Weaving User Immersive Experiences: Scientific Curiosity and Reasoning with Bodily Feelings Mapping and Evolution

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Abstract. The objective of this paper is to propose a gamification platform called Free2Grow that promotes scientific critical thinking based on User Immersive Experience (iX). Essential condition for effective use of media and methods is to make sure that they trigger and direct youngsters' curiosity, support their reasoning and emotional states, so that the learners are engaged and participate in new idea generation in co-creative writing. Free2Grow main characteristics are as follows: (a) diagnose/feed conative characteristics such as curiosity and reasoning as well as body atlas feelings as subtle ways that drive a youngster's reasoning and resilience; (b) enable gamification architecture; (c) team building and group formation techniques; (d) learners' active engagement in team co-creativity projects that will necessitate and make reference to the knowledge and skills acquired.

Keywords: Gamification, Immersive Experience, critical thinking, curiosity, emotional states, Computer Supported Collaborative Learning Communication, E-research with Communities, Team Based Innovation.

1 Introduction

Nowadays, there are several challenges for initial education such as fostering talent and training; transitioning from school to work; gaining and retaining employment; and introducing new skills: personal, social and learning skills such as initiative, resilience, creativity, team-working, empathy, co-construction and connectedness as well as skills for management, organisation and metacognitive skills which are important for learner-centered, social and lifelong learning. Free2Grow is a novel educational collective intelligence multimodal platform aiming to support, advance and challenge the interplay between reasoning and curiosity and feelings mapping charts by the creative use of gamification and enhancing youngsters' associated competencies for the Semantic Web. In result, based on these conative drives as well

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as cognitive, affective and social factors, advanced scientific thinking for technological meaning and implementation in action can help youngsters to unlock their potential.

2 Free2Grow Design

Free2Grow is focused on supporting students' natural curiosity and reasoning as well as feeling recognition and control, individual interests, drives and opening up the space for their reasoning including aligning several aspects of diverse information. These directly affect inductive/deductive reasoning preferences and thus, choices on decisions youngsters make on learning pathways, leading to tailor-made, targeted and constructive learning as well as motivating and engaging in teamwork. Consequently, an attractive and efficient gamification educational system provides customisable control, assessment and guidance for the youngsters to be responsible for their learning. Such functionalities can make thoughts and reasoning obvious in metacognition and challenge the youngsters on their preferred technological subject by providing creative flow conditions for their knowledge utilisation. The new unification learning model enables them to develop volition for technological innovation key competences as well as awareness and sensitivity about specific needs, excitement, enthusiasm and joy found in imaginative and innovative activities.

It is already known that emotions are connected to a range of physiological changes, such as perspiration, raised heartbeat, etc. New research reveals that emotional states are universally associated with certain bodily sensations, regardless of individuals' culture or language. Researchers found statistically discrete areas for each emotion tested, such as happiness, contempt and love that were consistent regardless of respondents' nationality. In science of emotion, consciousness and feeling evolution support the Free2Grow feeling mapping [1] and chart: Shame, guilt, apathy, grief, fear, hatred, tension, anxiety, worry, restlessness, desire, anger, pride, courage, neutrality, relief, willingness, acceptance, reason, gratefulness, friendliness, love, happiness, joy and peace. Emotions are often felt in the body, and somatosensory feedback has been proposed to trigger conscious emotional experiences, allowing the construction of culturally universal categorical somatotopic maps. Perception of these emotion-triggered bodily changes may play a key role in generating consciously felt emotions. Basic emotions, such as anger and fear, caused an increase in sensation in the upper chest area, likely corresponding to increases in pulse and respiration rate. Happiness was the only emotion tested that increased sensation all over the body.

