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Gamification of Prosthetic Dentistry: A Denture Processing Card Game

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1. INTRODUCTION

Gamification is the craft of driving all the fun and addicting elements found in games and applying them to real world or productive activities. It is a series of designs principles, processes and system used to influence, engage and motivated individuals, students groups and communities to drive behaviours and effect desired outcomes.[4] The current learners are inclined to game tools and have new profile. They grew up with various technologies and have different learning styles, new attitude to the learning process and higher requirements for teaching and learning.[2] Educational specialist such as instructional designers and teachers face new challenges on how to engage, educate and guide students exposed to an ever-changing realm of technology and internet advancements. Critical issues include students each of engagement, each of motivation as well as their inefficiency in problem solving. Some educators now include game elements within their teaching learning process to augment student engagement and motivation. This inclusion has been termed as gamification:" The use of game mechanics and virtual achievements in non game contents to engage users, are being added to the virtual environment to increase task engagement and decrease attention[3]. Modern Pedagogical paradigm and trends in education, reinforced by the use of ICT, create pre requisites for use of new approaches and techniques to implement active learning. Gamification in training is one of these trends[2]. This current word aims to study and prevent nature and secrets of gamification and to provide some ideas on how to implement in education[2].

2. BACKGROUND

The application of gamification in various domains can be linked back to psychologist team. Piaget who advocated the inclusion of games as a way for meaningful learning and interaction among children. Since Piaget's early advocacy for gamification, much has changed as video games and virtual reality have changed the child, adolescent and adult learning landscape. However, gamification is still closely related on the psychology of how humans are motivated[3]. The self determination theory develop by psychologist Edward Deci and Richard Ryan is based on the hypothesis that there is a set of universal psychological needs that must be satisfied for effective functionary and psychological health. Deci and Ryan define the core needs as autonomy, relatedness and competence. Hence learners and users benefit from gamification when the core needs are experienced.[5] Gamification who delivers advantages like students engagement, motivation, collaborative skills, knowledge, retention, personalized learning environment etc.

Conclusively gamification is an integration of game elements and game thinking in activities that are not games[2]. The literature on gamification often stresses that the judicious, strategic and appropriate use of game elements can produce a learning situation characterized by a high level of active engagement and motivation, which in turn produces positive outcomes in cognitive, emotional and social areas[1]. According to Gabe Zuckerman, the use of game mechanics improves the additives to learn new skills by 40%.Gamification is not directly annunciated with knowledge and skills, but it affects students behavior, commitment and motivation, which can lead to improvement of knowledge and skills.[6]

Total 52 cards of playing deck ,where use to create customized cards showing the steps in fabrication of complete dentures, split into substeps to make 52 steps in total.

Figure 1 – All Cards Shown Together

Each card was customized using photos and labels of various steps. Two different colour scheme were used: Blue and Yellow, Blue for 'laboratory steps' and Yellow for 'clinical steps'.

A photo was place in centre, with the rest covered by colored strip, leaving number/alphabets and shape of card visible, which would help to arrange cards in correct sequence order as shown in table.

Figure 2 – Card Showing systematic arrangement of photo labelling and the name of card

TABLES OF CARDS

Sr no	Spade	Heart	Diamond	Club
Aces spade	#Diagnosis and treatment planning	#Checking of tray extension	# Recording vertical jaw relation	*Dewaxing

2	#Making diagnostic impression	#Maxillary tray border moulding	# Recording horizontal jaw relation	*Packing
3	*Making diagnostic cast	# Mandibular tray border moulding	*Indexing of maxillary and mandibular cast	*Trial closure
4	# Mouth preparation	*Scraping of spacer wax	* Articulation and mounting	*Bench curing
5	# Tray selection	*Making relief holes in custom tray	*Arrangement of anterior teeth	*Curing process in Acrylizer
6	# Making primary impression	#Making definitive impression	*Arrangement of posterior teeth	*Denture retrieval
7	*Beading and boxing	*Disinfection	*Waxing and carving of trial denture	*Finishing and polishing
8	*Fabricating primary cast	*Beading and boxing	#Evaluation of mandibular trial denture	*Lab remounting
9	*Marking denture extension, spacer extension	*Fabricating master cast	#Evaluation of maxillary trial denture	*Selective grinding or occlusal shaping#
10	*Spacer wax adaptation	*Applying separating medium	#Evaluation of both dentures together	#Denture insertion

