



Research on Adult Sex Education Based on AI Dialogue: Single Case Analysis and Insights for Communication Barriers

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ABSTRACT

Purpose: This study explores the potential application of Communicative Artificial Intelligence (AI) dialogue in adult sex education, aiming to address the communication barriers that exist between adults about sexual knowledge and sexual needs. **Methods:** A case study method and semi-structured interviews were used to study a couple who had insufficient sex education in the early years leading to communication barriers. **Results:** Educational and cultural backgrounds, gender roles, and communication styles all affect communication between two parties. Using AI technology for sex education can improve the

communication barriers between adults and enhance their understanding of sexual knowledge. AI dialogue provides a rational and analytical, non-judgmental dialogue environment for users, who are free to express their thoughts and feelings in the face of the AI virtual environment. Implications for research and practice. Integrating AI technology in adult sex education and building an inclusive and adaptive educational environment can better meet individual needs, while focusing on user privacy and data security to form a healthy and safe sex education communication network system.

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Introduction

The development and progress of society has given new dimensions to sex education in social contexts. It is no longer a topic focused only on providing content for adolescents, but now adults are also benefited by the concept of sexuality and sexual health. For the adult audience, sex education is widely recognized also as an important means of promoting individual mental health, improving the quality of interpersonal relationships and reducing sexually transmitted diseases (Breuner et al., 2016). However, current traditional approaches to sex education have often faced several challenges, including lack of knowledge, communication barriers, and cultural backgrounds, which have led to ambiguities while acquiring and expressing knowledge of sexuality and have resulted in impediments to the advancement of the

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development of sex education (Yan, 2021; Zhou et al., 2024).

In recent years, the rapid development of AI technology has brought new opportunities in the field of sex education. The introduction of AI dialogue systems provides learners with a safer and more open learning environment, especially in the field of sex education, and this technology can promote more effective communication and knowledge dissemination (Hu et al., 2020; Pedro et al., 2019). Kong, Han and Zhang (2020), Xu et al. (2023) and Morales-Chan et al. (2024) have shown that AI can enhance learners' engagement through personalized feedback and interaction, thus improving their understanding and attitudes towards sexuality, which opens a new developmental idea in sex education.

Owing to showing less attention to sex education in modern curriculum, there is a lack of sex education during the pre-adult period. The lack of sex knowledge during the period of adolescence, in turn, affects the overall communication and exchange of sex-related information between adults. For this reason, a woman may only see sex as a means of procreation, and after giving birth, she may go into a state of resistance while the man's demand for sex would remain normal. This anomaly between a man and a woman regarding sexual needs can be resolved only through appropriate communication channels and a dialogue.

This study focuses on enlightening the role of AI dialogue in adult sex education and analyze the impact of AI on users to overcome communication barriers in sex education and improve their understanding and application of sex knowledge. By reviewing the relevant literature, this study explored the importance of sex education and the application of AI in the school curriculum. A theoretical framework comprising cases studies and review of past literature was built to guide this study and analyze the role of AI dialogue in addressing individual sexual needs and improving the communication effect of sex education through case studies.

Literature Review

Influence of Culture, Family, Education and Sex Education

Adult sex education plays an important role in improving sexual knowledge and relationships. Studies (Shulman & Connolly, 2013) have found out that lack of sexual knowledge can lead adults to face problems in intimate relationships such as blocked communication and inability to directly verbalize their need for sex. The study by Van Leent et al. (2023) showed that systematic sex education improves people's sexual health and reduce the incidence of sexually transmitted diseases. However, due to factors such as traditional thinking and socio-cultural factors, the development of sex education has been slow, and even society is in a state of resistance to sex. Differences in cultural, family, and educational backgrounds have a significant impact on the acceptability and implementation of sex education. Pleck, Sonenstein and Ku (1993) showed that traditional notions of masculinity may lead adolescent males to have more sexual partners, have negative attitudes toward the use of condom, and seek control and dominance in sexual relationships. Muza and Naidoo (2024) studied that the content of sex education often involves sensitive topics such as sexual behaviour, contraceptive methods, sexually transmitted diseases, which are considered taboo in many cultures leading to

embarrassment or discomfort for educators and students when discussing these issues, cultural taboos and prejudices against sex impede the effective dissemination of sex education, Villarruel (1998) and Okazaki (2002) found that gender role expectations of Asian Americans and Latinos also influence their sexual behaviour and attitudes, such as the tendency to be more conservative and to start sex later cultural values affect individuals' sexual attitudes and behaviours; Blackwood (2000) and Sinha et al. (2007) found that religious beliefs have a limiting effect on an individual's sexual behaviour, and that people in such cultures place more emphasis on the moral and social responsibility of sexual activity, which influences an individual's sexual choices and behaviour. Different cultural transmission, family attitudes and educational backgrounds can generate a lot of ignorance and conflict about sexuality. The study by Thomson (1997) emphasized the importance of creating a safe and open environment in sex education.

Impact Of Gender Roles and Gender Expectations on Communication Barriers

Adults' different understandings of gender roles and gender expectations lead to differences in their views on sexual attitudes and behaviours. MacPhail and Campbell (2001) and Chubb et al. (2024) mentioned that males may avoid accessing sex education information because of gender role expectations and females may avoid seeking sexual health because of the fear of violating gender role services, and that traditional gender roles lead to adult distrust and resistance to sex education information. Ellemers (2018) examined the impact of gender roles on adult learning and found that gender bias hinders effective communication between adults. Soccia, Turrini and Tanzi (2012) and Izquierdo, Furini and Myskiw (2016) showed that fear of motivational messages may lead to learner resistance, while positive communication strategies promote learner engagement, irrespective of gender.

