health. In this paper we study literature from two perspectives. The first perspective is the role of computer tools, serious gaming, and user engaging approaches in the context of therapeutic

counseling. Serious games when used appropriately in counseling have proven to be successful in addressing adjustment issues. The second perspective is the behavioral science side of counseling approaches that provide self-reflection and a self-uplifting outcome in individuals dealing with problems. Resilience helps individuals develop a bounce back that would help by encouraging introspection about their past experiences. This article describes the concepts related to a tool which passively mentors adjustment issues and provide reflective insights to its users. The tool indicates problems typical of a doctoral student (user) through engaging narrative scenarios. The narratives comprise of problem-solution sets, with narratives that solve behavioral problems in different ways. The narrative scenarios are based on conflicts encountered amongst researchers, their supervisors, and research peer groups. Conflict resolution consists of win-win to lose-lose styles of approach. The tool consists of such conflict resolution stimuli-response narrative cycles which are spread over stages (meetings with actors over time). Each stage lets a user encounter a situation; a problem a student faces with his/her peers, and provides actionable choices for solution. At the end of each stage, the user gets a score that depicts how optimally he/she could solve a problem at hand. The tool is reflective and suggests solutions that prompt behavioral adjustment. Such exposure aims to speed up research timelines for doctoral students and minimize the delays that are non-technical and/or behavior related, since the students prefer to avoid face-to-face meetings with counsellors.

II. LITERATURE REVIEW

A. Positive effects of gaming:

The sophistication in computer technology in the late 80's prompted the study of a computer application devised for psychotherapy [18]. The study by Newman in 1986, focused on various therapeutic computer applications which involved replacing a therapist with a computer. The study presents the individual an opportunity to confront and master situations that are considered amiable in society. This research is one of the earliest studies where gaming has proved to be effective when used in therapy.

Later in 1998, Sheher [21] designed a computerized therapeutic simulation game that raises the moral level of junior and senior high school students. Students were asked to play with various moral dilemmas and were asked to create some of their own dilemmas. There seemed to be a positive effect on students with respect to the change in their moral development and moral consciousness after being introduced

to the game. Authors [5] make a mention of ‘serious games’ (games which are for educational purposes including fun) and argue that game based learning in classrooms can bring positive change in the construction of student identity and a sense of self.

A 3D game called Emotional Labyrinth contemplates the levels of anti social behavior among children. The preliminary purpose of this game was to build an attractive tool to facilitate interactive psycho-pedagogical counseling sessions between children and counselors. Emotion Labyrinth: Learning to Rationalize Emotions through 3D Game Environments, allows the player to change his/her negative emotions to positive emotions. The system delivers a narrative at the end of the game which depicts changes in emotions of the player while playing. It was concluded that the player is able to ‘inspect’ his/her internal emotions from a system generated narrative of choices [13]. The ‘Personal Investigator’ on the other hand, lets players share their personal problems in the game and find ways to solve them in an incognito mode involving an avatar and timely helps from different animated characters in the game for ex. detectives or a random passerby who helps solve problems [15].

B. Studies on doctoral students:

Since the goal of this tool is to induce self-help approaches in doctoral students, our literature is focused mainly on cognitive behavior therapies such as REBT and client centered therapy and self-help traits such as resilience and Thomas-Kilmann conflict resolution techniques. This and the following sections of literature focus on a discussion of few studies with samples from doctoral students. The focus of these studies is on pressures faced by doctoral students; reasons for conflicts during research and importance of a steady relationship between student and guide.

Studies on doctoral students focus on the different changes in behavior that students demonstrate during their time as doctoral students [8]. Disappearing behaviors, is defined as the gradual decline in sharing, literary skills and the working practices of a student, due to which there is minimum interaction with peers and a complete absence of study groups that inculcate a collective learning experience. Researchers [7] discuss the importance of an advisor in guiding a student in writing, mentoring and making him/her aware of the discipline of writing a dissertation. The study also focuses on fragile relationships between a doctoral student and his/her supervisor. Researchers discuss the reasons a doctoral student chooses a research guide across academic disciplines. When the guide is chosen, the motivation levels differ in students as opposed to when the guide is assigned to students. It is said that, studying various motivating factors help students of different fields— like medical research, natural sciences and behavioral sciences— choose different research paths as career options which make supervisors understand the needs of students [22]. The intrinsic motivation of doctoral students as studied by researchers [14] suggests that delivering a Ph.D. dissertation is a result of a matter of drive in some students. In