Jack	*Tissue stops adaptation	*Fabrication of denture base	*Sealing denture with definitive cast	#Post insertion instruction
Queen	*Applying separating medium	*Fabrication of occlusal rim	*Flasking	#Recall and maintenance after 24 hrs
King	*Fabrication of custom tray	#Recording orientation jaw relation	*Counter flasking	#Recall and maintenance after 7 days

CLINICAL STEPS

SR NO	**CLINICAL STEPS**	**NAME OF CARDS**
1	DIAGNOSIS AND TREATMENT PLANNING	ACE OF SPADES
2	TRAY SELECTION	5 OF SPADES
3	MAKING PRIMARY IMPRESSION	6 OF SPADES
4	APPLYING SEPARATING MEDIUM	QUEEN OF SPADES
5	CHECKING FOR TRAY EXTENSION	ACE OF HEARTS
6	MAXILLARY TRAY BORDER MOULDING	2 OF HEARTS
7	MANDIBULAR TRAY BORDER MOULDING	3 OF HEARTS
8	MAKING DEFINITIVE IMPRESSION	6 OF HEARTS
9	RECORDING ORIENTATION JAW RELATION	KING OF HEARTS

10	RECORDING VERTICAL JAW RELATION	ACE OF DIAMONDS
11	RECORDING HORIZONTAL JAW RELATION	2 OF DIAMONDS
12	EVALUATION OF MANDIBULAR TRIAL DENTURE	8 OF DIAMONDS
13	EVALUATION OF MAXILLARY TRIAL DENTURE	9 OF DIAMONDS
14	EVALUATION OF BOTH DENTURES	10 OF DIAMONDS
15	DENTURE INSERTION	10 OF CLUBS

LABORATORY STEPS

SR NO	**LABORATORY STEPS**	**NAME OF CARDS**
1	MAKING DIAGNOSTIC IMPRESSION	2 OF SPADES
2	MAKING DIAGNOSTIC CAST	3 OF SPADES
3	MOUTH PREPARATION	4 OF SPADES
4	BEADING AND BOXING OF PRIMARY IMPRESSION	7 OF SPADES
5	FABRICATION OF PRIMARY CAST	8 OF SPADES
6	MARKING LINES ON PRIMARY CAST	9 OF SPADES
7	SPACER WAX ADAPTATION	10 OF SPADES
8	TISSUE STOP PREPARATION	JACK OF SPADES
9	FABRICATION OF CUSTOM TRAY	KING OF SPADES
10	SCRAPING OF SPACER WAX	4 OF HEARTS
11	MAKING RELIEF HOLES IN MAXILLARY CUSTOM TRAY	5 OF HEARTS

12	DISINFECTION	7 OF HEARTS
13	BEADING AND BOXING OF DEFINITIVE IMPRESSION	8 OF HEARTS
14	FABRICATION OF MASTER CAST	9 OF HEARTS
15	APPLYING SEPARATING MEDIUM	10 OF HEARTS
16	FABRICATION OF DENTURE BASE	JACK OF HEARTS
17	FABRICATION OF OCCLUSAL RIM	QUEEN OF HEARTS
18	INDEXING OF MAXILLARY AND MANDIBULAR CAST	3 OF DIAMONDS
19	ARTICULATION AND MOUNTING	4 OF DIAMONDS
20	ARRANGEMENT OF ANTERIOR TEETH	5 OF DIAMONDS
21	ARRANGEMENT OF POSTERIOR TEETH	6 OF DIAMONDS
22	WAXING AND CARVING OF TRIAL DENTURE	7 OF DIAMONDS
23	SEALING DENTURE WITH DEFINITIVE CAST	JACK OF DIAMONDS
24	FLASKING	QUEEN OF DIAMONDS
25	COUNTER FLASKING	KING OF DIAMONDS
26	DEWAXING	ACE OF CLUBS
27	PACKING	2 OF CLUBS
28	TRIAL CLOSURE	3 OF CLUBS
29	BENCH CURING	4 OF CLUBS
30	CURING PROCESS IN ACRYLIZER	5 OF CLUBS
31	DENTURE RETRIVAL	6 OF CLUBS
32	FINISHING AND POLISHING	7 OF CLUBS
33	LAB REMOUNTING	8 OF CLUBS