The Use of Technology in Sex Education

More and more scholars have studied the application aspects of online education and artificial intelligence in sex education. Widman et al. (2018) argued that the effective integration of technology and traditional education methods can enhance the effectiveness of adult sex education. Nadarzynski et al. (2021) found that digital education tools can promote individuals' knowledge of sexuality and reduce psychological barriers, and AI dialogue provides a way to solve communication problems in adult sexual education. Murtaza et al. (2022) proposed that AI-based personalized education platforms can help to meet the learning needs of different individuals. AlGerafi et al. (2023) investigated the use of virtual reality in sexual education, noting its role in improving the learning experience and understanding of sexuality, pointing out its potential to enhance the learning experience and depth of understanding. Mulyaningsih, Argaheni and Juwita (2024) studied how AI enabled users to discuss and learn more freely about sensitive topics through innovative educational interventions such as interactive chatbots. Lase et al. (2024) found that AR technology increased user interaction and knowledge acquisition through gamification in an empirical study in a secondary school in Indonesia. Knowledge acquisition and technology were also used to create Instagram filters as a new interactive and social education medium to improve users' understanding of sex education. AI tools support users' knowledge acquisition through human-like dialogue to help them understand sexual and reproductive health topics

such as defining sexuality, contraception, Sexually Transmitted Infections (STI) symptoms, and signs of pregnancy (Park, Singh, & Wisniewski, 2024).

Theoretical Framework for Sex Education

Kirkpatrick's (1959) Hierarchy of Learning Theory consists of four learning processes: feedback - learning - behavior - results. This is in conjunction with the guidance of the International Guidelines for Technical Guidance on Sex education (2018), which states that sex education should include the three dimensions of knowledge, skills and attitudes to help individuals make informed decisions about sexual health. Constructivist theory is also widely used in adult sex education (Liben, 2015; Willig, 1998). This theory emphasizes the importance of active learner participation and personal experience and encourages adults to reflect on and discuss their own experiences and perspectives in sex education, thereby facilitating in-depth understanding and application. Therefore, communication barriers between adults can be addressed through a constructivist approach that encourages them to express their thoughts and feelings in a safe environment, while AI dialogues can exclude peripheral distractions and improve adults' judgement and learning of sex education content.

Based on the above theories and guidance, the theoretical framework for adult sex education needs to focus on the holistic development of knowledge, skills and attitudes, encouraging observational learning and imitative behaviours, as well as creating a space for reflection and discussion, to enhance the learners' awareness and competence in sexual health as shown in Figure 1:

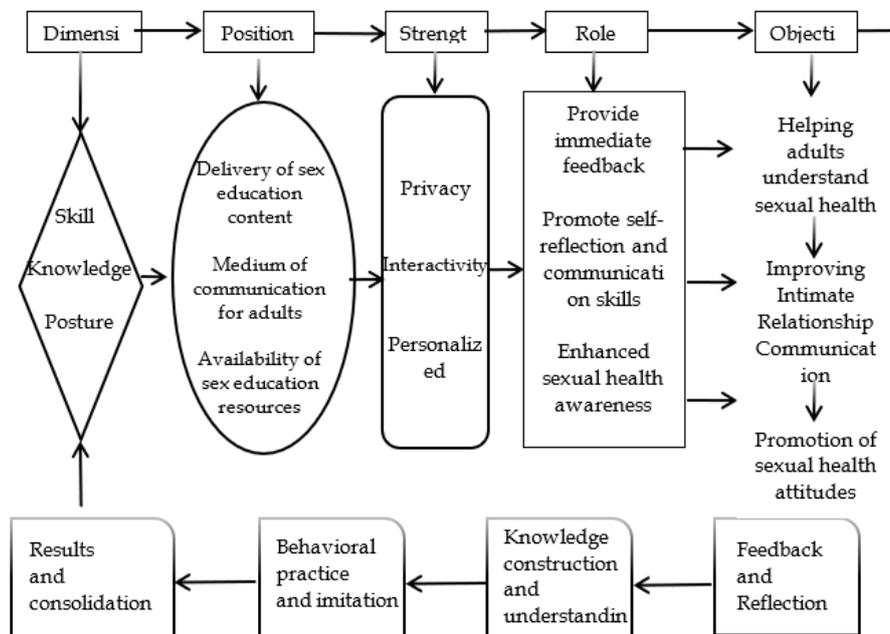


Figure 1: Theoretical Framework for Adult Sex Education.

Results

Case Background

This case focuses on sex education for a married couple with two sons in three years. The man comes from a single-parent family and was raised by his mother. He has a high level of education and believes that sex is a normal physiological need of human beings. The woman comes from a traditional family with a harmonious parental relationship, but has a poor understanding of sexuality, views sex as a tool for procreation and has a lukewarm attitude towards sex. In this marital relationship, after giving birth to a child, the woman shows resistance to sex, while the man has a normal need for sex. The lack of effective communication between the two parties led to the man's long-term repression of his sexual needs. The man though repeatedly hinted to the woman about his sexual needs, but the woman failed to respond and often responded in a humiliating and rejecting manner. For example, when the man attempted to kiss the woman, the woman questioned her oral hygiene and demonstrated her rejection of intimacy. This communication barrier not only exacerbated the psychological pressure on both partners but also caused the man to develop a sense of fear.

Through communication, it was learnt that the man in this case had a series of emotional and psychological problems. As a result, he resorted to masturbation techniques and purchased aids to seek sexual release due to the woman's inability to satisfy his sexual needs. This deepened man's psychological problems, leading to the development of psychological erectile dysfunction. To solve this problem, the man tried to stimulate the woman's sexual desire by various ways, but did not receive any positive feedback from the woman, but rather it triggered the woman's anger, leading to the deterioration of relationship. The woman communicated about the incident in many ways, not only with people close to her but also with strangers on the Internet, seeking answers to the question of whether the man could have cheated on her and could not be forgiven. Different responses from all quarters caused her to jump between affirmation and denial of herself, and she was in a constant state of internal conflict. Eventually, their work and life were seriously affected, and they even faced the possibility of divorce.

This case not only reveals the great difference in sexual knowledge between husband and wife but also reflects the important influence of culture and family education in the formation of individual sexual concepts. It also reflects the importance of adult sex education in real life, and how to promote understanding and harmony between couples through effective communication. Sexual education becomes a key issue that needs to be urgently introduced to resolve the face of complex culture, gender roles and individual psychological factors (Scheinkman, 2019).