Secondly, Free2Grow is focused on Semantic Web allowing the direct interchange of existing and user-generated data with internal and external software components. The two main aims are achieved by (i) separating Free2Grow architecture in the individual and the small-group level; (ii) facilitating users in creating an initial detailed profile for cognitive, affective, conative and emotional characteristics diagnosis, mapping and guidance aiding the individual to evolve in their personality traits and activities; (iii) providing semantic multimedia identification and real-time context-aware analytics; (iv) supporting learning activities coordination on an individual and small group level by adaptive Computer Supported Collaborative eLearning (CSCeL) scripts (learning scenarios); (v) offering customisation of educational resources and learning networks for building up individual and team learning pathways; (vi) addressing these specific personality characteristics as mediating factors between the perception of feedback, the goal pursued and the responses made; and (vii) developing feedback to challenge and keep youngsters into creative flow via innovative forms of CSCeL assessment based on feed-in -back and -forward system suggestions.

Thirdly, Free2Grow follows level descriptors such as knowledge, skills and competences Lifelong learning; key competencies (knowledge, attitudes and skills) are essential in a knowledge society and guarantee more flexibility in the labour force, allowing it to adapt more quickly to constant changes in an increasingly interconnected world. They are also a major factor in innovation, productivity and competitiveness, contributing to the motivation and satisfaction of workers and the quality of work. Following the EC direction, technological and digital competencies are two of the basic the basic ones. Technology is to improve human capabilities, and then using tool-augmented behaviour and habits to influence the further refinement of the tools, in a continual “co-evolution.”

For the third focus, Free2Grow provides the knowledge (educational material), enhances youngsters’ cognitive (involving the use of logical, intuitive and creative thinking) and practical skills (involving manual dexterity and the use of methods, materials, tools and instruments) and competencies (indicators for individual responsibility and autonomy).

3 Curiosity, Reasoning and Emotions in Gamification

Free2Grow supports the challenging and creative interplay between the conative drive of curiosity and its counterpart cognitive factor of reasoning with an attractive collective intelligence platform using pictorial/rich media databases to enhance user generated context and the co-creation of open-corpus knowledge and open innovation. Such approach requires detailed descriptions of the ways youngsters acquire knowledge, learn and apply new information on both an individual and small-group level, and use pedagogical pathways and scenarios for learning activities coordination to support their learning curve as learning pathways. The following aptitudes exist in learning [2]: Cognitive aptitudes include (a) intellectual ability constructs, consisting mostly of fluid analytic reasoning ability, visual spatial abilities, crystallized verbal abilities, mathematical abilities, memory space, and mental speed; (b) cognitive and learning styles; and (c) prior knowledge. Affective and Conative aptitudes include (a) motivational constructs such as anxiety, achievement motivation, and interests and (b) volitional or action-control constructs such as self-efficacy.

If the reasoning ability is enhanced by specific reasoning techniques associated with several and diverse individual learning styles and curiosity is supported to create a challenging creative flow, a youngster can be motivated either on his/her own or with peers to creative discovery.

3.1 Cognitive, Affective and Conative Learning Aptitudes – Group Cognition

Cognitive-Learning Aptitudes: Reasoning. Emphasis has been given to different aspects of cognitive personality driving to the cognitive and reasoning styles of an individual. A cognitive style refers to an individual's characteristic and consistent approach to organizing and processing information [3], while see it as a fairly fixed, static and in-built characteristic of an individual and thus mostly unconscious [4]. Thus in most cases cognitive and learning styles are studied together as for example, field independence-dependence [5], holistic-analytic [3], auditory-visual (e.g. sensory preferences of divergent and convergent thinking learners. Consciously using appropriate and most suitable reasoning styles is a skill; reasoning is used to associate one idea to the related idea building cognitive structures and synapses in the brain. Thus, achieving cognitive change in the brain leads to behavioural change, translating a skill to competence. Many educational and knowledge-based systems have been based to different reasoning styles such as deductive, inductive, abductive, analogical, fallacious or gestalt reasoning. Therefore, classification is needed based on what the system does and how it does it.. If appropriate tools are integrated in a Collective Intelligence System, they can facilitate technological concepts, taxonomies, causal relationships, co-occurance relationships, etc. Therefore such system tools can facilitate, support and enhance dynamic generation of problems where new instances can be generated for conceptual change and behaviour to occur.