some others it may be because of the need to identify with a dissertation or because they have an irrational desire to get a Ph.D. and also sometimes due to a fire within that results in a well applauded dissertation. Another important incentive for doctoral students to be motivated as recognized by researchers was the one drawn from the relationship a student and his/her guide share. A positive relationship and healthy interactions between the guide and the student increases the motivation of a student towards his/her research work and producing a dissertation. The next two sections discuss various self-help inducing cognitive behavior therapies and techniques which help individuals self-reflect on their behaviors and actions. This builds the foundation for the tool discussed in this paper.

C. Cognitive behavior therapy inducing self-help:

Rational Emotional Behavior Therapy is a type of cognitive behavioral therapy developed by Albert Ellis in the early 1950’s which primarily helps clients change or alter their irrational beliefs [10]. It was observed that clients progressed well only when they changed the way they perceived themselves, their problems and the world around them. REBT reasoned that therapy would progress faster if the focus was directly on the client’s belief. Researchers [9, 11] postulated that the activating events were not the real reason for the ‘cause’ of distress but irrational beliefs an individual has about those events. This could lead to two different consequences - healthy emotional consequences and the negative emotional consequences.

Rogers’s Client Centered Therapy focuses on a positive and constructive personality change in clients, who possess resources of self-knowledge and self-healing and considered each individual to have a potential to grow from within and see through his/her problems without being influenced by the therapist’s ideas in addition to having the inner resources to meet life’s difficulties [26]. The six conditions postulated by Rogers [19] namely, being client centric, work around a clients belief system which when focused on, helps a client understand his/her own actions better and nudges positive change from within the client without any external help from the therapist. Our research focuses on the fundamentals of these two aforementioned therapies in helping doctoral students introspect and self-reflect and thus trigger positive changes in their behaviors.

D. Self-reflection theories: Resilience and Conflict Resolution:

Resilience theory, considered parallel to the theory related to continuum of vulnerability, was first defined as the two types of coping: a) “Capacity to cope with opportunities, challenges, frustrations, threats in the environment”. b) “Maintenance of internal integration” [12]. Current theories view resilience with multiple constructs like temperament and personality traits of an individual in addition to specific skills (like active problem-solving) which allow individuals to cope with drastic events [4]. Resilience as studied by researchers [25] is based on a construct which is; presence of

positive emotions in individuals resulting in high resilient behavior. Resilient individuals are capable of harboring positive emotions and cope better than other non-resilient individuals.

Resilience was also studied with respect to the ability of individuals to “successfully adapt or bounce back” from stress or trauma. Researchers [2] define resilience as recovering from a simple insult and the ability to maintain a stable equilibrium. Maintaining that resilience is different from recovery, researchers [2] further claim that resilience theories would fit appropriately if studies focused more on the individuals dealing with a lot of stress, instead of cases with loss of loved ones or devastating calamities.

Conflicts arise when there is a disagreement between two parties over a common interest. Thomas and Kilmann [23] described conflict as “*a situation in which concerns of two people appear to be incompatible*”. They further classified individuals into two dimensions of behavior and assessed how they would resolve conflicts from methods they developed namely: collaborating, accommodating, compromising, competing and avoiding. Conflicts in the context of doctoral students were studied by researchers [1] which focused on the fact that timely completion of a Ph.D. thesis dissertation is crucial to students who have a tendency to become the all-but-the dissertation students. Conflicts of doctoral students are grouped as emotional and developmental conflicts which students have to help solve as studied by researchers [3]. When unaddressed these could bring differences in the relationship with the supervisor. The ideal situation of resolving a conflict is by having high cooperativeness/collaboration and assertiveness/accommodation which would result in collaboration (Win-Win situation) of ideas or opinions in the wake of a disagreement. The alternative is by portraying an all time low in both the dimensions of behavior which would result in avoiding (withdrawing) the situation completely and then, chances of resolving the conflict become remote. Nevertheless, the neutral situation of compromising would mean that both parties have agreed to a common ground and have resolved the conflict [23].