Impact of Lack of Sex Education on Mental Health

Differences in sexual knowledge and sexual cognition between husband and wife are at the center of the problem, and through further communication it was learnt that there was a mismatch between the female's sexual frigidity and the male's sexual needs, which resulted in the male repressing his sexual needs for a long period of time, and questioning his own sexuality, which ultimately triggered psychogenic erectile dysfunction. [Brotto et](#)

al. (2016) and Allen, Wood and Sheffield (2023) have studied that psychological erectile dysfunction is closely related to an individual's mental health, especially with the interplay of stress and anxiety. Men view sex as a normal physiological need, while women view sexuality as a process of reproductive function, and after giving birth to a child the task has been completed without the need for sex, and there is a lack of understanding of the pleasurable function and emotional sustenance of sex. Banerjee and Rao (2022) found that the importance of sex education is not only to teach physiological knowledge, but also to develop a healthy concept of sexuality and communication skills. Lack of sex education can easily lead to misunderstandings between parties in terms of sexual behaviour, which is especially prevalent in more culturally conservative contexts (Fine & McClelland, 2023; Heyes, 2019).

Influence of Cultural Differences on Sexual Attitudes

This case also reflects the influence of family on sex education, and the cultural differences in sex concepts that lead to problems in the couple's perception of sex. The man grew up in a single-parent family environment and is more eager for family integration. Through communication, we learnt that the man has long lacked the care of a complete family, so he attaches more importance to forming a family with the woman. However, the male partner, who has received higher education, believes that sex is a normal need between husband and wife, while the female partner, influenced by the conservative culture of her family, lacks sexual knowledge and general awareness, and simply believes that sex is limited to the purpose of procreation, and that sex is a means of procreation and a task. Zhang (2019) found that cultural and educational backgrounds and the family's sexual education enlightenment profoundly influence the individual's view of sexual behaviour and sexual relationships. This cultural conflict leads to different expectations of sex between couples and affects the divergence of their needs for sex, the woman's aloof attitude and humiliating behaviour is an indication of her limited perception of sex, and this negative perception of sex affects the emotional life of couples.

Impact of Communication Barriers on Sex and Marriage

Lack of effective communication between couples is an important cause of disagreement between couples. Studies (Girma Shifaw, 2024; Markman, Stanley, & Blumberg, 2010; Yoo et al., 2014) have showed that communication barriers in sexual relationships can lead to a decrease in marital satisfaction, and even increase the risk of divorce. Other studies (Séguin, 2024; Vowels et al., 2022) found that effective communication is essential for sexual relationships, especially when expressing sexual needs, expectations and boundaries. Due to the different attitudes towards sexuality between the spouses, the man feels frustrated after repeated unsuccessful attempts to communicate and tries to stimulate the woman's sexuality by addressing his physical needs through masturbation and seeking other means. On the other hand, the woman's failure to understand man's intentions and misinterpretation of his fidelity and her questioning of the anger towards such behaviours further exacerbate the breakdown of communication and leads to a crisis in the relationship.

In conclusion, the couple in this case had three main levels of problems, namely the level of sexual education awareness due to cultural and family inhibitions; the level of poor

communication which eventually led to a marital crisis; and the lack of sexual education in the early stages which had a huge impact on the couple's mental health and marriage. Figure 2 illustrates the three tiers of this case analysis in brief.

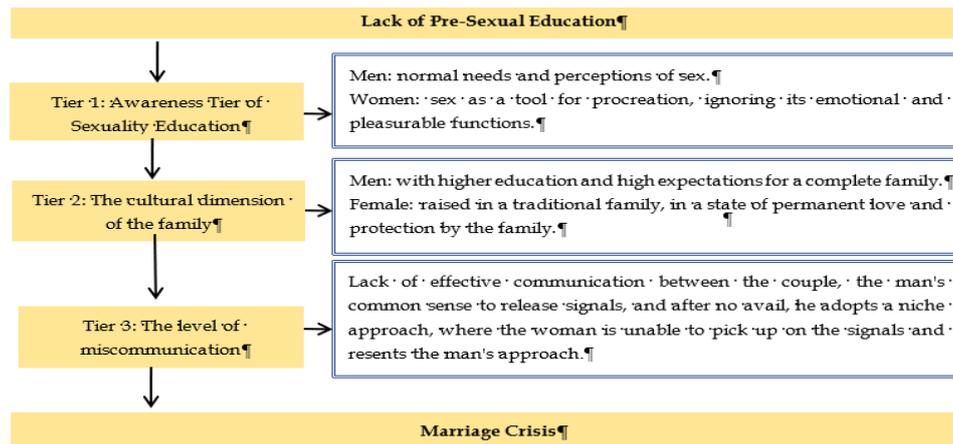


Figure 2: Impact of Lack of Pre-Sex Education on Couples' Mental Health and Marriage.

Discussion

Potential Applications of Artificial Intelligence in Sex Education

The Communicative Artificial Intelligence in sex education played an important role in the case sampled for this study. As revealed, the man did not have a suitable way of communicating with the woman, so he tried to stimulate the woman's desire for sex by learning about other niches, and exploited AI enabled resources on the Internet. The woman, after learning about the matter, also used communicative AI resources to resolve her queries and got different responses from each of her communicating resource, which led to her repeatedly jumping between affirmation and denial of her own perceptions.

Deep learning (DL) AI provides more objective choices in such situations as DL algorithms are used for dialogues between two communication points. Studies (Motger, Franch, & Marco, 2022; Wang et al., 2022) found that AI dialogue systems support by DL algorithms can provide an anonymous and safe learning and communication environment for people who have difficulty in discussing sexuality openly. Other studies (Hasal et al., 2021; Pataranutaporn et al., 2021) showed that Communicative AI systems can help individuals better understand and deal with problems in sexual relationships through personalized feedback and interaction. For couples, Communicative AI systems can help them express their needs and understand each other more effectively by simulating real communication scenarios, engaging in dialogue and learning.

This study is based on the case sampled for this study, and how the issues the parties concerned communicated with ChatGPT and KIMI in the form of dialogues. Table 1 summarizes these dialogues and compares the responses of ChatGPT and KIMI.