34	SELECTIVE GRINDING OR OCCLUSAL SHAPING	9 OF CLUBS
35	POSTINSERTION INSTRUCTIONS	JACK OF CLUBS
36	RECALL AND MAINTAINENCE	KING OF CLUBS

Figure 3 – All clinical Cards Shown Together

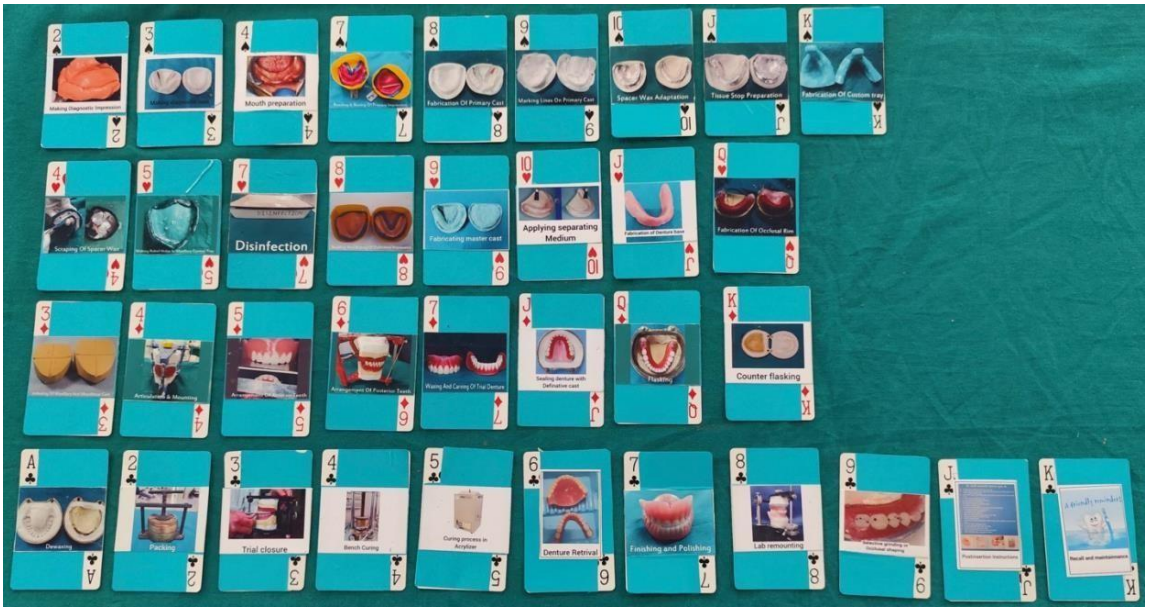

Figure 4 – All Laboratory Cards Shown Together

3. CONCLUSION

The incorporation of gamification principles into dental education has shown promising results in enhancing student engagement, motivation, and learning outcomes. The customized deck of cards created for the study provided an interactive and immersive learning experience for dental students, guiding them through the complex process of fabricating complete dentures. By leveraging the engaging and interactive elements of games, educators can create learning experiences that are both enjoyable and effective.

Future studies can build upon this research by exploring the application of gamification principles in dental education. Through research is to be done to check the effectiveness of such gamification method. Additionally, the development of digital gamification platforms can provide increased accessibility and flexibility for students, while also enabling real-time feedback and assessment.

Ultimately, the integration of gamification principles into dental education has the potential to revolutionize the way students learn and retain complex procedural knowledge, leading to improved patient outcomes and enhanced professional competence.

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