E. Narratives for games:

Narratives have proven to be successful in creating a background and capturing the attention of individuals subjected to them. Narratives when used in presenting cases comprising appropriate stories augment and build stronger connect with the audience and leave persuading effects on people more often than not. Stories have inspiring outcomes on people when told in a manner which is involving and captivating. The head of a successful company would be is a great story-teller with his/her inspiring visions and narratives. A narrative or a storyline is a situation of an ongoing event which when told in a certain way can either build or break motivation in people. To involve people in a deeper level, a narrative or a storyline should “*display the struggle between the expectations and realities in all its nastiness*” [16].

Narratives in games have a positive effect on players since they are put through an engaging environment and are further motivated to create their own storylines. Narratives, when incorporated into games, can bring out a better interaction between different media, different communities and different genders [17]. Such games often have a long lasting effect in a players mind since all events happen simultaneously; they give an impression of an episode happening for real. Whether a game is made with parallel narratives or branches of narratives, the player always has a “*linear experience*”- the beginning, the middle, the end, and a possible result [24]. Narratives in games are used to induce intrinsic motivation such that it causes curiosity and imagination.

The behavioral problems doctoral students face in their tenure, although not always entirely devastating, hampers the progress and performance of the student. The students that find themselves in a situation of behavioral adjustment challenges often unfortunately deny the presence of a problem faced. For reasons related to how one must project oneself to the outside world, these denials are more so in case of behavioral problems on a personal front. This situation is more poignant in societies such as India where projecting a happier picture of the self is desired in the public eye. In other words individuals are not keen to voice their behavioral problems and solve them through dialogue with any other significant other. Whilst face to face bi-partite dialogues can solve the problem, if the student is willing to dialogue with another, yet another approach is to have a non-human impersonal interaction surrogate to the dialogue. Research studies have rendered evidence in establishing that computer aided mental health interventions when used appropriately in counseling, are successful in the management of mental problems related to young adults [20]. There is opportunity for tools, such as computer aided ones, to play the role of a reflective third party therapist or significant other when current institutional or non-institutional solutions do not meet the role.

III. INSIGHTFUL INTROSPECTION: A PRE-COUNSELING BEHAVIOR MODIFICATION TOOL

This section describes the tool and its design and development stages. The section is divided into two sub-sections namely, the tool design and the stimulus-response cycle description, respectively. The tool design involves the technical framework for the tool, the structure of the tool, the inputs and the requirement specifications. The next sub-section discusses the creation of the narratives that are incorporated into the tool. Before the tool is discussed, the tool design is described in a stage-gate process [6] with different stages depicting the progress of the tool and its respective gates screening all processes. This is similar to the go-kill gates if stage-gate decision making. Thus while the player uses the tool they will have go-kill decisions to make regarding the behaviors of actors in the situation.