Table 1*ChatGPT & KIMI Answer Comparative*

Definition of identity given to ChatGPT & KIMI				
You are now a senior expert in sexual health and psychological counselling, mastering professional sexual knowledge and sexual health, and very professional in the treatment of mental illness; I now have some sexual and psychological problems that I want to consult with you. Please use your professional knowledge to communicate with me about my current problems and confusions.				
S.No	Questions	ChatGPT	KIMI	Note
1	Is the purpose of sex to make babies?	The purpose of sex is not just to have children. Procreation is an important function of sex, but it is not the only or most common purpose. In fact, sex has multiple functions and meanings, including: 1) physical needs; 2) emotional connection; 3) psychological fulfilment; 4) procreation; 5) sexual pleasure; and 6) stress reduction	The purpose of sex is not limited to having children. While procreation is a natural consequence of sexuality, sex plays multiple roles in human relationships: 1) emotional connection; 2) physical pleasure; health benefits; 3) self-exploration and expression; 4) social and cultural; 5) procreation	Female
2	I'm frigid about sex, how do I deal with my husband sexually?	If you are feeling frigid about sex, the key is to understand your own feelings and the underlying causes, and to explore different forms of intimacy by communicating openly with your partner. Frigidity can be caused by physical, psychological or emotional factors, and professional sexual health or psychological counselling can help you deal with these issues. Also, reducing stress in your life, improving your emotional connection and changing your ideas about sex may help to rekindle sexual interest. The important thing is to remain patient and open-minded and work together to find solutions.	When facing the problem of frigidity, the following steps can be taken to cope with it: 1) Consultation with doctor; 2) Improvement of communication; 3) Reduction of stress; 4) Enhancement of emotion; 5) Healthy life; 6) Psychotherapy 7) Medication; 8) Traditional Chinese medicine; 9) Other treatments: e.g. biofeedback, electrical stimulation or sex therapy, etc. 10) Psychological support: Give yourself and your partner enough psychological support and understanding.	Female
3	I can't understand and act disgusted by my husband's intimacy, is this normal behaviour? How do I give him feedback on his needs?	Feelings of incomprehension or resentment towards your partner's intimacy may stem from emotional disconnect, differences in sexuality, or stress. The key is to express your feelings through honest communication, understand each other's needs, and set intimate boundaries that are acceptable to both partners. This allows you to find a balance between honoring your own feelings while meeting your partner's emotional needs.	If you feel uncomfortable or resentful of your partner's intimacy, this may be a sign of personal feelings or needs. It's important to engage in self-reflection to understand the root cause of these feelings and to communicate with your partner in a respectful and non-aggressive way. Set clear boundaries, seek professional help if needed, and explore ways of being intimate that both partners feel comfortable with. By working together and communicating openly, solutions that meet the needs of both partners can be found to strengthen the relationship.	Female

4 Should I forgive my husband and understand him if he practices SM activities?	Whether or not you forgive your partner for practicing SM depends on how you feel about the matter and the outcome of your communication. The key is to understand his motives, be clear about his boundaries, and make sure that sexual behaviour is based on mutual consent and respect. If you are willing to address the issue, you can find a balance by communicating or seeking professional help to build a relationship of mutual understanding and trust.	Forgiveness and understanding in the face of your partner's involvement in SM activities depends on your communication, boundaries and agreement. It is important to have an honest dialogue, express your feelings and concerns, and work together to explore your mutual boundaries and comfort levels. SM activities should be conducted with mutual consent and respect, ensuring that they are safe and consensual. Seeking professional counselling is also a good option if needed. Remember that everyone has the right to refuse any sexual behaviour that makes them feel uncomfortable, and relationships should be based on mutual respect and consent.	Female
5 I don't want a divorce but can't accept that he understands this, how do I communicate effectively with him and how do I get along better in the future?	If you don't want a divorce but can't accept your partner's interest in SM, the key is to express your feelings through honest communication, understand his motivations, and set clear boundaries together. Strengthen the emotional connection, focus on other ways to be intimate, and gradually adjust your patterns of getting along. If communication is difficult, consider seeking help from marriage counselling to find a solution that works for both parties.	Effective communication and mutual understanding are essential when dealing with differences in sexual preferences between partners. Choose an appropriate time to express your feelings using 'I' statements ^① while listening to the other person's thoughts. Set clear boundaries, find mutually acceptable solutions and build trust. Consider seeking professional counselling for help. Pay attention to each other's emotional needs, remain patient, and communicate consistently to adapt to changes. Through these efforts, you can find ways to meet both of your needs, strengthen the relationship, and lay the groundwork for future challenges you may encounter.	Female
6 How do I effectively communicate with my wife about the daily needs of sex when she lacks education on sexuality and thinks that sex is just a means to procreation and that after procreation, she doesn't need sex?	To communicate with the wife about her sexual needs, it is necessary to avoid accusations through gentle guidance, first strengthen emotional communication, introduce sexual knowledge and help her understand the multiple meanings of sex in marriage. Listen to her feelings, understand concerns and seek professional support when necessary to improve sexual relationships together.	To communicate effectively with your partner about the daily demands of sex, start by choosing an appropriate time to express your feelings using 'I' statements and avoiding accusations. Share sexual health information to help each other understand the positive effects of sex. Listen to your partner's ideas, set common goals and build trust. Seek professional counselling if needed. Pay attention to emotional needs, remain patient, and communicate consistently to adapt to changes. Through these efforts, you can increase understanding, find solutions that meet both of your needs, and strengthen your relationship.	Male
7 Because of long-term sexual repression, I would like to know other ways to stimulate my wife's desire for sex (such as learning about SM), but only stay on the Internet operation did not practice, I this behaviour is right?	Trying to arouse your wife's sexual desires by learning about SM online, for example, is not always appropriate, especially if there is no open communication. The key to addressing sexual repression is open dialogue and understanding each other's needs. Unauthorized exploration of such content may exacerbate her discomfort and priorities improving the relationship through communication and professional help.	It is an individual's right to explore sexuality, including sexual practices such as SM, but any sexual behaviour should be based on mutual consent and respect. If you want to try new sexual practices, it is important to have open communication with your partner about her feelings and boundaries. Make sure the sources of information you obtain are reliable and understand the relevant safety measures. Seek professional advice if needed. Remember, it's vital to respect your partner's comfort level and decisions.	Male