3.2 Affective/Conative Learning Aptitudes

Cognitive abilities are distinguished from affective/conative abilities (such as anxiety, motivation, emotion, interest and curiosity) [6]. Curiosity is based on other affective learning drives and factors calling it as a passion or appetite for learning. Curiosity is the desire to know, see (knowledge) or experience that motivates exploratory behaviour, and, furthermore, curiosity is activated when there is the feeling of lacking knowledge for a subject of interest [7]. Such information need is substantial and capable of increasing subjective feelings of competence, in our case technological and digital competencies. Therefore curiosity also serves as an intrinsic motivational and activation factor. Intrinsic motivation is an internal state typified by a strong desire to engage and interact with the environment with stimuli. It is reinforced by interest and enjoyment, a willingness to initiate and continue autonomous behaviour, and prompts an individual to engage in activity primarily for its own sake, because the individual perceives the activity as interesting, involving, satisfying or personally challenging. Interest can be reinforced by competence and plays a primary role in intrinsic motivation [8]. Interest is defined as the emotion underlying curiosity, exploration, and attention [9]; also it is the result of "conceptual conflict" or "conflict between mutually discrepant symbolic response-tendencies as thoughts, beliefs attitudes, conceptions" [9]. Such configurations, or "schema-experience mismatches," are inherently attention-getting, causing arousal of autonomic nervous system activity which essentially has an interest provoking function [10]. Interest leads to selective attention of a particular stimulus which in turn produces exploration, investigation and manipulation of the stimulus [11]. He also notes that an "active-cognitive" orientation of joy "tends to be associated with a sense of vigor and with feelings of strength, confidence, and competency".

Curiosity seems to be the attitudinal exemplar for intrinsic motivation. It has been extensively used in gaming as the means to re-enforce repetitive desirable behaviours. If effectance and self-determination are necessary and perhaps sufficient conditions for curiosity, their utilization represents two key strategic objectives vital for the construction of intrinsically motivating persuasive messages (self-determination theory). Curiosity is the conative internal state when subjective uncertainty generates a tendency to engage in exploratory behaviour aiming at solving or mitigating this 'inconvenience'. This discordance has also have been linked to anxiety or even fear as the major instigator of exploratory behaviour. There are two types of curiosity, perceptual and epistemic, based on the degree of specificity and diversity of the subject of exploration [9]. Perceptual curiosity is defined as "the curiosity which leads to increased perception of stimuli", activating uncertainty-relieving perceptions [9], while epistemic curiosity, as "the drive to know" activates quests for knowledge that could be stored in structures of symbolic responses. Two associated types of exploratory behavior are differentiated [9], diversive, motivated by boredom, and specific, motivated by the desire to acquire information about novel stimuli. In this way, curiosity triggers exploration, and thus, it is rewarded for situations which include novelty, surprise, incongruity, and complexity.

3.3 Group Interaction and Cognition

Free2Grow work is anchored in the CSCeL field and the associated group cognition theories. Stressing the importance of group cognition, a new science for small group interaction is proposed [12] anchored in: (a) designing testbeds to support interaction within teams, (b) analyzing how interaction takes place within this setting, (c) describing how the teams achieve their tasks, and (d) the ways small groups blend both Computer Supported Collaborative Learning and Work (CSCL/W): "When small groups engage in cooperative problem solving or collaborative knowledge building, there are distinctive processes of interest at the individual, small-group and community levels of analysis, which interact strongly with each other. The science of group cognition is the study of the processes at the small-group level." In small groups, students act on both individual and group level; they each engage in their own, private individual activities. These also function as group actions, contributing to the on-going problem solving by participating in a socialisation process, through which the students become increasingly skilled, in our project acquire competencies to become members of the community of technologically literate citizens.