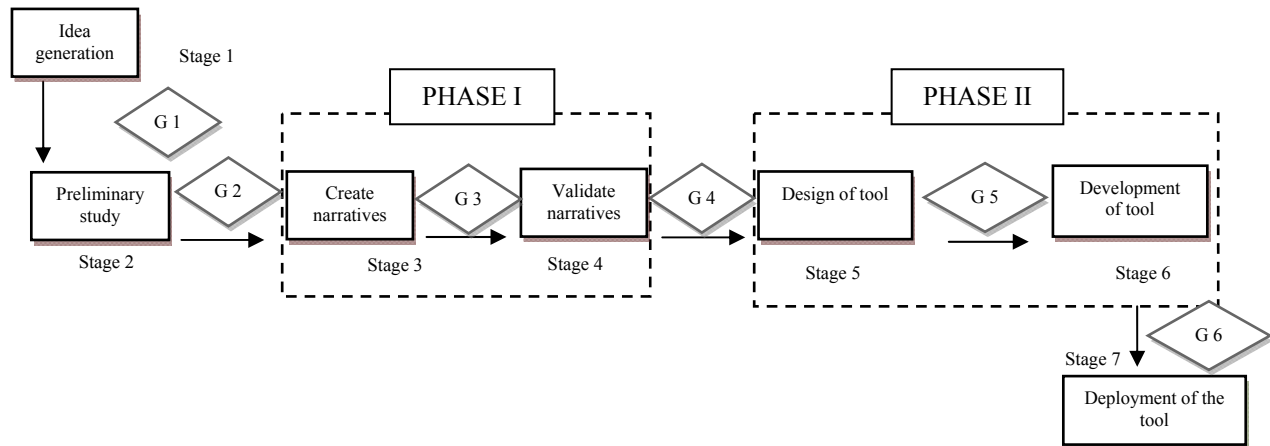


Fig. 1 Figure showing the stage-gate process of the tool

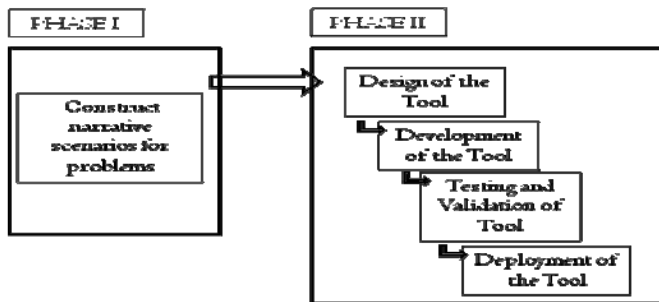


Fig 2: The two phases of the I-I tool development process

A. The Insightful-Introspection Tool Design:

The figure below is the two-phased diagram of the proposed design and development of the tool. The phases are described in detail below.

a. *Phase-I*: This phase consists of the construction of narrative scenarios for problems faced by doctoral students. Some of these problems were identified after a survey of doctoral students who expressed problems they faced with their guide, self and peers. These narratives are further developed based on the conflict resolutions methods devised by Thomas-Kilmann. The scenarios are portrayed in a manner and they navigate players (users, namely, doctoral students) through behavioral situations that are complex, but which at the same time can be managed by the student without third party counseling. The situations trigger thoughts and the user possibly falls back on their beliefs to engage with the situation further. Ranging from the different methods discussed earlier in the literature section, the narratives are built around ways to resolve conflicts such as taking up the accommodative path or using the communicative way or ignoring the conflict by avoiding a difficult situation. These methods although overplayed by the storyline, depict the various ways to resolve conflicts.

b. *Phase II*: This phase focuses on the design and development of the tool which lists the technical requirements, the platforms and operations of the tool.

Once a specific tool-kit is recognized for the development of the tool, it has to be designed in a manner to fit requirements such as inclusion of narratives at varying points of time. Once the design document is in place, the development of the tool starts and includes all the operational details. The next step is to validate and test the tool which is done in order to recognize if the tool is performing in a way in which it was planned to. Iterations are made to the design and development as and when there is a disparity found with the goal. Deployment of the tool with doctoral students will commence after the tool is tested for operational defects and design issues.

B. The stimulus-response cycles in narrative scenarios:

The action (stimulus)-response cycles comprise of narrative scenarios which are outcomes of problems that a student faces. Each cycle consists of five scenarios to choose from based on the conflict-resolution methods. The Thomas-Kilmann styles are used to design the narratives as mentioned earlier. To resolve conflicts the 5 styles used are collaboration, compromising, accommodating, competing and avoiding [23].

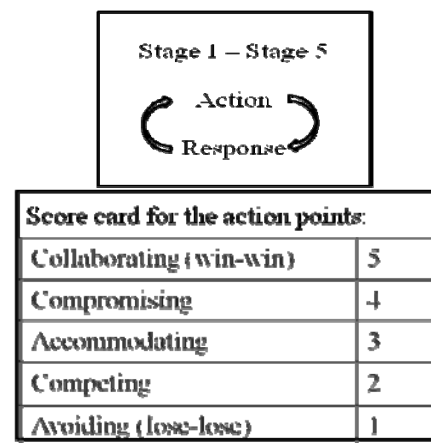


Fig. 3: Stages and score card for the conflict resolution styles

The figure above shows the different scores assigned to each of the conflict resolution style. The stages (1-5) are a series of stimulus response situations that enable players to navigate through a problem situation. The narratives are designed such that the actual conflict resolution style, for example avoiding a situation is not directly stated but is implied.

An example scenario obtained from problems narrated by doctoral students is as shown below:

"Deepa, 24, is a research student from HH city. From the beginning of her research training program or course work (RTP) she was the best in her batch. Things began to change when she started her research with her guide. She being a student straight out of her undergraduate program had very little or no research experience. Thesis writing was new to her and she was only beginning to learn how to articulate technical writing. On one such occasion during a discussion with her guide, she was made to redo (with improvement) everything she had written and asked to leave. Taken aback she was disturbed and upset."