8 Now I have developed psychological erectile dysfunction due to long-term sexual repression, and I have a fear of facing my wife, how do I communicate with her effectively?	The key to facing psychological erectile dysfunction and fear of your wife is to share your feelings openly and honestly, emphasizing that this is a challenge you need to face together. Seek joint solutions by discussing small steps to restore intimacy. If communication is difficult, consider professional counselling to help improve emotional and physical intimacy.	Effective communication with your partner is essential when dealing with psychological erectile dysfunction. Choose an appropriate time to express your feelings using 'I' statements and avoid blame. Listen to your partner, share sexual health information, and set common goals. Build trust, consider seeking professional counselling, pay attention to emotional needs, and be patient. Communicate consistently to adapt to changes and strengthen relationships. Through these efforts, you can increase understanding, find solutions that meet both of your needs, and work together to overcome challenges.	Male
9 My wife found out about my learning about SM and I have made it clear that there is no offline practice and that the purpose of the learning is to stimulate her desire for sexual needs, but she is very resistant and angry and wants to divorce me, how do I communicate with her?	When your wife finds out that you are learning about SM and reacts strongly to it, the key is to listen to her feelings, express your sincerity and motivation to learn, and emphasize that you are not practicing the content. Seek joint solutions, respect her boundaries, be willing to give up uncomfortable content, and consider professional help. If effective communication can be used, tensions can be gradually reduced and understanding and trust rebuilt.	In the face of your partner's discovery of SM knowledge and her resistance to it, first choose an appropriate time to communicate. Use 'I' statements to express your feelings, avoid blame, and listen carefully to your partner's thoughts. Share sexual health information to help her understand the importance of sex education. Set common goals, seek professional counselling, attend to emotional needs, and be patient. Communicate consistently to adapt to changes and strengthen relationships. Through these efforts, improve understanding, find solutions that meet both partners' needs, and work together to overcome challenges.	Male
10 Should I face her with an attitude in my life to make her forget about it and at the same time let her know that sexual needs are a normal part of a couple's relationship?	To confront the wife with a positive attitude, help her to forget unpleasant experiences and understand the normalcy of sexual needs, which can be achieved by maintaining positive communication, emphasizing emotional connection and gradually introducing sexual topics. Create a relaxed atmosphere, recommend healthy sex education materials, show patience and understanding, and gradually rebuild trust so that she can feel the importance of intimacy between husband and wife.	In order to help your partner forget unpleasant experiences and understand the importance of sexual needs in the relationship, you should remain patient and understanding, demonstrating your affection through daily love and support. Maintain open communication, share sexual health information when appropriate, and respect your partner's boundaries. Engage in shared activities to promote emotional connection and seek professional help when necessary. Maintain a positive attitude and give your partner positive affirmation and encouragement to promote understanding and intimacy. With consistent effort and communication, you can work together to overcome challenges and build a healthier and more satisfying sex life.	Male

Notes: ① 'I' statements are expressions that begin with the first person 'I' and are used to describe a person's feelings, thoughts or needs without directly accusing or judging the other person. The purpose of using 'I' statements is to promote more effective and non-aggressive communication, which helps to reduce the other person's defensive reactions and makes the dialogue more constructive.

Through the dialogue and responses of the two AI models, it is evident that responses of ChatGPT and KIMI complement each other, without any communication barriers of adult sex education found in humans. The responses of both AI models are objective and neutral, and at the same time, they have the support of popular science or Communicative AI. Where ChatGPT provides solid knowledge and structured advice that helps to analyze the problem rationally, KIMI facilitates emotional connection and understanding through emotional empathy and specific communication skills. Used in conjunction, these two approaches can be effective in helping adults overcome communication barriers in sex education and create a healthier and more open dialogue.

Comparative Analysis of Case Study and Literature

The couple in this case have had sexual functioning problems triggered by conflicting sexual concepts and communication barriers, and the family background and lack of sex education played an important impact on their sexual relationships. Studies (Russell et al., 2020; Trinh & Kim, 2021) found that cultural differences in the family background and the lack of sex education are important factors that lead to differences in the sexual concepts between one or both partners. This effect is particularly significant in individuals raised in conservative families (Hendrick et al., 1985). Numerous scholars have argued that growing up in an environment with conservative views of sexuality makes individuals develop negative attitudes towards sex affects their understanding and expression of sexuality (Baumeister, 2000). This theory coincides with the background of the woman in the case, who lacked education on sexuality from childhood, and consciously believed that sex was closely linked to procreation, ignoring the emotional dimension of sex, which led to the inability of couples to communicate effectively about their sexual needs. Mamali et al. (2022) showed that couples who lacked an effective channel of communication, especially on sexual needs, were prone to lead to psychological disconnection, and even trigger sexual dysfunction. This theory coincides with the background of the man in the case, who suffered from psychological erectile dysfunction due to his low self-esteem from self-doubt caused by the woman's behaviour.

The application of AI in sex education has gradually received academic attention. The study of Liew et al. (2023) suggests that AI dialogue system not only can provide personalized sex education for users, but also can serve as a bridge for communication of sexual needs between partners. Through the involvement of AI, partners can discuss their sexual problems without shame and pressure, enhancing their understanding of each other's needs. The AI technology appears to have more potential for application when the male partner has a problem of psychological repression of sexual needs; and when the female partner has a lack of sexual knowledge to communicate with other people. The AI system may be able to provide a more neutral and objective communication platform for them, thus avoiding further deterioration of the problem and enhancing communication ability.

Directions and Suggestions for Future Research

Sell, Oliver and Meiksin (2021) argued that future research should prioritize addressing the lack of sexual education for adults, especially in the context of individuals who do not receive adequate sexual education in the early stages and delve deeper into how to fill in

the gaps in their knowledge through later educational strategies. The influence of cultural, social and educational environments on adult sexual education cannot be ignored, and individuals' sexual concepts and sexual health perceptions show greater variability in different social contexts, which provides a broad space for future cross-cultural comparative research.