3.4 Emotion – Group Emotion

Body Atlas and bodily maps of emotions reveal bodily sensations associated with different emotions using a unique topographical self-report method [1]. Silhouettes of bodies alongside emotional words, stories, movies, or facial expressions can be coloured and associated with the bodily regions whose activity they felt increasing or decreasing while viewing each stimulus. Different emotions were consistently associated with statistically separable bodily sensation maps which were concordant across West European and East Asian samples. Statistical classifiers distinguished emotion-specific activation maps accurately, confirming independence of topographies across emotions.

3.5 Connecting the Nodes: The Zone of Proximal Flow

Creative flow is a crucial source of internal rewards for humans, it is the self-engagement in activities which require skills just above their current level. Thus, exploratory behaviour can be explained by an intrinsic motivation for reaching situations which represent a learning challenge [13]. The Zone of Proximal Flow (ZPF) is the area where flow occurs within the zone of proximal development. In this way learners' interest and engagement counteract the anxiety experienced in the creative flow. However, in order for the learners to experience ZPF for an enhanced learning experience, immersion is required [14]. There are ten factors to promote flow and not all of them need to happen simultaneously to experience flow: 1. Clear goals where the challenge level and skill level should both be high; 2. Concentration and focused attention; 3. Loss of feeling and 4. Distorted sense of time as in immersion; 5. Direct and immediate feedback; 6. Balance between ability level and challenge (the activity is neither too easy nor too difficult); 7. Sense of personal control over the situation or activity. 8. The activity is intrinsically rewarding, so there is an effortlessness of action; 9. Lack of awareness of bodily needs; and 10. Absorption into the activity.

ZPF in combination with bodily mapping [15][16] and feelings evolution can provide a multiple perspective view of individuals' and groups' actions and reactions on specific interactions as for example, a creative argument. As internal processes become apparent the team members may be able to solve discrepancies and build gaps or bridges for further development and thus, forward their own evolutionary process in the innovation game.

In free2Grow, there are two directions in which assessment and feedback provision is made by such systems: explicitly via initial questionnaires and implicitly via identification of users' preferences by the system. The socio-cognitive layer of interaction refers to personality traits, emotion and meta-perception, that is to say, interpretation of how a user perceives another user based on observed feedback.

The user profiles are based on user characteristics from the basis of most Web personalisation systems. Mobilised internet now provides different service delivery channels, especially computers, mobile phones and PDAs, accessing ever-more heterogeneous users groups and user environments. If an explicit user-model represents certain user characteristics, a domain model, which is a set of relationships between knowledge elements in the information space, is capable of modifying some visible or functional part of the system based on the information maintained in the user-model. Results from the implementation of such systems related to their effectiveness suggest a positive correlation with academic performance. The most recent research is directed towards a unified model of cognition and emotion. Models integrating emotion and cognition generally do not fully specify why cognition needs emotion and conversely why emotion needs cognition for example, appraisal values direct the participants' emotional states.

There is no research on the actual interplay between the conative drive of curiosity and the cognitive factor of reasoning as well as emotions for a challenging non-linear zone of proximal creative flow in gamification. Dynamic scripting has been used to generate creative behaviour in gaming. Dynamic scripting [17] is a reinforcement learning method for automatically acquiring effective scripts for games and adapts to a number of tactics and learned effective counter-tactics achieving evolutionary learning as well as tactics. Such applied evolutionary learning aids youngsters' metacognitive skills by customising developmental and effective sequences and Free2Grow evaluation of the degree for "novelty," "surprise," "complexity," and "challenge". Free2Grow scripts manage and diminish the occurrence of such mismatch by emerging recommendations on both levels as well as on individual and team basis presenting both students' and groups' projects for individual and small-group presentation and assessment.

4 Interaction Analysis in LAK

Computer-based Interaction Analysis (IA) can be defined as the automatic or semi-automatic processes that aim at understanding the computer mediated activity, drawing on data obtained from the participants' activities. This understanding can serve in supporting the human or artificial actors to take part in the control of the activity, contributing to awareness, self-assessment or even regulation and self-regulation.