For the above generated scenario, action-response cycles are created keeping the Thomas-kilmann conflict resolution approaches as a reference. The action (stimulus) generates a response which in turn becomes the narrative scenario for the next stage and this follows until the end of all the stages. The five scenarios shown below depict how narratives are designed as methods of conflict resolution. As a follow up to Deepa's story, in the stage 1 the following are a few ways in which she could handle her situation. After a selection is made in the stage 1, a set of different scenarios are presented in stage 2 and so on until stage 5. Each scenario falls under the spectrum of win-win to lose-lose combinations.

STAGE 1. Scenario 1: A collaborative style of working – (win-win for student and guide)

"Deepa became very alert soon after her guide asked her to leave the room and re-do her document. She wanted to get it right immediately. She went back to her desk and started making amends to her writing. After sitting for two hours without distracting herself, she had finished something and wanted to report to her guide. She asked for an appointment and met her guide. She wanted to dialog with her guide so that she did not repeat such mistakes again."

STAGE 1. Scenario 2: A compromising style of facing conflict – (win-win for student and guide)

"Deepa wanted to change her document as soon as possible so that her guide is not unhappy again. She had to do something before it was too late. She went back to her guide and asked for his inputs. He was still upset by her output because she had excelled in every course she had taken and was good at almost all other projects and assignments. Keeping the larger goal in mind, Deepa chose to concentrate on what her guide had to say about her document."

STAGE 1. Scenario 3: An Accommodating situation – (win-win for student and guide)

"Although completely taken aback, Deepa wanted her work to progress. She went back to her desk late that night and started her document from scratch. She knew she had to win her guide's confidence back in order to stay ahead with her work. She took two days and wrote another document and emailed it to her guide. She did not want to think too much about her guide's words which hurt her. She would rather focus on work and finish her task".

STAGE 1. Scenario 4: A competing situation – (win-lose for student and guide respectively)

"Deepa was a smart student who knew this for a fact. She did not appreciate the way her guide snubbed her with her work. She did not want her guide to think she was any less than him. She had taken it up as a challenge to show her guide that she was as good as he was or even better. She worked tirelessly for a night and produced a document which she believed was much better than her guides work. She was quite confident that this would silence her guide".

STAGE 1. Scenario 5: Avoiding a situation – (lose-lose for student and guide)

"After that scene with her guide, Deepa decided she would boycott her guide. After all she was the best in the academic Department for most semesters. She had done commendable work but her guide was not qualified to recognize her talent. She decided it was time to take things on her own. She did not need his advice to submit her thesis or any document for that matter. She was excellent in whatever she had done so far, and this was just writing a document. She was confident she could manage on her own. She did not go back to meet her guide."

For each method chosen, a score is generated which at the end of all the stages is shown to the student. Figure 2 shows the stages and the scores for each action point in the five cycles.

These situations when chosen would send the player to another set of five scenarios in the next stage. Hence, each situation such as the one described in the case of Deepa, develops with time ensuring the emergence of a learning cycle. The cycle would continue for about five stages and then give the player a final score. The player selects the consequential scenarios of each stage based on how the player thinks Deepa must act further. The selection of scenarios is as shown below. The scenario 1 (S_1) is the first narrative a player chooses, which would give five action points (A_1 - A_5). The player next chooses one of the action points which transforms into the next scenario (S_2). This continues for the n^{th} stage (five stages in this case). At the end of the five stages the player is given a final score according to the chosen choices. Figure 3 shows how each stage has stimulus-response cycles that is presented with scenarios from which a player chooses the appropriate option to go to the next stage.