Training AI for deep learning brings transformative possibilities for adult sex education. Goldfarb and Lieberman (2021) found that through technological features such as personalization, interactivity and privacy protection, AI is able to exert higher relevance and efficiency in sex education, especially in real-time feedback, interactive learning and continuity of education across timelines, which demonstrates great potential. Future research focuses on the intervention effect of AI technology in adult sex education, while focusing on the practical application in sexual health education and sexual behavioral guidance to meet the diverse needs of individuals through data analysis and personalization. Binns (2018) argues that how to ensure the protection of data privacy and individual mental health while applying technology, and to achieve effective learning and knowledge transfer will become an important topic for future research. This is not only about the maturity of the technology itself, but also about the trust and acceptance of AI applications in society.

Conclusion

This study explores the shortcomings of adult sexual education and the potential application of AI in it to discover the necessity of technological intervention in the current sexual education system. Adults have deficits in sexual health knowledge and behaviours due to lack of early education, which not only affects their personal quality of life, couples' relationships and has an impact on family harmony (Goldfarb & Lieberman, 2021). Enhancing the reach and quality of adult sex education, especially in the areas of self-awareness and sexual behavioral guidance for individuals, is of particular importance. The personalized, interactive and privacy-preserving features of AI in adult sexual education enable it to fill the gaps in traditional sexual education by providing real-time feedback and customized content to effectively enhance the motivation and engagement of individuals in learning (Binns, 2018). The introduction of this technology not only provides a new path for the reform of adult sex education, but also prompts educators and policymakers to rethink the form and content of sex education.

The limitation of this study lies in the selection of a single case study for analysis, which might be a drawback in getting sufficient data to support the arguments of the study. However, the case sampled was typical and special, and the two AI models commonly used in the market were analyzed for dialogue comparison to be able to practically feel the advantages and disadvantages of AI dialogue for adult sex education. Educators and policy makers need to focus on the combination of technology and interpersonal communication to create more inclusive and diverse learning environments. At the same time, they should pay attention to the ethical and safety issues of AI application in sex education, and ensure user privacy and data security, to build a healthy and safe sex education system.

References

- AlGerafi, M. A., Zhou, Y., Oubibi, M., & Wijaya, T. T. (2023). Unlocking the potential: A comprehensive evaluation of augmented reality and virtual reality in education. *Electronics*, 12(18), 3953. <https://doi.org/10.3390/electronics12183953>
- Allen, M. S., Wood, A. M., & Sheffield, D. (2023). The psychology of erectile dysfunction. *Current Directions in Psychological Science*, 32(6), 487-493. <https://doi.org/10.1177/09637214231192269>
- Banerjee, D., & Rao, T. S. S. (2022). Comprehensive Sex Education – Why Should We Care? *Journal of Psychosexual Health*, 4(2), 73-75. <https://doi.org/10.1177/26318318221092076>
- Baumeister, R. F. (2000). Gender Differences in Erotic Plasticity: The Female Sex Drive as Socially Flexible and Responsive. *Psychological Bulletin*, 126(3), 347-374. <https://doi.org/10.1037/0033-2909.126.3.347>
- Binns, R. (2018). Fairness in machine learning: Lessons from political philosophy. In *Conference on fairness, accountability and transparency* (pp. 149-159). PMLR. <https://proceedings.mlr.press/v81/binns18a.html>
- Blackwood, E. (2000). Culture and women's sexualities. *Journal of Social Issues*, 56(2), 223-238. <https://doi.org/10.1111/0022-4537.00162>
- Breuner, C. C., Mattson, G., Adolescence, C. o., Child, C. o. P. A. o., Health, F., Breuner, C. C., et al. (2016). Sexuality education for children and adolescents. *Pediatrics*, 138(2), e20161348. <https://doi.org/10.1542/peds.2016-1348>
- Brotto, L., Atallah, S., Johnson-Agbakwu, C., Rosenbaum, T., Abdo, C., Byers, E. S., et al. (2016). Psychological and Interpersonal Dimensions of Sexual Function and Dysfunction. *The Journal of Sexual Medicine*, 13(4), 538-571. <https://doi.org/10.1016/j.jsxm.2016.01.019>
- Chubb, L. A., Adewale, D., Jarvis, K., Jackson, S., & Naseer, B. (2024). Considering Culture and Countering Mistrust: Organisation Perspectives for Adapting Comprehensive Sexuality Education in Ghana. *Sexuality Research and Social Policy*, 1-15. <https://doi.org/10.1007/s13178-024-00946-z>
- Ellemers, N. (2018). Gender Stereotypes. *Annual Review of Psychology*, 69(1), 275-298. <https://doi.org/10.1146/annurev-psych-122216-011719>
- Fine, M., & McClelland, S. I. (2023). Sexuality Education and Desire: Still Missing After All These Years. In A. Darder, K. Hernandez, K. D. Lam, & M. Baltodano (Eds.), *The Critical Pedagogy Reader* (pp. 291-323). Routledge. <https://doi.org/10.4324/9781003286080-23>
- Girma Shifaw, Z. (2024). Marital communication as moderators of the relationship between marital conflict resolution and marital satisfaction. *The American Journal of Family Therapy*, 52(3), 249-260. <https://doi.org/10.1080/01926187.2022.2089404>
- Goldfarb, E. S., & Lieberman, L. D. (2021). Three decades of research: The case for comprehensive sex education. *Journal of Adolescent Health*, 68(1), 13-27. <https://doi.org/10.1016/j.jadohealth.2020.07.036>
- Hasal, M., Nowaková, J., Ahmed Saghair, K., Abdulla, H., Snášel, V., & Ogiela, L. (2021). Chatbots: Security, Privacy, Data Protection, and Social Aspects. *Concurrency and Computation: Practice and Experience*, 33(19), e6426. <https://doi.org/10.1002/cpe.6426>
- Hendrick, S., Hendrick, C., Slapion-Foote, M. J., & Foote, F. H. (1985). Gender Differences in Sexual Attitudes. *Journal of Personality and Social Psychology*, 48(6), 1630-1642.