Although IA is part of Learning Analytics, the unique implementation in a Collective Intelligence Platform requires a separate view. The IA research field focuses mainly in collaborative activities occurring within a learning context. An IA process consists in recording, filtering and processing data regarding system usage and user activity variables, in order to produce the analysis indicators. These indicators (presented usually in a visual format) may concern: a) the process or the 'quality' of the considered 'cognitive system' within the learning activity; b) the features or the quality of the interaction product; and c) the mode, the process or the quality of the collaboration, when acting in the frame of a social context formed through the technology based learning environment [18].

The core aim is to offer the means directly to the human actors, so as to be aware of and regulate their behaviour, either as individuals or as cognitive groups. The corresponding IA tools support the users in three major levels: awareness, metacognition and evaluation, aiming at optimizing the learning activity through: a) refined participation by the students through reflection, self- and group-assessment and self- and group- regulation, and b) better activity design, regulation, coordination and evaluation by the teachers. It is highlighted in the literature that students often face difficulties in understanding the goals of a collaborative learning activities and project their actions on a higher -group level activity- thus being able to understand the impact of their actions on the overall activity. IA tools facilitate this understanding and thus the application of metacognitive knowledge by the students upon their actions, enhancing the quality of collaboration and group well-being [19].

5 Immersive Experience for Team Projects

Immersive eXperience (iX) [20], as with User Experience (UX), is the creation of immediate, deeply immersive, meaningful and memorable learning experience. Thus, it is appropriate, satisfying, successful, and related to humane values, also directed towards the specific learning objectives for each course or session. User eXperience (UX) is a person's perceptions responses resulting from use and/or anticipated use of a product, system or service.

iX is focused on supporting learners' natural curiosity and reasoning, individual interests, drives and opening up the space for their reasoning including aligning several aspects of diverse information. These factors can be explicit such as cognitive, learning, social and pedagogical, and implicit such as metacognitive, affective and conative such as curiosity. Curiosity is the desire to know, based on knowledge or experience that motivates exploratory behaviour; furthermore, curiosity is activated when there is the feeling of lacking knowledge for a subject of interest. Such needed information is substantial and capable of increasing subjective feelings of competence, in our case technological and digital competencies. Therefore curiosity also serves as an intrinsic motivational and activation factor. Intrinsic motivation is an internal state typified by a strong desire to engage and interact with the environment with stimuli. It is reinforced by interest and enjoyment, a willingness to initiate and continue autonomous behaviour, and prompts an individual to engage in activity primarily for its own sake, because the individual perceives the activity as interesting, involving, satisfying or personally challenging. Also the feelings mapping and evolution on both an individual and group level work on identifying the level of contribution and engagement in both levels. There are specific immersive factors, conditions and associated iX Design attributes that enable and enhance the user's engagement and activity on platforms that require such actions and evolutionary mapping.

These directly affect inductive/deductive reasoning preferences and thus, choices on directions learners make on learning pathways, leading to tailor-made, targeted and constructive anywhere-anytime learning as well as motivating and engaging in teamwork. Consequently, an attractive and efficient 3D iX environment provides customisable control and immediate feedback. Such functionalities can challenge the learners by providing creative flow conditions with enhanced awareness and sensitivity about specific needs, excitement, enthusiasm and joy found in imaginative and innovative activities.

6 Conclusions and Future Work

This paper proposes a combined approach of critical thinking and emotions mapping towards individual and group creativity and innovation. Gamification is the suggested technical approach on and platform called Free2Grow. On Free2Grow youngsters and not only can create their profiles with characteristics related to critical thinking such as curiosity and reasoning as we as bodily feelings mapping and evolution so the system can detect the exact stage and aid in team building and group formation. The semantic multimedia identification and real-time context-aware and interaction analytics support activities convergence towards the team project aims as well coordination on an individual and small group level. Such adaptive approach customizes the educational resources and learning also helping the individual to transform his/her specific personality characteristics in an evolutionary way. As the individual evolves in time, ideas, feelings and thoughts are translated into actions, collaborative activities and learning. If a system can shed light into our internal processes and initial intentions then as human beings, we may be aided to unfold our potential and creativity towards the targets we have chosen ourselves.

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