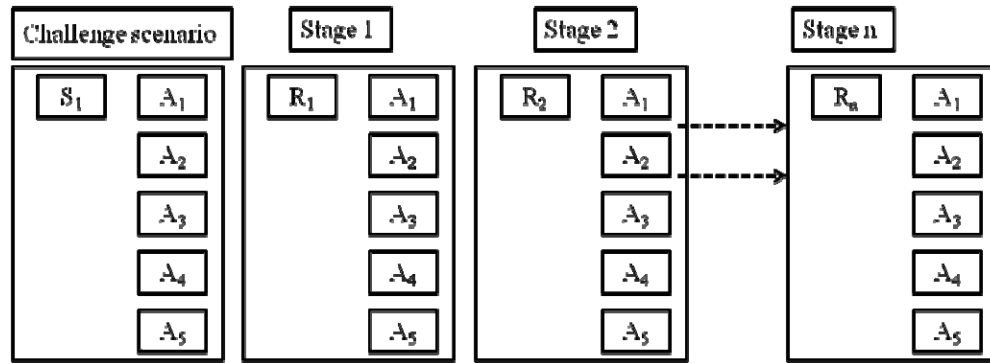


Fig. 4: The action-response cycles in the stages

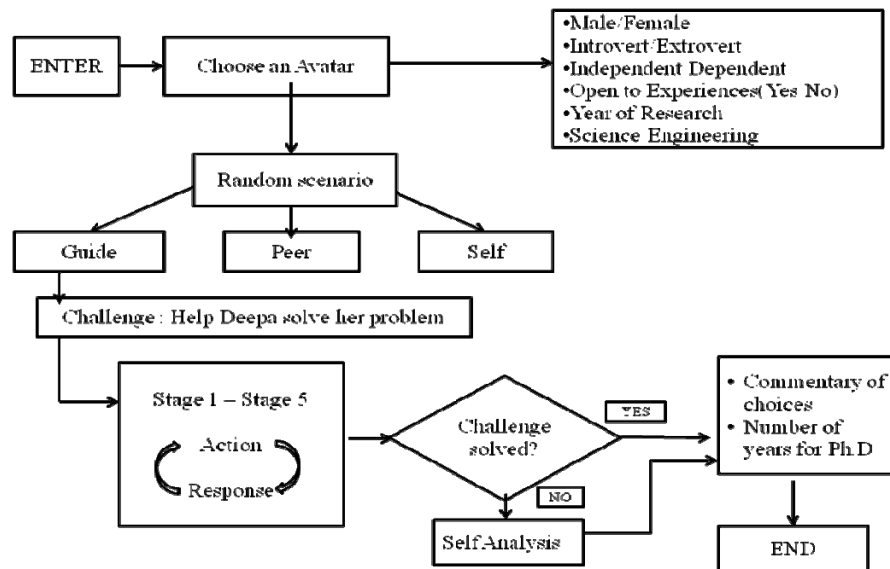


Fig 5: Design of the tool

At the end of all the stages the tool gives a score and prompts if the student needs a self-analysis examination when the score dips. If the student chooses to go into analysis, implying the user is not satisfied with the outcomes, then the next level of the tool takes the user through reflective behavioral self tests. The self-analysis method uses standard time tested questionnaires measuring the personality traits, attitudes and resilience. After the self-analysis the student is either given a choice to exit or choose another problem to negotiate or re-negotiate the current situation. A crude sketch of the overall tool design for the case of Deepa shown previously is as in figure 4.

At the beginning of the tool experience, as soon as the player enters the console, he/she is asked to choose an avatar which best describes his/her (user's) personality or mood (hate and anger/happiness/confused, for example) at the moment. After this step, the player is given a choice to choose a scenario with respect to the guide, the peer and the self. The player then enters the five cyclic stages which would determine his/her score. The next step would be the

tool's decision to suggest to the player to take a personality test based on the score the player obtains from the stages. The commentary of choices followed by an entertaining feature would be the last segment of the process of the game. The tool is aimed to be an .exe file which is platform and OS independent available over the internet.

IV. DISCUSSION AND FUTURE WORK

With the advent of technologies that may assist psychological counseling and therapists, our paper attempts to understand the dynamics of counseling without the personal intervention of a therapist. The tool expects to fulfill its purpose of inducing a sense of self reflection in a doctoral student with the goal of completing a doctoral thesis in due time. Future work includes building scenarios for each problem (at least 5 for each case), building various narrative cases for the guide-student, student-peer and student-self scenarios. A face validation of the story lines scenarios will be conducted with experts. Once the conceptualization of the

scenarios are complete, deciding the technical requirements for the tool would start. Development of the tool (the technology required to realize the design) and testing the validity of the tool would be followed by deploying it for use and finally validating the tool with doctoral students.

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