- <https://doi.org/10.1037/0022-3514.48.6.1630>
- Heyes, J. M. (2019). Towards a virtue ethical approach to relationships and sex education. *Journal of Moral Education*, 48(2), 165-178. <https://doi.org/10.1080/03057240.2018.1450232>
- Hu, X., Neupane, B., Echaiz, L. F., Sibal, P., & Rivera Lam, M. (2020). *Steering AI and advanced ICTs for knowledge societies: A Rights, Openness, Access, and Multi-stakeholder Perspective*. UNESCO Publishing. <https://unesdoc.unesco.org/ark:/48223/pf0000372132>
- Izquierdo, I., Furini, C. R., & Myskiw, J. C. (2016). Fear Memory. *Physiological Reviews*, 96(2), 695-750. <https://doi.org/10.1152/physrev.00018.2015>
- Kirkpatrick, D. L. (1959). Techniques for Evaluating Training Programs. *Journal of the American Society of Trainings Directors*, 13, 21-26.
- Kong, W., Han, S., & Zhang, Z. (2020). Construction of Adaptive Learning Path Supported by Artificial Intelligence. *Modern Distance Education Research*, 32(3), 94-103. <https://www.xxmu.edu.cn/hnjyxgjsb/112.pdf>
- Lase, E. A., Saputro, B. H. S., Manuputty, E. J., Indonesianus, C. J., & Perwiratama, R. (2024). Pengenalan Pendidikan Seksual Berbasis Augmented Reality sebagai Upaya Pencegahan Pelecehan Seksual kepada Siswa SD Mutiara Persada Yogyakarta. *GIAT: Teknologi untuk Masyarakat*, 3(1), 75-84. <https://doi.org/10.24002/giat.v3i1.9147>
- Liben, L. S. (2015). Probability values and human values in evaluating single-sex education. *Sex Roles*, 72, 401-426. <https://doi.org/10.1007/s11199-014-0438-9>
- Liew, T. W., Tan, S.-M., Yoo, N. E., Gan, C. L., & Lee, Y. Y. (2023). Let's talk about Sex!: AI and relational factors in the adoption of a chatbot conveying sexual and reproductive health information. *Computers in Human Behavior Reports*, 11, 100323. <https://doi.org/10.1016/j.chbr.2023.100323>
- MacPhail, C., & Campbell, C. (2001). 'I Think Condoms Are Good but, Aai, I Hate Those Things': Condom Use Among Adolescents and Young People in a Southern African Township. *Social Science & Medicine*, 52(11), 1613-1627. [https://doi.org/10.1016/S0277-9536\(00\)00272-0](https://doi.org/10.1016/S0277-9536(00)00272-0)
- Mamali, F. C., Lehane, C. M., Wittich, W., Martiniello, N., & Dammeyer, J. (2022). What Couples Say About Living and Coping With Sensory Loss: a Qualitative Analysis of Open-ended Survey Responses. *Disability and Rehabilitation*, 44(12), 2784-2805. <https://doi.org/10.1080/09638288.2020.1850889>
- Markman, H. J., Stanley, S. M., & Blumberg, S. L. (2010). *Fighting for Your Marriage: A Deluxe Revised Edition of the Classic Best-Seller for Enhancing Marriage and Preventing Divorce*. John Wiley & Sons.
- Morales-Chan, M., Amado-Salvatierra, H. R., Medina, J. A., Barchino, R., Hernández-Rizzardini, R., & Teixeira, A. M. (2024). Personalized Feedback in Massive Open Online Courses: Harnessing the Power of LangChain and OpenAI API. *Electronics*, 13(10), 1960. <https://doi.org/10.3390/electronics13101960>
- Motger, Q., Franch, X., & Marco, J. (2022). Software-based dialogue systems: survey, taxonomy, and challenges. *ACM Computing Surveys*, 55(5), 1-42. <https://doi.org/10.1145/3527450>
- Mulyaningsih, E. A., Argaheni, N. B., & Juwita, S. (2024). Leveraging Artificial Intelligence to Address Adolescent Sexually Transmitted Infections: A Systematic Review. *Malaysian Journal of Medical Research (MJMR)*, 8(3), 14-27. <https://doi.org/10.31674/mjmr.2024.v08i03.003>
- Murtaza, M., Ahmed, Y., Shamsi, J. A., Sherwani, F., & Usman, M. (2022). AI-based

- personalized e-learning systems: Issues, challenges, and solutions. *IEEE Access*, 10, 81323-81342. <https://doi.org/10.1109/ACCESS.2022.3193938>
- Muza, E., & Naidoo, J. (2024). 'We don't openly discuss these things': Cultural complexities in teaching about sexuality and HIV in South Africa. *Culture, Health & Sexuality*, 26(1), 16-29. <https://doi.org/10.1080/13691058.2023.2181403>
- Nadarzynski, T., Puentes, V., Pawlak, I., Mendes, T., Montgomery, I., Bayley, J., et al. (2021). Barriers and facilitators to engagement with artificial intelligence (AI)-based chatbots for sexual and reproductive health advice: a qualitative analysis. *Sexual Health*, 18(5), 385-393. <https://doi.org/10.1071/SH21123>
- Okazaki, S. (2002). Influences of culture on Asian Americans' sexuality. *Journal of Sex Research*, 39(1), 34-41. <https://doi.org/10.1080/00224490209552117>
- Park, J., Singh, V., & Wisniewski, P. (2024). Toward Safe Evolution of Artificial Intelligence (AI) based Conversational Agents to Support Adolescent Mental and Sexual Health Knowledge Discovery. *arXiv preprint arXiv:2404.03023*. <https://doi.org/10.48550/arXiv.2404.03023>
- Pataranutaporn, P., Danry, V., Leong, J., Punpongsanon, P., Novy, D., Maes, P., et al. (2021). AI-generated characters for supporting personalized learning and well-being. *Nature Machine Intelligence*, 3(12), 1013-1022. <https://doi.org/10.1038/s42256-021-00417-9>
- Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). *Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development* (Working Papers on Education Policy;7). UNESCO. <https://hdl.handle.net/20.500.12799/6533>
- Pleck, J. H., Sonenstein, F. L., & Ku, L. C. (1993). Masculinity ideology: Its impact on adolescent males' heterosexual relationships. *Journal of Social Issues*, 49(3), 11-29. <https://doi.org/10.1111/j.1540-4560.1993.tb01166.x>
- Russell, S. T., Mallory, A. B., Bishop, M. D., & Dorri, A. A. (2020). Innovation and Integration of Sexuality in Family Life Education. *Family Relations*, 69(3), 595-613. <https://doi.org/10.1111/fare.12462>
- Scheinkman, M. (2019). Intimacies: An integrative multicultural framework for couple therapy. *Family Process*, 58(3), 550-568. <https://doi.org/10.1111/famp.12444>
- Séguin, L. J. (2024). "I've learned to convert my sensations into sounds": Understanding during-sex sexual communication. *The Journal of Sex Research*, 61(2), 169-183. <https://doi.org/10.1080/00224499.2022.2134284>
- Sell, K., Oliver, K., & Meiksin, R. (2021). Comprehensive sex education addressing gender and power: A systematic review to investigate implementation and mechanisms of impact. *Sexuality Research and Social Policy*, 1-17. <https://doi.org/10.1007/s13178-021-00674-8>
- Shulman, S., & Connolly, J. (2013). The challenge of romantic relationships in emerging adulthood: Reconceptualization of the field. *Emerging Adulthood*, 1(1), 27-39. <https://doi.org/10.1177/2167696812467330>
- Sinha, S., Curtis, K., Jayakody, A., Viner, R., & Roberts, H. (2007). 'People make assumptions about our communities': sexual health amongst teenagers from black and minority ethnic backgrounds in east London. *Ethnicity and Health*, 12(5), 423-441. <https://doi.org/10.1080/13557850701616839>
- Soscia, I., Turrini, A., & Tanzi, E. (2012). Non Castigat Ridendo Mores: evaluating the effectiveness of humor appeal in printed advertisements for HIV/AIDS prevention in Italy. *Journal of Health Communication*, 17(9), 1011-1027. <https://doi.org/10.1080/10810730.2012.665416>

- Thomson, R. (1997). Diversity, values and social change: renegotiating a consensus on sex education. *Journal of Moral Education*, 26(3), 257-271. <https://doi.org/10.1080/0305724970260302>
- Trinh, S. L., & Kim, J. L. (2021). The correlates of sexual experience and reasons for abstinence among Asian Americans. *Cultural Diversity and Ethnic Minority Psychology*, 27(1), 82-94. <https://doi.org/10.1037/cdp0000350>
- Van Leent, L., Walsh, K., Moran, C., Hand, K., & French, S. (2023). Effectiveness of relationships and sex education: A systematic review of terminology, content, pedagogy, and outcomes. *Educational Research Review*, 39, 100527. <https://doi.org/10.1016/j.edurev.2023.100527>
- Villarruel, A. M. (1998). Cultural influences on the sexual attitudes, beliefs, and norms of young Latina adolescents. *Journal for Specialists in Pediatric Nursing*, 3(2), 69-79. <https://doi.org/10.1111/j.1744-6155.1998.tb00030.x>
- Vowels, L. M., Roos, C. A., Mehulić, J., O'Dean, S. M., & Sánchez-Hernández, M. D. (2022). What does it mean to be responsive to a partner's sexual needs? Toward a definition of sexual need responsiveness. *Archives of Sexual Behavior*, 51(8), 3735-3747. <https://doi.org/10.1007/s10508-022-02432-2>
- Wang, H., Gupta, S., Singhal, A., Muttreja, P., Singh, S., Sharma, P., et al. (2022). An artificial intelligence chatbot for young people's sexual and reproductive health in India (SnehAI): instrumental case study. *Journal of Medical Internet Research*, 24(1), e29969. <https://doi.org/10.2196/29969>
- Widman, L., Nesi, J., Kamke, K., Choukas-Bradley, S., & Stewart, J. (2018). Technology-based interventions to reduce sexually transmitted infections and unintended pregnancy among youth. *Journal of Adolescent Health*, 62(6), 651-660. <https://doi.org/10.1016/j.jadohealth.2018.02.007>
- Willig, C. (1998). Constructions of sexual activity and their implications for sexual practice: Lessons for sex education. *Journal of Health Psychology*, 3(3), 383-392. <https://doi.org/10.1177/135910539800300307>
- Xu, W., Meng, J., Raja, S. K. S., Priya, M. P., & Kiruthiga Devi, M. (2023). Artificial intelligence in constructing personalized and accurate feedback systems for students. *International Journal of Modeling, Simulation, and Scientific Computing*, 14(01), 2341001. <https://doi.org/10.1142/S1793962323410015>
- Yan, G. (2021). Information technology revolution and school education reform: reflection and prospect. *Journal of East China Normal University (Educational Sciences)*, 39(7), 1-15. <https://doi.org/10.16382/j.cnki.1000-5560.2021.07.001>
- Yoo, H., Bartle-Haring, S., Day, R. D., & Gangamma, R. (2014). Couple communication, emotional and sexual intimacy, and relationship satisfaction. *Journal of Sex & Marital Therapy*, 40(4), 275-293. <https://doi.org/10.1080/0092623X.2012.751072>
- Zhang, X. S. (2019). Popularising Scientific Knowledge of Sex to Enhance the General Health of the Population. *Chinese Journal of Human Sexuality*, 28(03), 3. <https://doi.org/10.3969/j.issn.1672-1993.2019.03.002>
- Zhou, K. Z., Zhu, Y., Shan, J., Sanfilippo, M. R., & Lee, H. R. (2024). Revitalizing Sex Education for Chinese Children: A Formative Study. *arXiv preprint arXiv:2402.01707*. <https://doi.org/10.48550/arXiv.2402.01707>